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RadCom

Journal of The Radio Society of Great Britain
£3.95

Volume 76 No 5 ♦ **May 2000**

The Voice of Amateur Radio

What can you do for two pence?

MFJ-269 Antenna Analyser reviewed

NEW! Free e-mail service for members

One-man DXpedition to 3B8

FIRST IN Amateur Radio

Waters & Stanton PLC

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All OFFERS subject to availability

Whatever way you look at it £799

YAESU Choice of the World's top DX'ers — You can't Ignore The Price

FT-100 160 - 70cm All Mode

You could spend this amount on a HF only transceiver. With the FT-100 deal you also get a powerful 100W all-mode on 6m, a full 50W all-mode on 2m and a useful 20W all-mode on 70cm.

You could of course wait around for next year's model and pay twice the price!

But you only get one chance at this price.

It's the small things that count and set it apart.

The only design of it's size that provides linear amplifier keying and ALC input. For digital modes there's a data socket. Bandwidths of 6kHz, 2.4kHz, 500Hz and 300Hz included as standard. Built-in keyer and CW reverse mode, plus DSP filtering down to 60Hz and audio peaking filter keeps the CW operator happy. And DSP also adds notch filtering and programmable microphone equaliser, whilst even more punch is achieved by the switch-able speech processor. Other features include Time-out, CW Ident, VSWR meter, ARTS, CTCSS, 1750Hz tone, 9600BPS, 300 Memories and Spectrum Scope. Finally, you also get a FREE 24-month warranty.

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

YAESU FT-840 160- 10m All Mode

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

24-Month FREE Warranty on Yaesu

YAESU FT-1000MP AC 160- 10m All Mode

SAVE

19.4% APR Available

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

It has stood the test of time and used by the worlds top DXers and DXepeditions. Its excellent receiver combined with its superior trans-mitted signal makes this a natural choice for the HF enthusiasts.

ICOM IC-746 Plus IC-2100H with IC-706IIG

160m - 2m All-mode
2m FM Mobile
£1099 without IC-2100H
subject to availability

Your chance to purchase one of the most popular "all-band, all-mode" transceivers at a very competitive price and also get, the lovely IC-2100H mobile transceiver which has switched 12.5 & 25kHz filters. The IC-746 offers 100 Watts output on all bands and has a receiver per-formance to match.

ICOM IC-756PRO 1.8 - 52MHz 100W

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

YAESU FT- 920AF HF 160m-6m-100w

SAVE

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

ICOM IC-706IIG Plus IC-T8E

160 - 70cm All Mode
3-Bander Handy with IC-706IIG
£879 without IC-T8E
subject to availability

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

YAESU FT-847 SAVE

160m - 70cm All Mode
£1329 with switch mode power supply

PRICE MATCH

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

KENWOOD TS-570DG 160 - 10m All Mode

19.4% APR Available

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

We Will Match or BEAT Competitor's Prices

On genuine UK Stock

wsplc.com is coming

CHECK IT OUT!

ADI AT-600 Dual Bander Airband Rx

£199

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

KENWOOD TM-700DE 2m / 70cm Data Mobile

£459

SAVE

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

HOKA Software

The Secret's Out!

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

£349.95

C-150 2m Handy

£99.95

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

£269

YAESU VX-5R

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

YAESU FT-50R

£199

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

SAVE C-408 70cm Handy

£69.95 *Previously £89.95*

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

NEW

Optoelectronics CD-100 MULTICOUNTER

Reads Frequency & Codes

£379.95

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

KENWOOD TH-D7E

£259

* 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

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

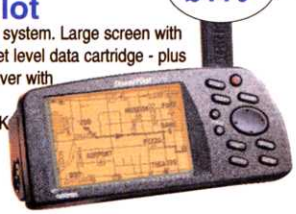
£199

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

GARMIN In-Car GPS Street Pilot

£419

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



GARMIN In-Car GPS-III Plus

£349

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

ICOM IC-2800H

In Full Colour!

£329

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

Includes FREE Remote head cable.

ICOM IC-207H

£279

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

KENWOOD TM-G707E

£279

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

YAESU FT-8100R

£349

* 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

£339

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

E & OE

Waters & Stanton

FREE MFJ Catalogue - Just Phone!

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

MFJ

FREE CATALOGUE

Every Model Stocked

MFJ-969 300W ATU

£139.95

160 - 6m Wire, Coax or Balanced

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

MFJ-949E 300W ATU

£115.95

160 - 10m Wire, Coax or Balanced

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

MFJ-948 300W ATU

£99.95

160 - 10m Wire, Coax or Balanced

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

MFJ-901B 300W ATU

£59.95

160 - 10m Wire, Coax or Balanced

MFJ-962D 1.5kW ATU

£198.95

160 - 10m Wire, Coax or Balanced

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

MFJ-986 3kW ATU

£243.95

160 - 10m Wire, Coax or Balanced

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

MFJ-989C 3kW ATU

£269.95

160 - 10m Wire, Coax or Balanced

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

MFJ-912 Ladder Feed Balun

£39.95

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

WD- 25 Duplexer

£24.95

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

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

MFJ-269 Analyser

As Reviewed by RadCom

£299.95

160m - 70cm Amazing Value

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

MFJ-418 CW Tutor

£58.95

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

MFJ-1704 4-way Switch.

£49.95

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

CX - 201 2-way Coax Switch

£18.95

2 -way coax switch ideal for use in antenna system and service departments. Provides a very positive method of switching between two coax systems and offers very low loss.

MFJ-259B Antenna Analyzer

£199.95

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

MFJ-1026 Noise Phaser

£129.95

Reduces local electrical noise by up to 3 S points

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

LINEAR AMP UK Amplifiers

£895

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

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

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

British made Amplifiers with a Pedigree

GREAT VALUE

Cushcraft

5 Band Compact Beam NEW MA5B Mini - Beam

£289.95

Regular HF Beams from Cushcraft

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

Full Cushcraft range stocked - Check our Web Catalogue

Carolina Windoms

CW-80 Special

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

£84.95

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

PacComm TNCs from USA

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

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

Power Supplies

£99.95

SEC-1223

13.8V PSU

23 Amps - 3.2lbs!

Back In Stock

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

WATSON

UK's top selling power supplies.

£89.95

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

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

Compact 10 Amp Switch Mode PSU

£49.95

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

Order Details on inside Front Cover

Number ONE in Amateur Radio — Waters & Stanton

Order Details on inside Front Cover

Replacement Batteries

SAVE

		List	Ours
FT-50R			
NBP-40Y	6V 650mAh	£43.00	£27.95
RFNB-42	9.6V 1100mAh	£46.00	£29.95
IC-T8E			
NBP-200	9.6V 680mAh	£40.00	£25.95
NBP-199	6V 700mAh	£30.00	£25.95
TH-D7E			
NBP-39K	9.6V 600mAh	£45.95	£29.95
TH-22			
RPB-32	6V 600 mAh	£31.95	£21.95

PS -200 Portable PSU

This is a totally portable power supply, ideal for a wide range of field applications. It will even run a 100W HF transceiver on SSB. If you can suffered with ignition noise from your car electric's then running your rig from a totally separate battery will often resolve the problem. Then trickle charge from your cigar lighter or pop the unit in doors and charge using the AC adaptor.

RF Metering

Avair AV-600 1.8 - 525MHz 400W

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

WATSON VSWR / Power Meters.

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

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

WATSON 144/ 430MHz Dual Band Yagi.

Amazing Performer

Superbly Built

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

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

WATSON Watson Frequency Counters

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

Hunter - 10MHz - 3GHz **£59.95**

FC-130 - 1MHz - 3GHz, switched gates, 16 segments and signal strength meter **£79.95**

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

Antenna Rotators

AR-300XL Lightweight

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

YS-130 Medium Weight VHF

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

New Create RC5-1 Rotator

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

Yaesu Rotators for HF Systems

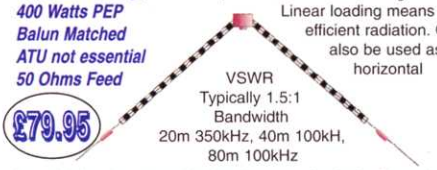
G-450C	Smaller Tri-band Yagis etc.	**£379.00**
G-650C	Larger Tri-banders etc.	**£499.00**
G-1000C	4 element HF Yagis (cw with 25m cable)	**£559.00**
G-2800SDX	Really large HF Yagis	**£1229.00**
G-550	Elevation Rotator	**£309.00**
G-5500	Az/El Rotator	**£569.00**

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

80/40/20m Dipole 50ft Long!

G3OJV 80-Plus-2 Space Saver

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

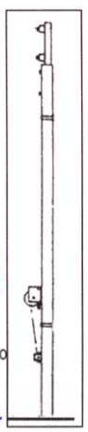


Ideal for the small garden. Linear loading means efficient radiation. Can also be used as horizontal

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

SGC SG-230 Smartuner 1.8 - 30MHz Wire ATU

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



Telescopic Masts

Much Stronger than Alloy Poles! NEW

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

VHF/UHF Antennas

Base Station Fibre Glass

WVA-100	2m/70cm 2/4.5dB 1.09m	£29.95
W-30	2m/70cm 3/6dB 1.15m	£39.95
W-50	2m/70cm 4.5/7.2dB 1.8m	£49.95
W-300	2m/70m 6.5/9dB 3.1m	£59.95
W-2000	6m/2m/70cm 2.5m	£69.95

Mobile Antennas PL-259 bases

W-285	2m 5/8th foldover base 1.33m	£14.95
W-77LS	2m/70cm 0.39m low profile	£14.95
W-770HB	2m/70cm 1.1m 3/5.5dB	£24.95
W-7900	2m/70cm 5/7.6dB 1.5m	£32.95
W-627	6m/2m/70cm 1.62m	£34.95

Mounts

W-3HM	Hatch / Boot Mount	£14.95
W-3CK	5m low loss cable kit	£18.95
W-ECH	5m RG-58 standard cable	£12.95
WMM-7	Magnetic mount	£11.95
WAM-2	BNC window mount	£12.95

IR- 270 MONO PHONES

IR - 270

INFRARED HEADPHONES

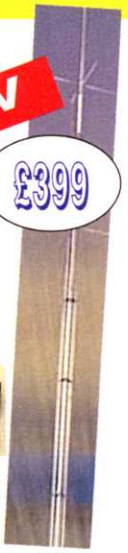
Connects to your Receiver without need for long cable.

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

Cushcraft

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

NEW



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

TEN-TEC 40/20m CW TRANSCEIVER KITS

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

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

Heil Headsets In Stock

Proset

HM-10

Hear the Difference!

A choice of normal or DX inserts when ordering

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

WATSON HF Whips

160 - 6m
250 Watts

NEW

Interchangeable Single Band Whips

From £18.95

* High Effciency
* Low Profile
* Robust Build
* Fully Tuneable
* CW & SSB Bands
* 2 Section Design
* Easy Boot Stowage
* 3/8th Stud Base
* Approx 7ft Long

WHF-6	6 metre whip	£18.95
WHF-10	10 metre whip	£18.95
WHF-12	12 metre whip	£18.95
WHF-15	15 metre whip	£18.95
WHF-17	17 metre whip	£18.95
WHF-20	20 metre whip	£18.95
WHF-30	30 metre whip	£18.95
WHF-40	40 metre whip	£18.95
WHF-80	80 metre whip	£19.95
WHF-160	160 metre whip	£49.95

FOR THE VERY LATEST UP TO DATE PRCES AND SPECIAL OFFERS SEE WWW.HAMRADIO.CO.UK

ML&S Bargain Page!

Every now and then, real 'whirlwind bargains' come along that you just cannot live without. Here are a few that are genuinely in very limited supply, all 'brand new' and covered by a full parts and labour warranty by the UK distributors.

Kenwood TS-570DGE

Save a massive £250!

In a league of its own, the new TS-570DGE is ideal for anyone that doesn't require a DC to blue light coverage. The TS-570 offers excellent performance on the entire HF spectrum, has DSP and is first class for either SSB or CW operation.

- 160m-10m HF Operation & 500kHz-30MHz Gen Cov RX
- 16 bit AF Stage DSP
- Digital filtering with 11 CW DSP filters
- Adjustable TX audio quality & NR1 Noise Reduction system
- World's first CW Auto Tune
- Built-in preset auto antenna tuner
- Programmable function keys
- Mobile/fixed station size

RRP £999

ML&S Special offer only £749

Now that IS a real bargain!

Also available on finance with no deposit & 42 payments of £25.

Icom IC-2800H

Save a massive £210!

Even ignoring the large easy to read colour TFT screen, the IC-2800 is a pretty cool piece of kit. The build quality for one is in a different class to the rest and employed at home or in the car, its doubtful if we will ever sell you another dual bander. (that's pretty tough on us).

- Up to 50 W* or 35 W* of powerful output power for the VHF and UHF bands, respectively
- Set mode helps simplify operation
- Tuning steps and DTMF can be set up from independent setting modes
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Mike Roedel, M0ASA, modifying PMR equipment for use on the 70cm band.

RadCom
Radio Communication

Publications Manager
Mike Dennison, G3XDV

Editor
Steve White, G3ZVW

News Editor
George Brown, M5ACN

Technical Illustrator
Bob Ryan, 2E1EKS

Designer
Suzanne Dunnett

Secretarial
Pauline Reid

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

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

Tel: 01707 659015
Fax: 01707 645105

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

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Headquarters and registered office:
Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE
Telephone 01707 659015 - Members Hotline and book orders
Fax 01707 645105. **Web Site** http://www.rsgb.org
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The RadCom Leader

Take a Sideways Glance

ONWARDS AND Upwards, or Onwards and Sideways? Difficult questions! I am often asked 'How can my club attract new members?' Well, the simple answer is 'I don't know'. If I did then I would have obviously passed on the clues by now. What I can pass on though are some ideas that other clubs have adopted to attract new members and to keep the club circuit alive in their area. They are ideas which appears to be having some success.

Firstly, what's in a name? A lot, apparently. One club in the west of England, whose membership was falling rapidly and was in danger of folding, changed their name from 'Amateur Radio Club' to 'Electronics and Computer Club'. Bingo, lots of new and much younger members. The club is now structured with an 'Amateur Radio Section' and a 'Computer Section'. Both dovetail well, with a lot of mutual interest on both sides of the club. They are running NRAE and RAE courses for the first time in years - a *real* success story.

Recently, I attended for the first time, the 'Blackpool Rally', held at the Norbreck Hotel on Blackpool's sea front. What struck me immediately was the atmosphere of the event. It was by far the friendliest that I have attended in eight years. The atmosphere is terrific. Why? I believe it is because the event is organised by clubs in the area, for the clubs in the area and the wider amateur radio community. It is this co-operation between local clubs that makes the event the success it undoubtedly is.

Clubs that are finding it hard to continue should look sideways at their neighbours.

Two struggling clubs in an area could think about amalgamating. A further suggestion that has been put forward recently is for clubs in an area to form themselves into an association of local clubs. This could be county wide, or even within a close network of towns. This allows the collective strength of the clubs to promote amateur radio on a wider basis than is possible for an individual club to achieve with limited resources.

If your club is having some success in maintaining a strong membership, please don't keep the secret to yourselves. For every successful amateur radio club in the country today there are probably five or six failing clubs in close proximity. Get in touch with your neighbouring club and address the problems of keeping amateur radio as a vibrant hobby with lots of local interest in your neighbourhood. 'Onwards and Sideways', perhaps!

Peter A Kirby, G0TWW, General Manager

Saucepan capacitor used in new crystal set

Home-Cooked Radio

REMEMBER WHEN capacitance used to be measured in Jars? Well, it seems that a new unit, the Pan, ought now to be used.

As part of the BBC TV / Open University series *Rough Science*, five scientists had to tackle challenges using very basic equipment and materials. For good measure, the challenges took place on the deserted Mediterranean island of Capraia, and one of them involved building a short-wave crystal set which was to be used to find the latitude and longitude of the island. The group's laboratory was furnished by a disused prison.

The finished product can be seen in the photograph, and is dominated by the unique tuning capacitor, made from an old saucepan. A broom handle serves as a coil former, the inhabitants of the 'deserted' island kindly providing some brand-spanking-new bolts, washers, polythene sheet and a crystal earpiece. The radio *did* work and was used to receive a time signal which enabled the group to estimate its position. Our thanks to G1EXG of the University of Sussex Creative Science Centre, for providing the details and the photograph.

The saucepan-tuned short-wave crystal set.

Dunkirk 60th Anniversary

THE 60TH Anniversary occurs this month of the Dunkirk landings, when 338,000 men were evacuated by a flotilla of small ships. The Scarborough Special Events Group will be on the air over the weekend of 20/21 May to commemorate the event. Two of the few remaining rescue ships are based in Scarborough harbour, and a special QSL card features one of them.

The group will be active on CW and SSB, mainly in the 40m band. QSL cards will be sent via the bureau. Direct QSL cards may be sent to the club station, G0OOO.

GB50IPA

THE INTERNATIONAL Police Association (IPA) is a friendship organisation for serving and retired Police Officers. To celebrate the fiftieth anniversary of the association, this Special Event station will be operated from the association's World Congress being held in Bournemouth from 7 – 13 May. Members from all over the world are attending the event. Listen for the club call GX4IPA and QSL via the bureau. Further details are available from g0joh@qsl.net

RSGB VHF AWARDS

Summary of Award Recipients for March

50MHz:	**144MHz:**
50 squares: EI7IQ	40 squares / 10 countries: ..... G3LNR.
150 squares: G1EFL	60 squares / 15 countries: G3LNR
300 squares: G1SDO	100 squares / 20 countries: G4NPH
10 countries (2-way): 2E1BRT	**432MHz:**
20 countries (2-way): 2E1BRT	30 squares / 6 countries: G3LNR
	40 squares / 10 countries: G3LNR

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

WACRAL in Action

METHODISTS FROM all over the world attending the special 'Conference 2000' at the Huddersfield Town Hall from 26 – 30 June, will be invited to send their personal greetings to fellow Methodists over the air. Special Event Station, GB4MCH, has been presented to the Conference in partnership with the Denby Dale and District Amateur Radio Society and the Halifax and District Amateur Radio Society. Located on the Town Hall's top floor, with permission having been granted to erect aerials high on the roof, the station should have an unobstructed take-off.

A display of historic photographs, QSL cards and other memorabilia will be on show throughout the week.

WACRAL was founded in 1957 by a local Methodist Minister, the Rev Arthur Shepherd, G3GNF.

100% Pass Rate

GLORIA, G3VUN, teaches at the Brompton-Westbrook Primary School in Kent, and has formed an amateur radio club at the school. The shack transceiver, an Icom IC-706 Mk2G, was partly sponsored by Icom (UK) and the Gillingham Education Partnership.

In the face of doubt from many around her, Gloria persevered with the children (mostly under 10 years old) to achieve a 100% pass rate in the December 1999 Novice RAE. Some practical assistance in soldering and construction was provided by members of the Medway Amateur Receiving and Transmitting Society; the Bredhurst Receiving and Transmitting Society arranged a hands-on session at their Gillingham HQ, and Ray Petri, G0OAT (RLO for Kent), ran through some sample papers. Gloria was always on hand, providing great enthusiasm and encouragement.

Gloria's group. Back row: Stephen Odle (10), 2E1HRX; Gareth Phillips (10); Ray Petri, G0OAT, (RLO Kent); Gloria Ackerley, G3VUN; Ben Gallimore (10); Caroline Stevenson, 2E1HRW; Pauline Odle, 2E1HRY. Front row: John Horsbrugh (10); Francis Adams (10); Robert Cassie (9).

Gloria is now preparing them for the 5WPM Morse test, and her next Novice class includes 8-year old Emma Monkhouse.

Caroline, 2E1HRW, will be abseiling from a 40-foot tower at the Hope Hill Scout Centre in Meopham to raise funds for Gloria's 'Information Network' work in Romania. She will perform her descent on 21 May and also intends to operate a radio on the way down, and has a special QSL card ready to mark the occasion.

To complete the story, Gloria took her RAE in May 1992 and rapidly sat the Morse test so that she could inherit her late father's callsign. Some of her students are shown in the photograph.

DVLA Issues Vanity Plates

AS OF Monday 3 April, radio amateurs have the opportunity to purchase G-prefix DVLA select registrations appropriate to their callsigns direct from the DVLA . Any vehicle registered on or after 1 August 1989 qualifies to sport a previously-unissued G-prefix personalised number.

The registrations will be available through the DVLA's only telesales hotline number on 0870 600 0142, on a first-come-first-served basis. They cannot be pre-ordered or reserved.

There are almost a quarter of a million possible combinations, and customers will also be able to check the availability of registrations via the DVLA web site at www.dvla-som.co.uk

To tailor a personal G-number, simply choose the G-prefix, followed by the chosen number from 1 to 20. Then choose any three letters except I, Q and Z. Prices start from £499, with certain registrations individually-priced.

The Select Registrations hotline is open weekdays from 0900 to 1700 local time.

No BARTG Rally This Year

MANY READERS will know that there was no BARTG rally last year, due partly to the Sandown Park venue being too expensive. No suitable, alternative, and affordable venue has been found, so the BARTG Committee has decided against holding a rally this year as well. This has freed resources, both of people and finances, so it is hoped that BARTG stands will appear at more club rallies.

Repeaters and Slow CW

FOLLOWING a number of requests from repeater groups and users, the RSGB Repeater Management Committee has gained agreement from the Radiocommunications Agency that voice repeaters may be used for Slow Morse Transmissions.

Any amateur wishing to provide such a service may do so without any formal Notice of Variation of the amateur licence, but it is of course advisable to gain agreement of the group responsible for the repeater and to carry out such transmissions at times when the unit is not normally in use by others.

For further details about the work of the RMC, or comments on any matters regarding voice or television repeaters, please contact Carlos Eavis, G0AKI, RMC Chairman, c/o RSGB Headquarters, Lambda House, Cranborne Road, Potters Bar, Herts. EN6 3JE.

Woodpecker Alert!

THE WOODPECKERS are back! During the latter part of the Cold War, a Russian-built over-the-horizon (OTH) radar system swamped large chunks of the short-wave broadcast and amateur bands. So much so, that some receivers and transceivers were fitted with so-called 'woodpecker' noise blankers.

Thanks to *perestroika*, the use of the system was curtailed, and it was eventually tested only rarely. The US Navy built a similar system at Moscow(!), Maine, but it used spread-spectrum techniques and resulted in only a slight increase in background noise, rather than the obliteration of specific ranges of frequency, which is what the Russian system achieved.

It now appears that the Canadian government, the Canadian Department of National Defence and Raytheon have agreed to use an up-to-date OTH system with a range of about 450km. Because of wideband interference which enveloped the 80m band in eastern Canada and the north-eastern United States, negotiations between VE3IQ and departments of the Canadian government have resulted in the frequencies being shifted outside the 80m amateur band.

Moving the frequencies does not remove the problem, however; someone else will be suffering now.

CQ RAFARS

ROY WALKER, G0TAK, has been appointed as the Royal Air Force Amateur Radio Society's area representative for Lancashire. He would like to contact anyone in Lancashire who has current or past connections with the RAF, WRAF, RAuxAF or VRT, and who has interest in any aspects of the hobby. Roy's address is correct in the current *Yearbook*.

- Please note that the Telford Radio Rally is to be held on 10 September at the RAF Museum, Cosford. These are changes of date and venue.

IOTA News

Honour Roll

The Honour Roll and Annual Listings will be published this year in the July *RadCom* at the end of June. The later date is due to the need to give priority to work on the new *IOTA Directory*. However, if time allows, it is envisaged that it may be possible to put the listings on the RSGB web site in late May, once the *Directory* has gone to print.

The new *Directory* will be published in the middle of June. If you are an active IOTA participant, or indeed a closet island chaser, you will certainly need a copy. The changes are sufficiently significant that, without it, you will be at a real disadvantage. Copy-holders will know instantly whether or not the island worked counts for IOTA - because if it is not listed, it probably won't. They will know instantly which island to target for their next DXpedition - no need to check first with IOTA HQ. They will also know instantly how to maximise the use of their time, and to target their efforts in an effective way to get those valid IOTA QSLs.

Watch for an announcement in June about the publication date. Copies will be available from RSGB, price to be announced.

RSGB HF & IOTA Convention, Windsor 2000

Put the date in your diaries now. This year's RSGB HF and IOTA Convention will be held over the weekend 13 - 15 October in Old Windsor, Berkshire. An interesting programme, with plenty of IOTA content, is under preparation, with a number of well-known speakers lined up. The IOTA Committee will explain the background to changes and developments in IOTA as it enters the New Millennium. The Convention Centre is served by excellent road and rail links and, for those coming by air, is within easy reach of London Heathrow. Let's have a really big IOTA attendance this year.

IOTA enthusiasts planning to come are encouraged to drop me a note so that we can monitor likely attendance and plan the IOTA programme accordingly. Booking arrangements will be announced later.

Please note that the RSGB IOTA web site is now to be found on http://www.rsgbiota.org Both this and the IOTA Manager's web site (http://www.eo19.dial.pipex.com/index.htm) are being developed as and when time can be stolen from *IOTA Directory* revision and accompanying map-work.

Out to Mongolia

LAURENCE "FLO" Howell, GM4DMA, is operational from Mongolia for a number of weeks. His call is the same as last year, JT1FCR, and he is active on HF and (especially) 6m.

Last year's 6m operation netted nearly a hundred JAs, and also stations from Hong Kong. As ever, his equipment will be QRP, lightweight and probably solar charged.

No definite schedules or dates of operation are possible. He is installing HF equipment and teaching HF techniques to the staff as part of Raleigh International expeditions in this magical country.

There are vacancies for radio operators on a number of expeditions, which this year are scheduled to take place in Brunei, Belize, Chile, Mongolia, Namibia and Ghana.

If all goes to plan, Laurence hopes to visit and operate from Brunei, Ghana and Chile this year, making a change from the recently-completed Antarctica and North Pole expeditions.

Raleigh are always looking for keen radio amateurs who have an open mind, don't object to roughing it and have plenty of team spirit! If you can spare about 12 weeks on an expedition, telephone 0171 371 8585 for more information.

The Vikings are Coming!

THE RESORT OF Scarborough was founded by the Vikings in 966, and to mark the Millennium year the town is hosting a Viking Festival, with longboats in the harbour, parades of decorated floats and mediaeval activities on the Castle Headland, from 21 – 25 June.

The Scarborough Special Events Group will be active as GB0VIK during the festival, mainly on 40m SSB and CW, and a commemorative QSL card will be issued for the occasion (see photograph). These will be sent via the bureau to all who make contact. Direct cards may be sent to the club call, G0OOO.

The Scarborough QSL card.

G6HL's Station

THE NEWS ITEM ON page 13 of the April 2000 *RadCom*, reported the intended installation of the complete station of the late G6HL as part of the Muckleborough Collection. The North Norfolk Amateur Radio Group has a display within the Collection which will eventually house the complete station in full working order. The display is not yet open to the public, but may open later in the year. The Group has every confidence that all will be in place for the 2001 season. Nevertheless, the rest of the museum still contains much to see and do. The latest information is available on the Group's web site: http://www.nnarg.fsnet.co.uk

The 32m dish at Sondrestrom.

Greenland EME Attempt

The first earth-moon-earth (EME) contact from Greenland was made in 1988 by OZ1FDH and OZ1DJJ/OX3LX. Bo, OZ1DJJ, then had the idea of using an existing 32m-diameter dish at Sondrestrom in Greenland as the incentive to mount an EME DXpedition, although the dish would be used on 23cm only. Holger, OX3HI, who lives near the dish, was also in favour of the idea.

The aim of the expedition is to make as many EME contacts as possible on 2m, 70cm and 23cm. Normal operation on 6m and HF is also planned. It is also intended to make things easier for other amateurs to mount DXpeditions to Sondrestrom. There will be six separate stations manned by 25 operators, so that simultaneous operation on all bands will be possible. The expedition should be active from 29 May until 5 June 2000.

More details may be found on the expedition's home page, which is well worth a visit: http://www.qsl.net/ox2k/home.htm

New RSGB QSL Bureau Sub-Managers

THE FOLLOWING changes in RSGB QSL Bureau sub-managers have been announced.

G0BAA - G0BZZ series:

Mr M K Evans, MW0CNA, 322 Heol Gwyrosydd, Penlan, Swansea SA5 7BR.

M0AAA - M0AZZ series:

Mr C W Spence, M0AVW, 32 Woodford Walk, Harewood Park, Thornaby-on-Tees, Cleveland TS17 0LT.

GM2AA - GM3ZZ and GM2AAA - GM3ZZZ series:

Mr B Addis, 30 Deneside, Seghill, Cramlington, Northumberland NE23 7ER.

● The following special callsigns have been allocated to the Irish Radio Transmitters' Society (IRTS) for use by its members during the current year: EI2K, EJ2K, EI2MM, EJ2MM, EI2000, EJ2000. These calls are administered by the IRTS, and the QSL Manager in all cases is Mr P Grant, EI4HX (QTHR).

Internet-Linked Voice Repeaters

THE RSGB HAS reached agreement with the Radiocommunications Agency over two changes to the arrangements for repeater authorisation and use.

Repeater Coverage and Licensing

The existing policy of no coverage overlap in considering applications for additional repeaters is to be relaxed somewhat, provided that sufficient frequencies can be found to avoid co-channel interference. The full implementation of the IARU Region 1 12.5kHz channel spacing on the 2m band in June 2000 enables the introduction of additional repeaters. On the 430MHz band, there may be some difficulties with available frequencies, and the RA is prepared to consider applications for new additional dedicated Internet-linked repeaters with wide frequency spacing, as has been allowed for in the existing band plan. Details can be found in the RSGB *Yearbook 2000* on page 54.

Frequency co-ordination will have to be carried out carefully, and the Data Communications Committee Chairman has agreed that some packet links may have to be moved if necessary. Care will also be needed to preserve the interests of ATV enthusiasts, and the RSGB Repeater Management Committee will keep up dialogue with the British Amateur Television Club to ensure that mutual interference is minimised.

Internet Linking

The relaxation of linking the Internet to amateur radio was announced by the RA in their December 1999 Press Release. Arrangements have now been concluded for the issue of the necessary Notices of Variation, as described in that Press Release, for individuals who wish to operate Internet gateways via their local repeaters.

This policy revision will be incorporated in the new *Guide to Repeater Licensing*, due to be published later this year. In the meantime, amateurs who wish to move forward with proposals are invited to contact the RMC, which will be willing to help the processing of any applications.

For further details about the work of the RSGB RMC or comments on any matters regarding speech or television repeaters, please contact Carlos Eavis, G0AKI, RMC Chairman, c/o RSGB Headquarters, Lambda House, Cranborne Road, Potters Bar, Herts, EN6 3JE.

BDARS at the Fair

ON SUNDAY 5 March, the Bromley and District Amateur Radio Society was represented at the Hobbies Fair in Bromley Civic Centre. Its demonstrations included ATV and HF. In the foreground, Secretary Alan, G0TLK, is operating the HF station, while in the background John, G8MNY, expounds the finer points of ATV.

Nevada has moved

AFTER 30 YEARS in its Portsmouth home, Nevada has moved to huge new 11,500sq ft premises which includes showrooms and a distribution centre. The site is conveniently located on the outskirts of Portsmouth, just 2 minutes from the Farlington exit of the M27/A27 south coast motorway.

Managing Director Mike Devereux, G3SED, says "With so many negative views of the amateur radio business prevalent just now, we feel quite the opposite. We have made this positive move to provide our customers with better facilities, spacious showrooms and easy car parking at an out-of-town location".

Nevada's capacious new warehouse.

Nevada will be stocking many new products, previously unseen in the UK, for the shortwave, scanning and amateur radio enthusiast.

Their new address is: Unit 1 Fitzherbert Spur, Farlington, Portsmouth PO6 1TT.

VHF Vacancies

THE VHF CONTESTS Committee currently has vacancies for Full and Corresponding Members. The Committee manages and adjudicates numerous contests on behalf of the RSGB. Full members will require access to a PC for contest adjudication and e-mail facilities are desirable, as most Committee business is conducted this way. Corresponding members should feed input to the Committee on a monthly basis, on average, and be prepared to assist in major contest adjudication. The Committee holds meetings two or three times a year, usually in London. Anyone interested should contact the Chairman, G4XUM, (QTHR) whose e-mail address is vhfcc.chairman@rsgb.org.uk with a brief résumé of experience and interests.

Meet the President

MARK HAYNES, 2E0APH, met the RSGB President Don Beattie, G3OZF, at the RSGB Annual General Meeting last December. Mark was the 1999 Young Amateur of the Year, and has since passed the full RAE and the 12WPM Morse test. He is now M0DXR ('DXer'), a call which he reserved to mark his own interests in DX, working mainly on CW and taking part in contests.

Mark, M0DXR, and the RSGB President Don Beattie, G3OZF, at December's AGM.

● On page 12 of the May 1999 edition of *RadCom*, we reported the formation of a new Masonic Lodge in West Lancashire for those interested in radio communications. The consecration of this Lodge, the new Masonic Radio Millennium Lodge No 9709, will take place at Urmston Masonic Hall, Westbourne Road, on Saturday 4 November. Details are available from Jack, G3FEV (QTHR), 01706 211 339.

● The Bridgend and District Amateur Radio Club will no longer be holding radio rallies and wish to thank both traders and visitors for their loyal support over the years.

Licence for Life

INDUSTRY Canada has announced news of the combination of its Amateur Radio Operator Certificate and radio station licence. The Operator Certificate was previously issued for life and the radio licence on a yearly basis, with a renewal fee. From 1 April, only one document is needed – the Amateur Radio Operator Certificate – this being the sole authorisation needed to operate amateur radio apparatus in the amateur radio service. It is valid for life, no renewal being needed.

● The Rev George Dobbs, G3RJV, wishes to apologise "most humbly" for an error that crept into his 'QRP' column in the March *RadCom*. His reference to the 'Low Power DX League' in the first paragraph should really be to the 'Medium Wave Circle'.

● The repeater GB3WB has been relocated to Worlebury Hill, Weston-Super-Mare, and should now be active on 433.300MHz (RB12) with a new CTCSS frequency of 77Hz.

One-man DXpedition to Mauritius

*By Gwyn Williams, G4FKH**

View of the bungalow and CP-5 antenna from across the street.

ON 13 JANUARY 2000 I took off from Heathrow on a holiday/DXpedition to Mauritius (3B8). I stayed for six weeks, and for five of those I signed 3B8/G4FKH. This is a journal of the trip and the events leading up to it. What I hope to do in this feature is demonstrate that you do not need professional qualifications or 20 people in order to have some fun and have a successful DXpedition.

For the uninitiated, Mauritius is a smallish island off the East Coast of Madagascar in the Indian Ocean. It has a chequered history, having being discovered by Portuguese sailors. For a time it was a French colony, then a British one. It is now independent, with a mixed population made up from various peoples: European, African, Indian and Chinese. The spoken language is predominantly Creole, a French patois, but the legal language is English.

BACKGROUND

MY XYL IS Mauritian and I have visited the island many times in the past. It has always been an ambition of mine to work a pile-up from there. When we decided on a holiday to Mauritius this year I decided to take radio equipment. For some years the Mauritian government has not allowed reciprocal licences, because a visiting amateur was caught with drugs hidden inside their radio equipment. That has now been forgotten and the Mauritian authorities are happy to issue reciprocal licences once more.

Paddling his way though over 1000 contacts, 3B8/G4FKH.

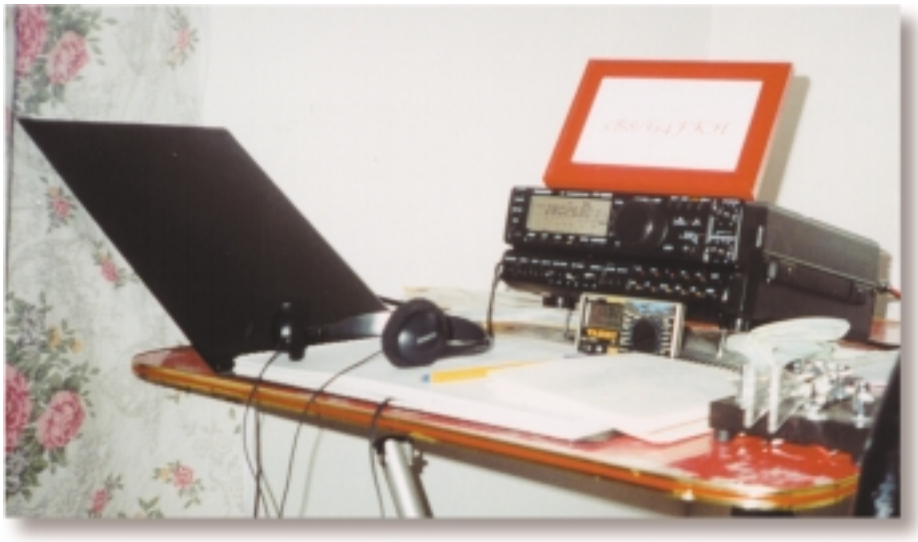
In my case and because of family connections (I believe), a licence was granted within three weeks. A more realistic estimate is probably three months. On one of my previous visits to the island I had taken measurements of my mother-in-law's bungalow and property. I could therefore plan the installation of my station accordingly, especially the type of antenna, the siting of an earth stake and the whereabouts of electrical points. After long consideration I decided on a vertical, because there was not enough room for my preferred large dipole. There was a suitable chimney stack on the bungalow, on which it was possible to mount a vertical. I choose the Diamond CP-5, because it covered the bands that I was interested in, is compact to carry, easy to erect and - most importantly - was within my budget. The next thing I considered was the radio transceiver. I had budgeted for second hand equipment, which I was thinking that I might even leave behind for a return trip. However, in the end my association with Neville Cheadle, G3NUG, turned up trumps. Neville is the IOTA equipment custodian and I was lucky enough to secure the loan of a Yaesu FT-900 for the duration. The rig comes complete in a very professionally packed case containing, along with the rig, a mains power supply, headphones and a paddle key. The latter was of prime importance, because my operation was to be CW only. The weight of the packed case was 14kg; the suitcase for myself was also 14kg, totalling more than is allowed. In the event I did not have to pay any excess baggage charge in either direction.

The antenna is another story. I decided to ask my brother-in-law, a carpenter, to make me a lightweight wooden box to hold the CP-5, all my tools, coaxial cables, etc. He did an admirable job. The trouble is, it looked like a gun case, which caused some concern to the immigration authorities in Mauritius. The weight of the fully packed box was 50 kg. I therefore decided to send this sea-mail, for a cost of £50. The voyage was to take four weeks.

As you can see, planning is all-important.

As part of my preparations I produced some propagation predictions. These were basically the same as those that I prepare for *RadCom*, but were centered on 3B8 instead of Britain. If things turned out I would know when to look for the countries that I wanted, as a DXCC was one of my goals. I took a world map and some small stickers that I used

* *21 Borda Close, Chelmsford, Essex CM1 4JY.*



The transceiver was a Yaesu FT-990, loaned by the RSGB IOTA Committee.

to highlight the countries that I worked. In this way I accounted for eighty countries, but with twenty to thirty prefixes unaccounted for I'm unsure of my final DXCC tally.

SETTING UP

UPON ARRIVAL in Mauritius I contacted the shipping agent and was informed that I would have to wait a week for my box. Apparently the ship was the oldest in the fleet and was running late due to some bad weather. This didn't go down too well with yours truly, so in true amateur fashion I put my thinking cap on. I had a rig, etc, but no earth, no antenna, no wire and no tools. A visit to the local hardware emporium furnished me with the relevant bits for very little outlay. I speak very little Creole and the shopkeeper spoke even less English, nevertheless we worked it out and he was pleased to take my money. I purchased about 13m of speaker wire, which I split down to make 26m of multi-stranded PVC covered wire. I used this to make a long wire and an earth connection. Bearing in mind the fact that everything I needed was in that box, I thought some more. I wrapped about a foot of bared wire around a steel spike and stuck this into the ground for an earth. For the antenna I used 21.38m as a long wire. This I strung around the bungalow at a height of about 6ft and attached to the walls. Then came the problem of connecting it to the rig. My PL259s were in the box and I didn't have a clue whether or not they were available locally, so I bared about an inch of wire, wrapped this around a suitably-sized stick and poked it into the rig's SO239 antenna socket. Whilst this practice is not recommended, in an emergency it works well for a short time. With this setup I had my first QSOs.

HARD WORK

I WORKED VERY hard for the contacts, but with perseverance and the 3B8 call I managed Europe and a lot of the USSR. A couple of days later a cousin brought back my mother-in-law's ladder, thus I now had access to the roof. I slung the long wire over it, using the television aerial's support and some fruit trees to dogleg it around, in the clear and just above roof height. Now I was getting somewhere! All signals improved by a couple of S-points, so it was a little less difficult to get QSOs. With lash-ups like this there are inevitably some problems. My main one was that the metal parts of the Morse paddle were live, so on the occasions that I touched them my sending suffered. No one complained though, except me.

As I have already mentioned this was also supposed to be a regular holiday, I had beach duty for the following week. However, I did manage to pick the box up and clear the customs procedures, etc. A cyclone also hit at this time. This was the same storm that eventually caused all the damage in Mozambique; we were lucky to only experience the periphery of it. On 31 January I erected the CP-5 vertical. A nice PL259 connector into the rig with a good earth stake made all the difference. No more RF on the Morse paddle and big signals on the bands.

RESULTS

FOR THE MOST part I worked on the 28MHz and 21MHz bands, with only occasional excursions onto 14MHz. During the busiest periods I had pile-ups, which resulted in my best rate of three to four QSOs a minute. It was interesting to note that the weekend contests during February did nothing to enhance my results. I had promised to look out for a number of fellow amateurs, they could only come on the bands at the weekends, unfortunately the contests completely spoilt this. I did very little operating at these times. It just goes to show that we all have different tastes in radio. During the early morning periods I was able to work into Eastern Europe on 28MHz and at times, if it wasn't for the UA and SP stations, I would have been lonely. The lower bands were open, but they are not used to a great extent in this part of the world. Hawaii was a notable exception, although I wasn't sure whether I worked him long or short path. Theory states it should have been via Sumatra and out over the Pacific.

Apart from practically every country in Europe, some notable prefixes that I worked included; CE, W7, W3, VO, VE, 6V, 5X, Z2, D6, VQ9, 8Q, 9N, S2, JT, E2, 9M2, YB, DZ, BV, BU, 3W, VK and R1ANP (Antarctica), this last one several times. One prefix that is a missing is ZL; I tried several times on the frequencies and at the times suggested by my predictions, but I never even heard one. The only explanation that I could come up with is that a weird looking three-storey building had been erected close to my mother-in-law's bungalow. As best as I could tell it was in the take-off path for ZL. I therefore had two alternatives, (1) blow the building up, or (2) erect my vertical on top of it. In the event I left things alone and tried not to upset anyone. I also thought it expedient to go QRT at 6:30pm when Luz Clarita (a Brazilian soap opera) came on TV, as the whole island watches it. I did not wish to risk TVI at this time! Even the thought that TVI may be possible put shivers down my spine. Anyway, the sun had set by this time and it was comfortable outside in the breeze with a cold beer.

I guess the best part of the whole DXpedition was the realization of a long-cherished ambition. Because of the time that I had spent planning it all, everything went more-or-less to plan. I completely filled an RSGB transmitting logbook, some 1050 QSOs. Not too bad for a single-handed effort, especially when my other duties are considered, ie beach, social and shopping. I fixed two of the various family members' video players and the local shopkeepers standby generator whilst

View from the roof of the CP-5 antenna, looking in the direction of Britain.

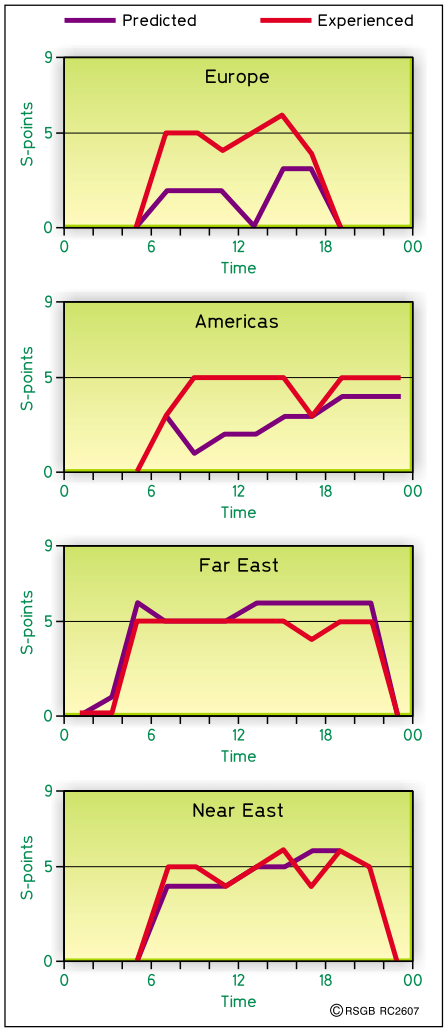


Fig 1: Predicted and actual signal strengths for 28MHz between Mauritius and other parts of the world.

there. My QTH was very rural and the mains occasionally went down as low as 110 volts (from 240 volts). The rig switched itself off at these times and I merely waited for 'normal' voltage to return before resuming operations. There were two cyclones during my stay, one of which I have already mentioned, The other was only a minor disruption, I had to take the vertical down for three days.

BAND ANALYSIS

AN ANALYSIS OF one band (28MHz), showing the results that I obtained versus the predictions I had made prior to my UK departure, is depicted in **Fig 1**. I was not active for 24 hours each day, but most of the results are genuine, only a few being extrapolated. Europe was where I had the most contacts, but not Western Europe. It was the eastern countries that I was most able to work into. The results are better than were expected. However, if the UK were considered alone, the graph would appear quite different, ie far less contact than predicted. The Americas were heard on relatively few days, the exception being during contest weekends when signal strengths were huge at times. Both the Far and Near East were as predicted. Overall it was a worthwhile exercise to produce predictions. They assisted in scheduling my operating times and my band choices. I'm sure that everyone appreciates that solar flares and other solar disruptive forces are impossible to predict, for the time frames that I was working to. Notable events occurred on 20 Jan, 22-23 Jan, 24 and 26 Jan, 27-29 Jan, 5 Feb, and 7-12 Feb. I have since discovered that these disturbances were mainly coronal hole related, but a few were flare related. Solar flux values were also up and down during this period, with a low of 126 on 28 January and a high if 211 on 15 January. The overall average solar flux figure for the period was roughly 166. The week of 17-23 January was particularly volatile, with figures varying between 131 and 196. It is these varying conditions that are responsible for quite notable received signal strength variations. Since coming back I have been informed that some people seeing my call on the DX-Cluster looked for me only to hear my signal disappear into the noise. One of my main frustrations was that I did not have an Internet connection and could not therefore obtain the information I needed in order to analyze the situation. I therefore had to persevere and only read about the radio conditions that I had experienced at a later date. I'm still not sure whether I have my 3B8 DXCC, because my logbook guru (G3PEM) is still working on it and the QSLs. We anticipate that by the time that this feature is published, all outstanding QSL cards will have been sent.

CONCLUSION

AS I BELIEVE I have demonstrated, a single-handed DXpedition can be achieved, a lot of fun had, and some new techniques discovered. With a little imagination and some prior planning, a DXCC is easily achievable within a couple of weeks.

You do not need to have an Electronics degree to carry out a successful DXpedition. Enthusiasm is the main ingredient, with some determination to carry through that which has been started. I thoroughly enjoyed this DXpedition and would encourage anyone to do a similar exercise. All the necessary steps are detailed here, which hopefully will be enough to encourage others to enjoy like experiences. ♦

To obtain a reciprocal Mauritian amateur license, write to: The Government of Mauritius, Telecommunications Authority, Attn: Mr. Beeharree, Blendax House, Dumas Street, Port Louis, Mauritius. The following should be enclosed: two copies of a letter giving full personal details, home license details plus copies, planned stay (dates, duration, address), passport, and three passport-style photographs of yourself.

technical feedback

Eurotek

RADCOM, FEBRUARY 2000

THE AUTHOR, F5NJN, advises that there was an error in the URL given (and in the original Radio REF feature), which apparently he overlooked when he proof-read both. The corrected URL is http://oigsysop.atsc.allied.com which he says has a link to http://oig1.gsfc.nasa.gov/scripts/foxweb.dll/app01? which also can be accessed directly.

Erwin David, G4LQI

The Poorer Man's Caesium Clock

RADCOM, APRIL 2000

IT IS TRUE THAT you could get mains voltage *on the internal earth rail* of older-type TV sets if the live and neutral wires in the mains plug were reversed, but such TVs never had a SCART socket or any kind of socket other than a fully isolated antenna connector. All modern receivers with a SCART socket have a fully isolated supply and will never acquire mains voltage on the internal earth rail, on the SCART socket, or anywhere else accessible to the user, regardless of how the mains plug is wired. It is therefore quite safe to connect experimental frequency-standard equipment to the SCART socket.

Peter Martinez, G3PLX

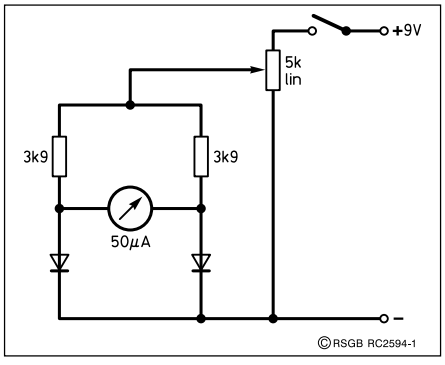


Fig 1: Corrected Fig 8, from the April 2000 *TT*.

Technical Topics

RADCOM, APRIL 2000

In Fig 8, which relates to the 'Simple Diode-Matching Unit', the diodes were shown back to front. See **Fig 1** for the correct orientation.

Pat Hawker, G3VA

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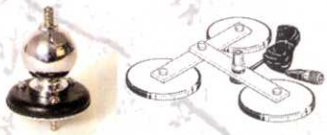
You need a good mount for HF work. The ball mount (W-BM1) is ideal for mounting on a bracket at bumper level, or other flat surface. The 3-way magnetic mount is ideal for roof or boot use. It is extremely firm - believe us!!



WMM-3401-38	Mag mount 3/8"	**£39.95**
WMM-3401-23	Mag mount SO-239	**£39.95**
W-BM1	Ball mount 3/8"	**£19.95**

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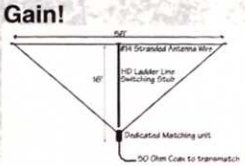

S-loop 80	1.5kW	**£89.95**
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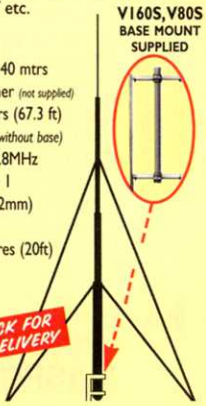

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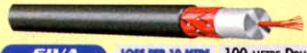

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Save Your Tuner for Two Pence

*By Tony Preedy, G3LNP **

GIVEN THE CHOICE of circuits suitable for HF antenna tuning, would you sensibly choose a T network?

The T network is renowned for suffering from low power transfer efficiency when compared with typical tuned transformer circuits. As usually configured, with a shunt inductor, it also fails to provide protection against the harmonics that inevitably accompany the output of our transmitters. Arguably this is not a function of an ASTU, but a function of the transmitter, although in the past when TV used lower frequencies many amateurs relied on their tuner for the last 'ounce' of harmonic suppression. The T network does offer the ability to transform, to the usual 50Ω required by the transmitter, a wide range of impedances over a wide range of frequencies with a minimum number of components. It is this flexibility that makes it a popular choice for commercial and home-built tuners, regardless of its failings.

I became aware of the limitations of my T network tuner when I first used it to transform the impedance of a non-resonant antenna, as seen via open wire feeder, to the 50Ω required by my linear amplifier on the 12m band. As no sample settings were offered for this band in the instruction book, I otherwise followed the manufacturer's instructions to the letter, tuning on low power for minimum VSWR before introducing the amplifier. When I put the key down I was dismayed to see smoke leaking out of the cabinet of the tuner. I cannot recall what settings I used, but suspect now that I had obtained a high loaded Q, as distinct from component Q, because of too small capacitor values.

Inspection revealed that the contact wheel on the variable inductor had become so hot that the lubricant had vaporised. Some time later I experienced arcing on this same component and found that the turns of wire were loose on the former. As both ends were still attached I concluded that the plastic former on which the coil was wound had shrunk.

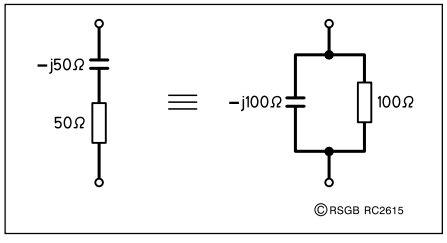

Fig 1: Equivalent parallel and series circuits.

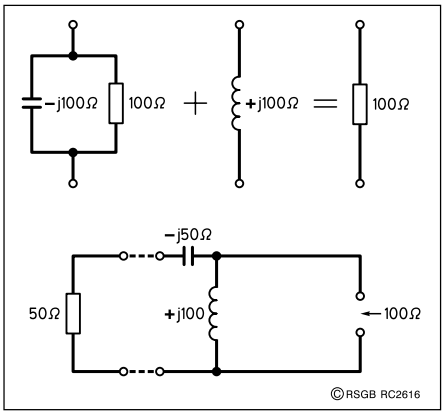

Fig 2: The L network used to transform 50Ω to 100Ω.

Presumably, like many plastics, it was hygroscopic and the heat generated by losses in the inductor had caused it to dry out! To restore the coil it was necessary to remove about 6 cm of wire.

I decided then that there was some discrepancy between my Watts and those used by the manufacturer when he rated this tuner at 3kW! Why did the integral power meter have a full-scale deflection of only 2kW? I concluded that the claimed power rating is most likely based on the system used by manufacturers of amateur antennas: *The peak DC input power to a typical transmitter's final stage having efficiency of 2/3 when using a two tone test signal.* Alternatively, perhaps the tuner will handle 2kW over a restricted range of impedances not specified by the manufacturer. If we take the power in an SSB speech signal to be 10dB below PEP, this equates to 200 real output Watts! This is also the average power in a 400 Watt CW signal having 50% duty cycle. This particular 3kW tuner may well have been suitable for 400 Watts CW or even RTTY, where the duty cycle is 100%, if more care had been taken when choosing initial settings for the controls. That is, settings which minimised the stress on the variable inductor. I was not surprised to learn that the manufacturer subsequently changed the variable inductor design after I bought my tuner.

These incidents caused me to investigate the requirements for the inductor in a T network tuner.

HOW THE 'T' WORKS.

TO UNDERSTAND the T network we must first appreciate how the L network functions.

The L network relies on a simple principle whereby complex impedances (those with resistance and reactance) in series circuits are represented as equivalent parallel circuits. A resistor of say 50Ω is without doubt the same in either parallel or series configuration, but a resistor of 50Ω in series with a reactance of 50Ω can also be represented by a resistor of 100Ω in parallel with a reactance of 100Ω (**Fig 1**).

If we connect a reactance of opposite sign, but still 100Ω, across this parallel circuit we obtain a pure resistance once more, but now of 100Ω, because the reactances cancel each other. The pair of series and parallel reactive components in this case form an L network with an impedance transformation ratio of 2 (**Fig 2**). Higher ratios are achieved simply by choosing a smaller value of series capacitance. Lower ratios require quite large values of capacitance which make the L network impracticable as a regular ASTU circuit, where we are often attempting to make quite small impedance changes, such as reducing VSWRs of 2 to unity.

POWER DISSIPATION

BECAUSE VARIABLE capacitors have much higher Q factors than inductors at HF, any losses, due to the inductor of the L network having a finite Q, can be represented by a parallel resistance equal to Q times the reactance of the inductor. By calculating the voltage across the inductor and hence across the loss resistance for a particular output power, we can obtain the power dissipated in the tuner. The calculations are straightforward. For example: an antenna impedance consists of 10Ω plus some series reactance, the transmitter requires a load of 50Ω, the required antenna power is 400 Watts and the tuner has an inductor with Q of 50. Provided the series capacitor has sufficient range of adjustment we can ignore any reactance component of the load: the power dissipated in this case works out to be only 16 Watts.

The simple L network as shown in Fig 2 has its limitations.

1. It can only transform impedances in which the resistance component is less than the resistance required by the transmitter.

2. For small impedance transformations, as would be the case when the load VSWR is low, the series capacitor values are unmanageably high.

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To overcome these problems we have either to reverse the network and use large value capacitors, or use two L networks. In the latter case, one to bring the load resistance to a higher intermediate resistance, another to step the intermediate resistance down to the required transmitter resistance. Hence the T network!

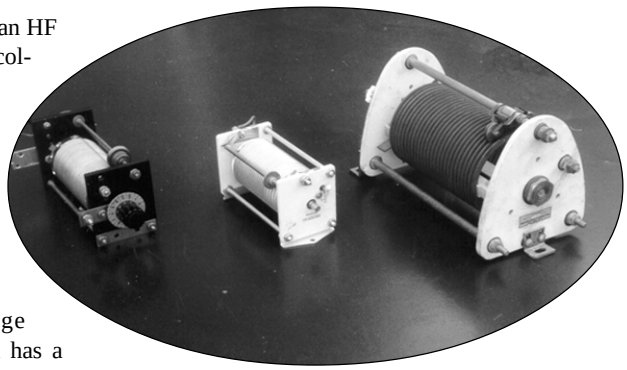
The T network is therefore two L networks connected back to back. In the usual ASTU circuit the series arms are variable capacitors and the two shunt arms are then combined in a single variable inductor (**Fig 3**). As with the L network, almost all of the lost power is dissipated in the inductor, now with the losses of two inductors.

The build quality of the inductor is therefore the most significant factor when choosing or designing a T network ASTU. However, regardless of how good the inductor is, it can be degraded by too close proximity to lossy metalwork such as a steel screening box. These losses appear as additional series or parallel resistance at the inductor. The practical methods of minimising coupled losses are to place the inductor in the centre of a large cabinet, to use copper plating on the inside if using steel and/or to use aluminium construction (precautions which are all noticeably absent from many popular contemporary designs). I optimistically used a wooden cabinet in an ASTU built in the 1970s to minimise this problem.

VARIABLE INDUCTORS

DURING THE 1930s and 1940s a great deal of work apparently went into designing effective variable inductors suitable for HF transmitters. Of the various, sometimes ingenious, devices the two that proved most popular were the spiral and the cylindrical single layer solenoids, both using a contact wheel free to move along a rod to traverse the winding. The latter 'roller coaster' inductor is universally found in amateur radio equipment.

The photograph top right shows some representative pre-1950 roller coaster types. The smaller pair are by E F Johnson Company and the larger unit by Radio Development and Research Company. The small dark coloured inductor (1) consists of 37 turns of 18 AWG tin-plated copper wire on a 50mm diameter former of resin bonded fabric material. It has a maximum inductance of 30µH and came from the master oscillator of an HF Transmitter. The small light coloured 20µH inductor (2) designed for the output tank circuit of HF transmitters is wound with 14 AWG tinned copper wire, 27 turns on a 50mm diameter ceramic former with reduced pitch in the low inductance region. The large inductor (3) is of 50µH and has a coil of 25 turns of 6mm x 2 mm bare copper strip, edge wound on ceramic slats giving a diameter of 90mm. This robust item was salvaged from an RCA ET4336 500 Watt (real Watts!) marine transmitter. The initial Q of this item was disappointing until the inductor was dismantled and the parts treated to a session in the dishwasher. The main problem appeared to be old grease on the rotating contact surfaces. A later design, the inductor from the Heathkit SA2060 tuner (4) consists of 38 turns of 12 AWG wire on a 60mm diameter fibreglass former. The most recent (5) is from my MFJ 989C tuner and has 40µH inductance, 47 turns of 14 AWG tinned copper wire on a 50mm PTFE former.



A selection of pre-1950 roller-coaster inductors.

Since taking the photographs I found another variable inductor (6). This consisted of 20 turns of silver plated copper strip, 6mm x 0.5 mm edge wound on a diameter of 90mm, with variable pitch and having a maximum inductance of 40µH. The coil was wound inside a skeleton former consisting of four fibreglass slats. The moving contact was uniquely inside the coil. This item came from a Gates broadcast transmitter.

I was intrigued to learn how the Q of the inductor in my tuner compared with the others, particularly those using pre-war materials.

Q, the ratio of inductive reactance to loss resistance, was obtained by measuring the equivalent parallel resistance with a Wayne Kerr B801B bridge. For inductors of good to moderate Q, the relationship between the parallel equivalent and series loss resistances is simply that the latter is Q squared times the former. It was not possible to measure the Q throughout the range of inductance at a single frequency because of both stray reactance effects and the limited measuring range of the bridge.

The measurements were therefore taken such that the section of inductor in circuit was representative of that which would be found, with typical load impedances at the measuring frequency, when the inductor was used in a T antenna system tuning network. The results are shown in **Fig 4**.

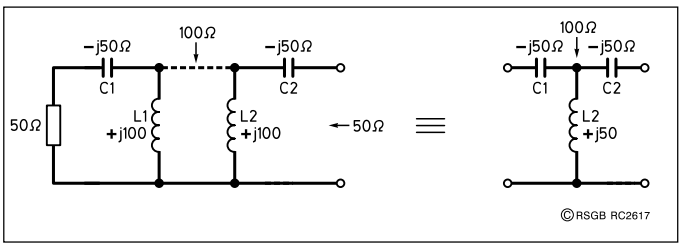


Fig 3: Derivation of the T network from two L networks (in this case transforming between a 50Ω load and source, via an intermediate resistance of 100Ω).

The Heath and MFJ inductors were first measured *in situ*, whilst the others were in the open. The general trend can be seen, whereby an initial high Q deteriorates as soon as turns are shorted and then it continues to fall gradually as minimum inductance is approached. As one might expect, the Q also degrades with frequency for a given inductance value, presumably because of both increased skin effect at the windings and increased dielectric loss in the former. A major factor at the higher measuring frequency of 29MHz is the former material. The Q of the last few percent of turns is most important, because this is the normal working region when tuning on the upper HF amateur bands.

The large RCA inductor (c) and the Johnson (b) with their ceramic insulation were very good at the lower frequencies. However, when I obtained the Gates unit (f) I discovered that it was even better, being outside my measuring capability at 4MHz. Although using less copper than the Radio Developments unit, it apparently benefitted from both the construction method and silver plating. The RCA unit might have also been best at higher frequencies, because of its thick conductor and skeleton former, but its high stray reactance prevented reliable measurements from being taken at 29MHz. On the higher frequencies the MFJ inductor was, despite my experience, less lossy than the pre-war inductors of comparable size.

The thicker wire and greater diameter of former used in the Heath inductor (d) gave disappointing results at first. However, this tuner had not been used for a decade so I decided to strip the inductor down and gently clean all the parts with a *Brillo* soap pad and warm water, before baking the coil in the oven for about 5 minutes. The moving parts were given a fine coat of contact lubricant before rebuilding. The reassembled inductor was unbelievably good, particularly at 29MHz when measured on the bench. The rapid improvement in Q below 3% of turns is due to the silver plated connection tapes for the bridge. These increasingly provided the most significant reactance when below one turn.

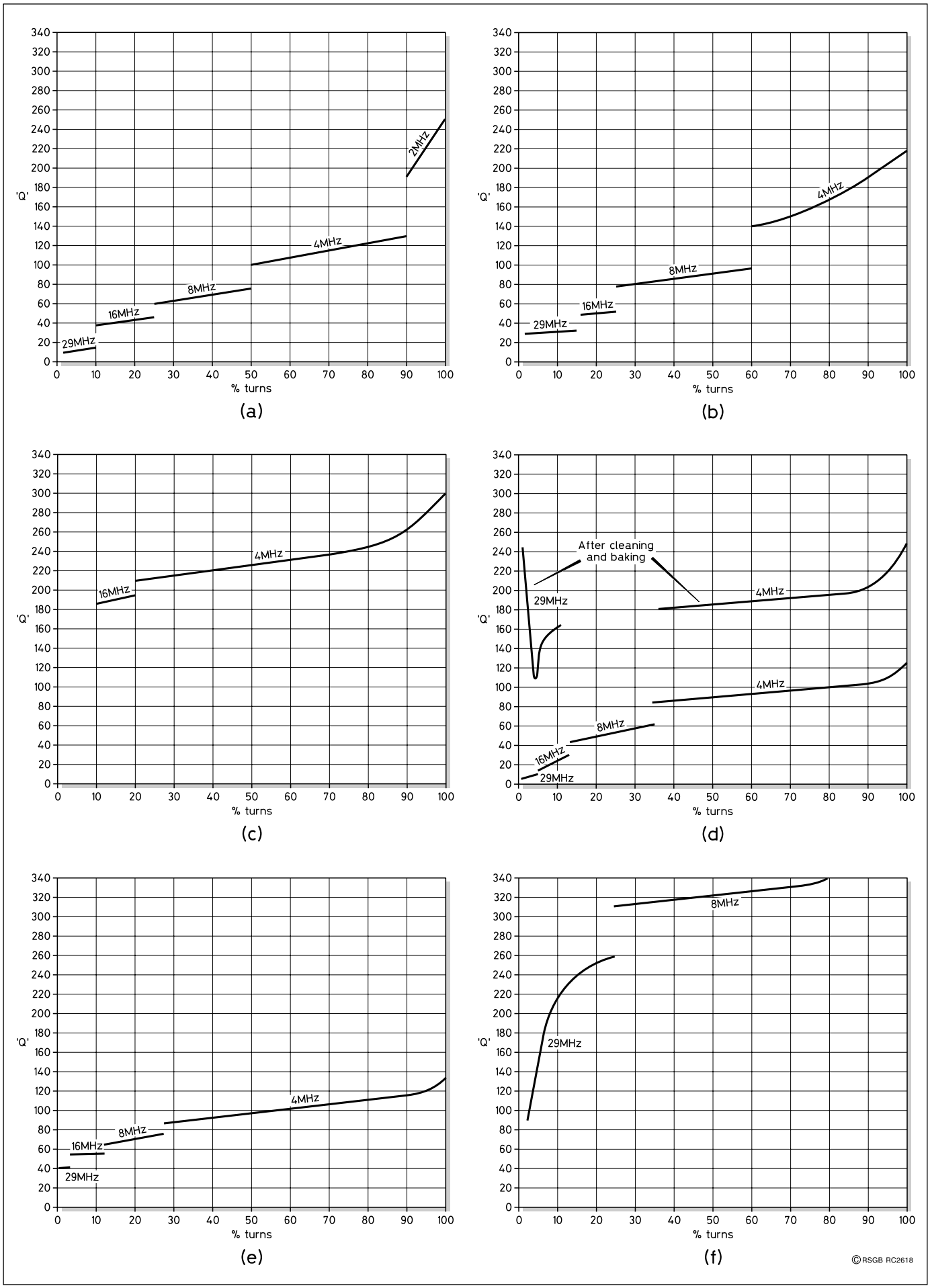


Fig 4: The Q of various variable inductors at a variety of frequencies.

COMPARING NETWORKS.

WE SAW EARLIER how much power was dissipated in the inductor of a typical L network. Now let's see how the T network compares: for example, let's make the intermediate resistance in a T network, as seen across the inductor, 200Ω. This is a value that can normally be achieved over most of the higher frequency range with component values in a typical T network ASTU. We therefore have an L network, C1 and L1, which transforms our 10Ω load to 200Ω.

The second half of the network, L2 and C2, transforms 200Ω to 50Ω. In this case the power dissipated in the loss resistance of the equivalent single inductor has increased to 49 Watts. To obtain 400 Watts in the load our transmitter must supply 449 Watts! Although quite a lot more power is lost than in the simple L network, one can argue that the difference in radiated power will never be noticed on the HF bands. This is probably true, but think of the life expectancy of the inductor in the ASTU and how this will be reduced by unnecessary heat dissipation.

Suppose that we inadvertently tuned the network to obtain a transformation with a much higher value of intermediate resistance such as 600Ω, as I might have done on 12m. In this case, assuming the Q of the coil remains at 50, the loss is 88 Watts! We need to supply 488 Watts, a significant amount of which is dissipated in the inductor, and we have no indication other than our sense of smell to warn us of this fact!

The same comparison between L and T networks can be made when the load impedance contains a high resistance, say 600Ω. Assuming nothing else has changed, the L network loss = 26.5 Watts. For the T network case, assuming an intermediate resistance of 1200Ω, the loss increases to 46 Watts.

REDUCING LOSSES

THE Q VALUE used in the numerical examples above is typical of that measured at 16MHz. At higher frequencies the Q is less and consequently the T network losses can be greater. Generally there is an optimum ratio of winding length to diameter that results in the best Q for a particular inductor. Typically this ratio, or form factor, is 1.5. Measured at maximum inductance the Q value always appears to be maximum, even though the form factor would normally indicate a better Q at intermediate values of inductance, if these could be achieved without shorted turns.

Most often we will be using only a small proportion of the inductor, with most of the turns shorted out. Although they are shorted, these turns are still coupled to the active turns. Therefore they still contribute losses. The unused turns could be left open to prevent the rapid loss of Q in the top 20% of turns, but then, as we progressively reduce

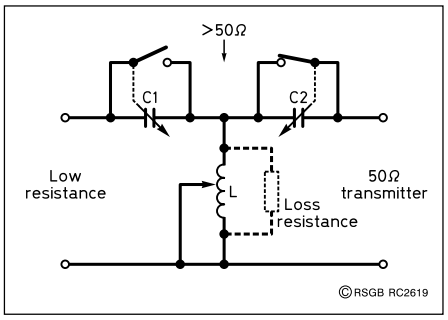


Fig 5: A T network adapted to function as an L network, by closing either switch. For a high resistance load, the switch states are reversed from those shown.

the number of active turns, we would couple a high voltage across the now greater number of unused turns with the possibility of both increased losses and voltage breakdown. If we could guarantee that more than half of the coil would always be in circuit it might be possible to leave the unused turns open circuited to achieve less loss.

Another approach might be to use a separate inductor for frequencies above say 10MHz, but both of these solutions would detract from the simplicity and flexibility of the T network.

Alternative techniques, more sophisticated than the roller coaster or spiral, are employed in some professional tuners where it is required to maintain the Q of the inductor throughout its range of adjustment. One method uses a conducting cylinder in which a thread has been cut which matches the pitch of the coil. The cylinder is screwed over the coil, thus enclosing and joining all the unused turns. Another removes all the unused turns, formed by flexible metal tape, from the inductor by transferring them to a storage drum where they cannot influence the working circuit.

Within the constraints of our roller coaster inductors we can minimise loss in the T network either by minimising the value of intermediate resistance or by optimising the Q of the inductor. We can do nothing to improve the latter except to keep the contact surfaces in a clean condition and generally keep the inductor free from contamination, whilst the former is very much under our control.

The unfortunate weakness that comes with the flexibility of the T network tuner has now been revealed! When we twiddle the controls for minimum VSWR we do not know what value of intermediate resistance we are achieving and if this resistance is not significantly less than the parallel aspect loss resistance we lose a lot of our valuable RF!

To avoid excessive dissipation it is obvious that we should aim for the lowest value of intermediate resistance consistent with obtaining unity VSWR at the transmitter. Unfortunately on the higher frequencies this condition can result in either insufficient turns to handle the voltage across the intermediate resistance, causing breakdown between turns, or excessive minimum inductance due to the residual inductance of the turn-shorting mechanism. To offset these tendencies we use more turns than are necessary for minimum dissipation. Some inductor designs like (2) and (6) increase the coil pitch, hence turn spacing, near minimum inductance to offset the first problem.

There will be instances, particularly on the lower frequencies, where the T network will only achieve the required transformation ratio with relatively high values of intermediate resistance. This is because the variable capacitors C1 and C2 are too small for efficient tuning at the lower frequencies. However, Q of the inductor is not such a problem on the lower bands where the voltage rating of the series capacitors tend to restrict the input power.

TUNING TECHNIQUE.

WHAT WE CAN show is that the lowest losses will occur when one of the capacitors C1 or C2 is at the highest value consistent with a correct transformation being achieved. This is the closest we can get to turning the network from a T to an L configuration with the adjustment range provided by the manufacturer. Under this condition we will normally have the greatest number of turns, across which the voltage is shared. From what we have seen above, and as you may already know, the minimum loss tuning technique for a T network ASTU is:

1. Start with both capacitors at maximum.
2. Then adjust the 'antenna' capacitor and inductor for minimum VSWR.
3. If the minimum VSWR is not unity, then progressively reduce the 'transmitter' capacitor and repeat the other adjustments.

CONVERTING THE ASTU CIRCUIT

WE HAVE SEEN that we can further reduce losses, when the load resistance is known to be less than the required resistance at the transmitter, by converting the network into an L network. The simple way to do this is to short out the 'transmitter' capacitor C2. This is easily but inelegantly achieved by bending the corner of one moving plate, so that at maximum capacitance the fixed and moving plates touch each other (**Fig 5**). The L network that we have thus created will not provide unity VSWR for the wide range of antenna impedances previously covered by the T network but for those impedances and higher frequencies, where there is sufficient range of capacitor adjustment, also the frequencies where T network losses are highest, it will have benefits. The same technique can be applied when the load resistance is higher than that required at the transmitter, by shorting out the plates of the 'antenna' capacitor C1.

A SIMPLE MODIFICATION

YOU MAY NOT be keen to spoil either a good variable capacitor or the resale value of your tuner by bending the plates. In this case you can follow my example and add a contact which is closed by a cam that is fixed to the shaft of the capacitor. If, like on most T network HF ASTU capacitors, the shaft is free to rotate 360 degrees it is only necessary to arrange that the contacts close, joining the fixed plates to the shaft, when the control knob is off the normal 180 degree tuning range (**Fig 6**).

The tuner will still work as it was intended within the calibrated scale. This simple modification will:

1. Reduce tuner losses.
2. Allow higher power on the higher frequencies, by reducing both the volts per turn and current in the inductor.
3. Reduce the number of variables.
4. Extend the upper frequency tuning limits for a given range of load impedances - because the inductor does not then have to act as two inductors in parallel.

You can apply this modification to most of the popular T network tuners that incorporate a variable inductor for two pennies – literally! The photograph bottom right shows a modified capacitor as used in the Heathkit SA2060 tuner. I also added the modification to my MFJ-989C tuner and no doubt other manufacturers' products can be similarly modified.

MECHANICAL DETAILS

A PAIR OF CAMS are formed, one for each capacitor, as shown in **Fig 7**, by first taking a copper disc approximately 25mm diameter and drilling in the centre a 6.5mm hole. I used old type copper penny coins for my cams. It is illegal to mutilate current coinage of the realm, and besides the modern coins are not made of copper. Old sofas are a good source of old pennies, incidentally.

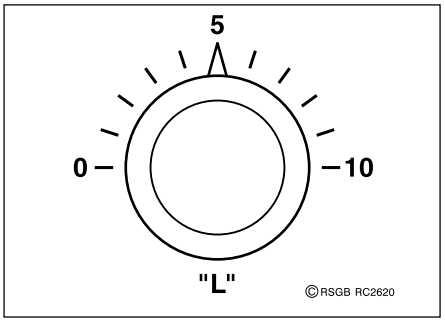


Fig 6: Control legend.

Over an arc of 270 degrees, the radius is reduced to 5mm using a hacksaw and file. A small vee shaped indent is made at the centre of the larger radius segment to locate the capacitor control. The corners of the cam are radiused with a fine file and the edge polished with fine abrasive paper.

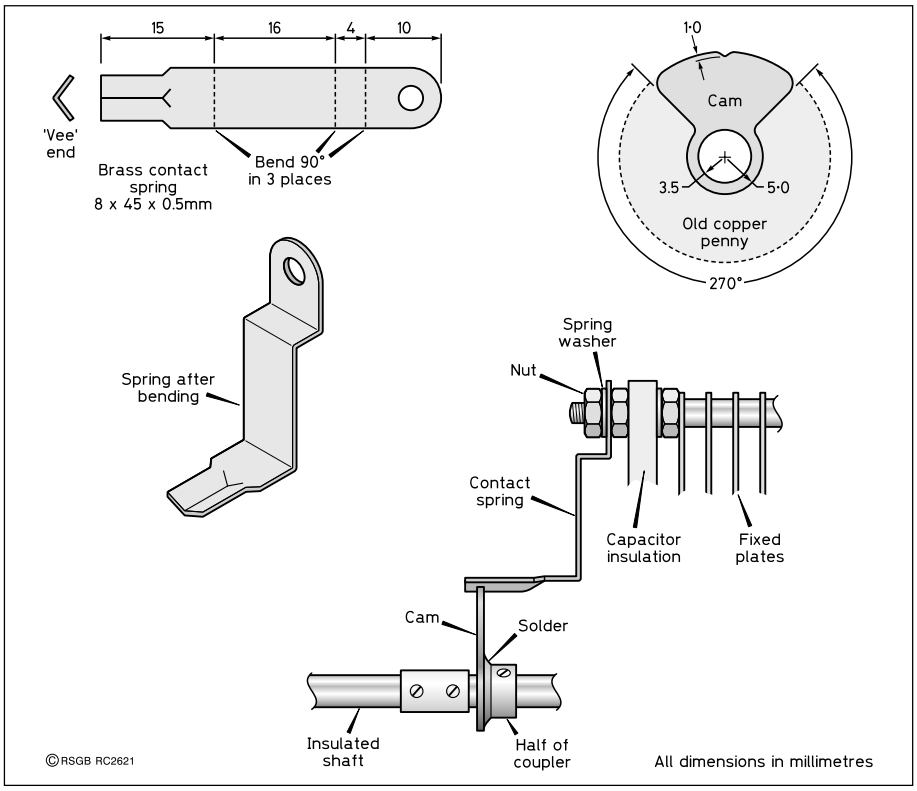
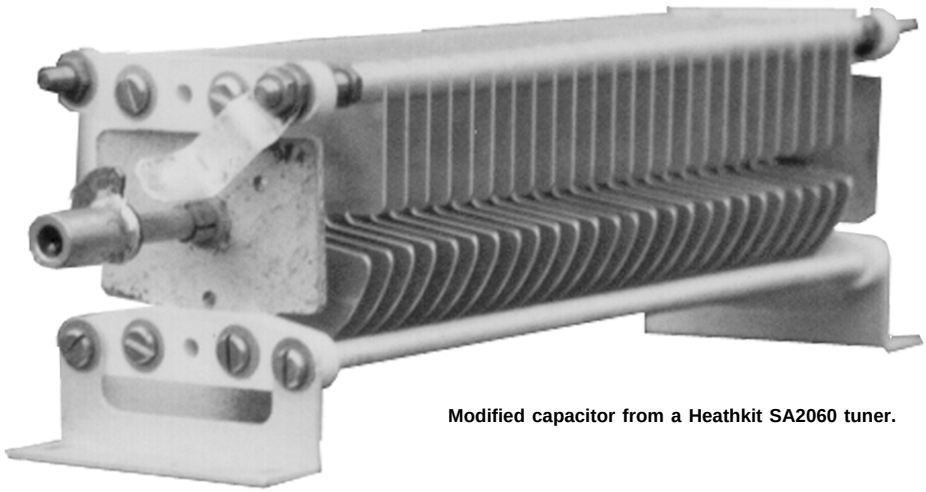


Fig 7: Mechanical details of the cam and contact, for shorting the capacitors in a T network ATU.

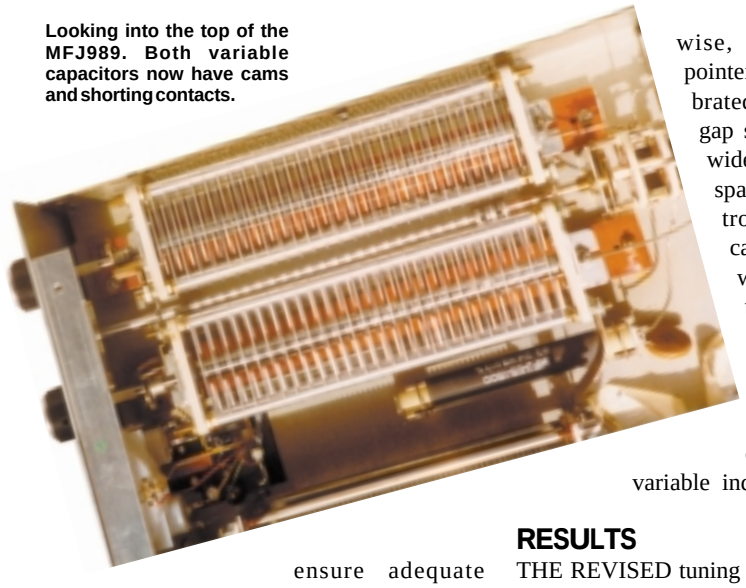
For A Heathkit SA2060 tuner, remove the shaft coupler from each capacitor by releasing the grub screws and pulling the knob and plastic shaft clear. Solder the cam to one end of the coupler. To ensure that the holes in the cam and coupler are coaxial it is best to check with the 6.5mm drill whilst soldering. If the coupler is made of steel it will be necessary to file away any plating material from the end before solder will adhere. After cooling, use the 6.5 mm drill bit to ream any excess solder from within the bore of the coupler.

Refit the coupler to the capacitor and insulating shafts with the cam closest to the capacitor. Form a contact from springy conducting metal, such as a heavy duty relay contact strip or a piece of bronze draft excluder, and drill one end to fit the threaded connection at the fixed plates of the capacitor. I used some sheet bronze about 0.3mm thick. Shape the contact end into a shallow vee, to mate with the indent on the cam. In the case of the MFJ tuner, which has no couplers, it was necessary to acquire one and saw it in half. Each half is then soldered to a cam. A single grub screw is adequate to lock the cam to the metal shaft.

The easiest way to access the capacitor shafts in the 989C is to remove the front panel. This involves undoing the three lower front panel retaining screws, releasing the meter, disconnecting the counter drive belt and taking off all four control knobs. The contact, identical to that used in the Heath tuner and shown in Fig 7, is attached to the fixed plates of the capacitors using the nuts that are used for the inter-capacitor connection. The crank in the spring is required to



Modified capacitor from a Heathkit SA2060 tuner.



Looking into the top of the MFJ989. Both variable capacitors now have cams and shorting contacts.

ensure adequate clearance between the spring and the grounded end bearing plate of the capacitor.

The cams should be mounted on the metal shaft of the capacitors of the 989C as shown in Fig 7 and the grub screws tightened such that the contacts engage firmly, with the vee of the spring in the notch of the cam, only when the capacitor control is pointing downwards and the plates are half meshed, ie off the calibrated scale on the front panel. Otherwise, when the control pointer is within the calibrated scale, the contact gap should be at least as wide as the capacitor plate spacing. With the control knob of any one capacitor in the downwards position the tuner is obviously in the L network mode. With both capacitors in this condition the tuner circuit is simply a shunt variable inductor.

RESULTS

THE REVISED tuning technique, for an unknown antenna condition, requires that you initially attempt to obtain minimum VSWR with first one and then the other capacitor in the L network mode. If this fails, then resort to the normal T configuration. I found this modification to be always advantageous on the 18MHz band and above. On 14MHz and below, where the inductor is less vulnerable, there was sometimes not sufficient capacitance available to reduce the VSWR to unity when using the L configuration.

Some typical results are included below, where I have tabulated the inductor counter readings for alternative T and L configurations whilst driving a nominally 50Ω antenna with VSWR too high for my radio to deliver full power without an ASTU. These show that there is now much more inductor in circuit when using the L configuration. Note that these results are for the MFJ 989C tuner, which has 2.7 counts per turn of the inductor:

MHz band	'T' (counter)	'L'
18	5	9
21	2.5	10
24	4	10
29	2.5	9

The corresponding capacitor settings were always higher for the L condition, indicating that the single working capacitor was also less stressed, ie it had less voltage, in this configuration. Antenna results with typical VSWRs of 3 to 4 were more haphazard but, in my case, it was possible to use the same L circuit, with the antenna capacitor shorted, for all bands from 14 to 29MHz. A useful advantage, particularly if retuning after QSYing within a band, is that of now only having two controls with which to fiddle. ♦

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● Douglas, G3KPO, is looking for an ex-RAF **R1082** receiver and **T1083** transmitter for inclusion in his wireless museum on the Isle of Wight. G3KPO, QTHR. Tel: 01983 567665.

● G3NHU is looking for a copy of the circuit diagram for the **Yaesu FT-70GH** transceiver. All expenses reimbursed. G3NHU, QTHR. Tel: 01493 721173.

● Douglas, G0UYC, is looking for a copy of the operating and service manuals for the **HP-419A** DC null voltmeter, plus the **Rhode & Schwarz USWV** Selektomat measuring receiver. All costs reimbursed. G0UYC, QTHR. Tel: 01362 688142.

● Bill, GM0KMG, is looking for the source for a **2N3858** transistor (or equivalent), to repair his Drake R4 VFO. GM0KMG, QTHR. Tel: 0141 562 4571.

● Colin, GM3WKZ, would like to hear from anyone who has information on **CAT software products**, such as automatic log keeping, for the **Yaesu FT-100**. GM3WKZ, QTHR. E-mail: crbayliss@aol.com

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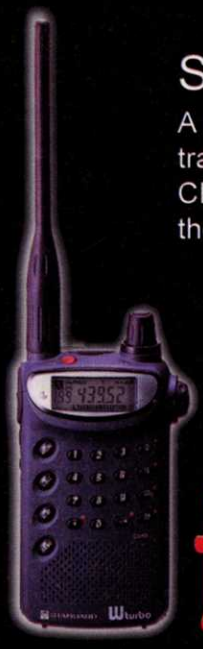

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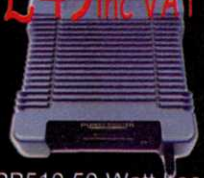

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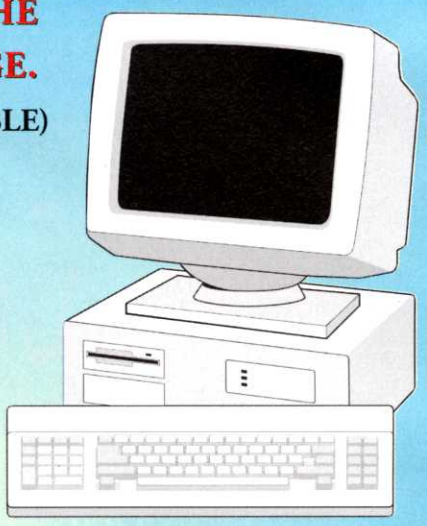

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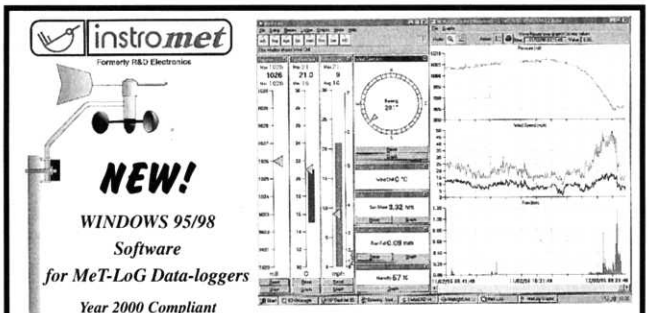

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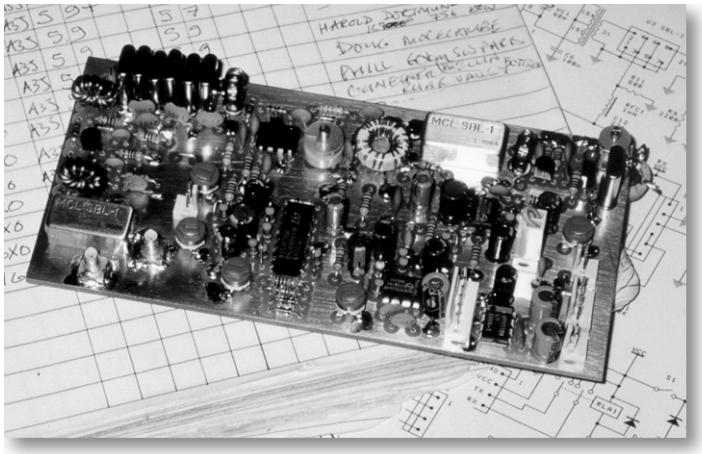
The Belthorn SSB IF Module

Concluding part, by Ron Taylor, BSc, CEng, MIEE, G4GXO*



IN THE FIRST part, the design criteria were discussed and descriptions were given for some of the circuit sections. In this concluding part the remainder of the circuit sections are described, along with use of the module.

DETECTOR / MODULATOR & CIO

The appeal of using one stage to perform two functions is realised nicely here. A second SBL-1 (IC3) is used as a product detector on receive and a balanced modulator on transmit. The 50Ω RF port is matched into the IF stage by T3. The DC port is used for the audio input and output, R11 provides a 50Ω termination.

Several single-transistor carrier oscillator designs were tried in an attempt to keep the component count down. All of these failed to provide sufficient mixer drive, characterised by high conversion loss, poor receive performance and low transmit output level. Additionally, these simple oscillators had tuned output circuits which, when adjusted, interacted with the crystal trimmer setting, shifting oscillator frequency and making start up unreliable. Reluctantly, a more conventional approach was adopted which uses a FET Colpitts oscillator followed by a simple FET buffer. This slightly more complicated configuration was well worth the compromise on component count, giving more than adequate mixer drive, reliable oscillator start-up and smooth tuning.

AUDIO STAGES

A standard low noise preamplifier design employing an NE5534N (IC4) is used to amplify the detected audio by +30dB to drive IC5, the LM386N AF power amplifier and IC7 AGC system. AF roll off is provided by C46, to reduce the characteristic wideband demodulated noise produced this type of IF in the absence of 'tail end' filtering. No further audio filtering is used, other than the low pass LC arrangement at the modulator DC port. A six pole connector (SK3) is used to connect the AF gain control to the circuit board. The pins are configured to provide access to the audio pre-amplifier output, the input of the AF power and AGC stages, and provide a ground connection and +12 volts on receive. This feature allows a proposed optional piggy back, variable bandwidth, capacitor filter unit to be added (yet to be developed) without modification of the main PCB. Whilst not entirely necessary, a variable bandwidth audio filter can be useful in heavy QRM.

During transmit, a second NE5534N (IC6) with variable gain is used to inject low level audio into the modulator. J1 selects high/low microphone terminating impedance. No switching is needed between the transmit and receive audio stages, as the low impedance of the modulator prevents any interaction. I use a cheap dynamic microphone insert from Maplin, mounted inside an old PTT housing. It works a treat and produces beautiful audio.

AGC

Having got the working breadboard design this far, I couldn't resist the challenge of an AGC system! All the books tell you that an RF AGC scheme is the best. This is true, but to get an RF derived AGC system working you need to ensure minimal carrier leakage - both out of the demodulator and through the IF, and develop about +120dB of RF/IF gain to drive the detector diodes at a reasonable signal threshold. This is not an easy thing to achieve in a simple design, particularly with stage re-use and bilateral amplifiers, so an AF AGC system was the only solution. I based the design upon one of Wes Hayward [4], which employs full wave detection and is DC coupled. This approach cuts down the number of components needed, but has the disadvantage of being susceptible to switching transients causing full AGC to be applied on TX to the RX, with a resulting annoying delay in the receiver gain recovering. This problem is cured by a simple discharge circuit which operates during transmit-to-receive switching. The AGC circuit is built around an LM324 quad op amp package (IC7). Two amplifiers, IC7a and IC7b, are configured as an audio pre-amplifier and full wave rectifier. The gain is provided by IC7a, which operates as a non-inverting amplifier with gain set by RV3. The DC output bias of the AGC system is set by RV4 and used to adjust the AGC threshold, the point at which an increasing AGC voltage reduces receiver gain. The output of IC7a drives IC7b, a unity gain inverting amplifier. The outputs of both these amplifiers, which are equal in amplitude but in antiphase, are rectified by D7 and D8 to obtain full wave rectification. The output of the rectifiers charge the AGC capacitor C34, with R54 setting the attack time and R35 the decay time. The design left me with a spare op amp (IC7d) which I had originally earmarked for a full hang circuit. I used this as a monostable to discharge the AGC capacitor on TX-to-RX switching. The result is an audio AGC system with one of the best performances I have come across. With a few extra parts it should be possible to add full hang AGC to IC7d and incorporate the monostable action.

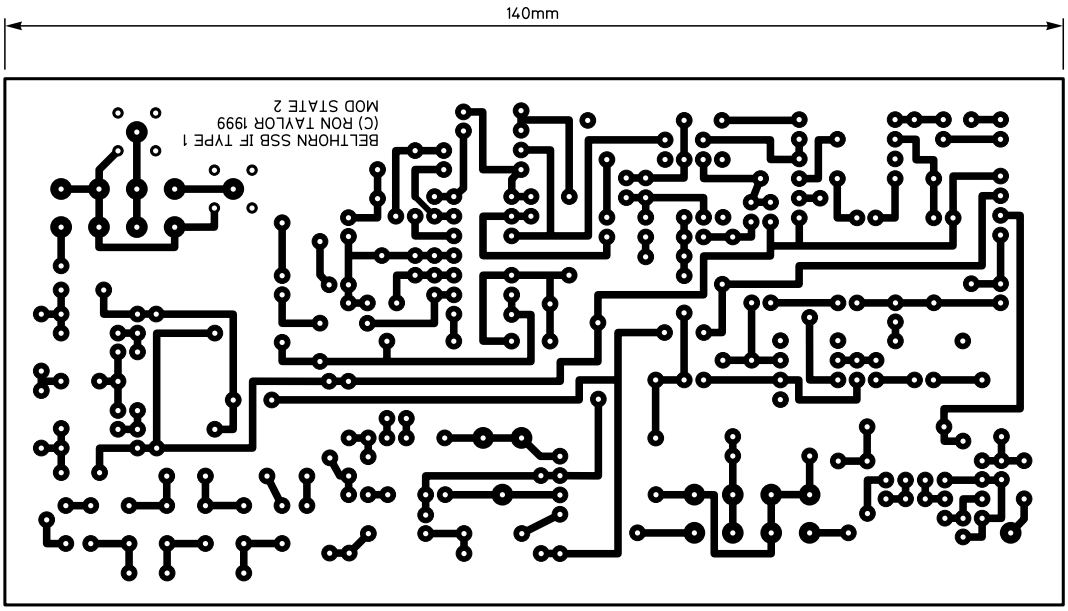
DC SWITCHING

The T/R switching provides the module's TX and RX rails, +12 volts is applied to a rail to make that function active, the other function rail must be grounded. This ensures correct operation of the bilateral stages. The DC switching has been deliberately left off the PCB, as this will usually form part of the host transceiver's power system.

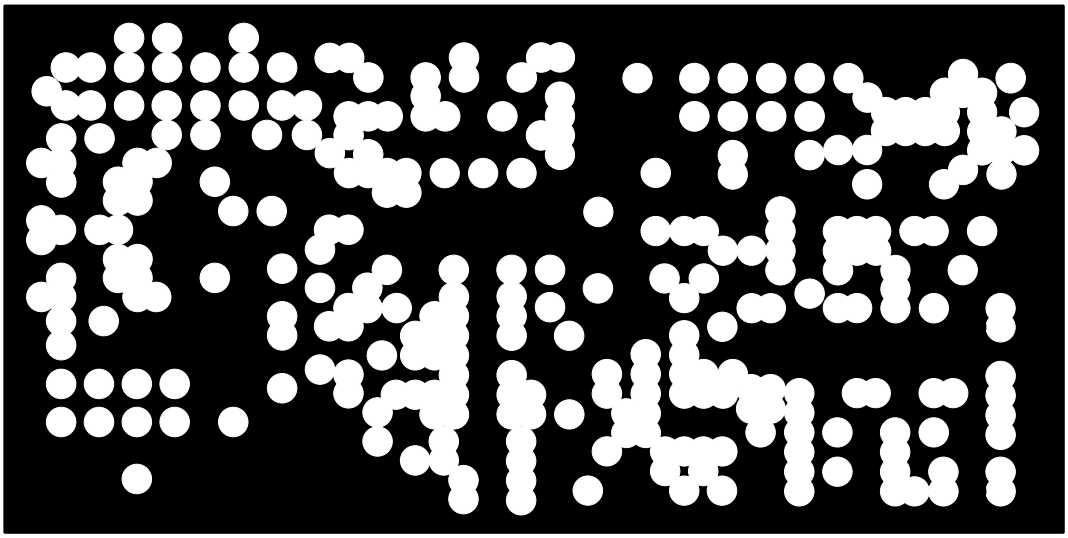
CONSTRUCTION

If you are building this circuit as a 'one off', I strongly recommend the use of 'ugly' construction. In this, the circuit is assembled above a piece of copper laminate board with ground connections being made direct to the copper and all other connection being made by component leads or short lengths of tinned copper wire. Some components, such as the diode ring mixers, are best glued to the board on their backs, leaving their pins upright (known by the American hams as 'dead bug' construction). With care and a little practice, this technique allows the construction of compact and very rigid circuits that are easy to modify - a bonus for experimenters.

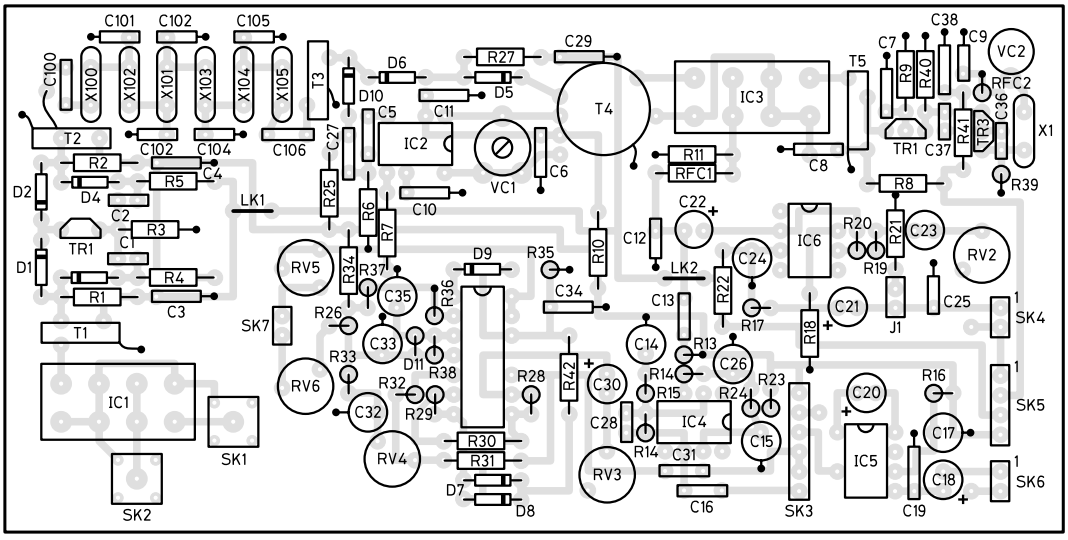
** 89 Belthorn Road, Belthorn, Blackburn, Lancs BB1 2PA. E-mail: ron.taylor@cwcom.net*



Bottom layer



Top layer (component side)



Component side

Fig 4: PCB component overlay and track layout.

FERRITE CORES

A few words on ferrite cores. Many projects have been abandoned because the constructor could not find the precise ferrite components described in the design. In certain high power or very low frequency applications core material and dimensions are important, but for broadband low power HF and general IF signal use there is generally only one critical factor, the *initial permeability* μ. This, combined with the number of turns, sets the winding reactance of the transformer at the frequency it is to be used. For correct operation this should be at least 4 times the source or terminating impedance of the winding at the lowest frequency of operation. For example, a winding being driven from a 50Ω source should display a reactance of at least 200Ω. The ferrite transformer cores used in my prototypes were made from ferrite beads and small toroid cores that were ready to hand. These are typically 850μ or 43 type material and are ideal for use from LF to at least 30MHz. The cores used in the broadband stages should ideally be T37 size. These will offer ample magnetic volume for this application and are easy to wind. If you get really stuck, as I mentioned earlier, 850μ ferrite beads make good 'balun' cores. Glue two of these side by side to resemble a pair of binoculars and wind the transformer by threading the wire around through both holes. About three turns are adequate for 50Ω use at 10MHz, more turns will be needed for higher impedances or lower frequencies. Note that the ferrite bead approach is only good for fine wire (up to about 0.28mm), larger diameter wire will restrict the number of possible turns.

PCB

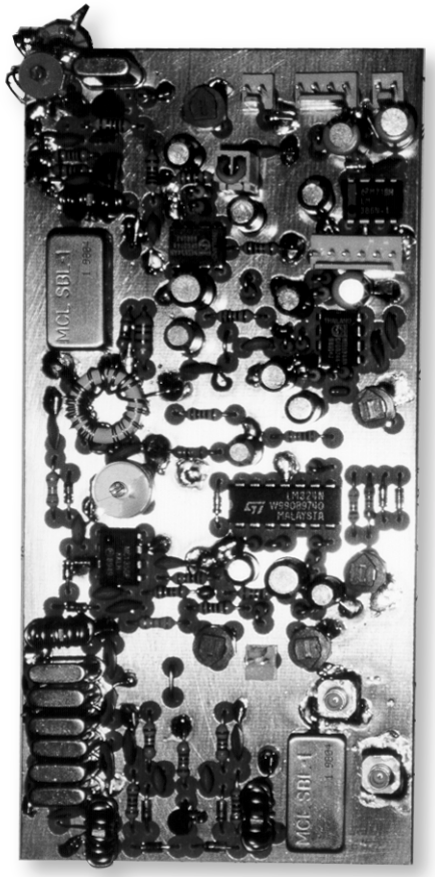
For those wishing to make their own PCBs, a layout is shown in **Fig 4**. All ground connections are made to the top earth plane. Note that to save space, the layout has been designed to accommodate vertically mounted radial electrolytic capacitors. Pads shown without holes are intended to be drilled-through to the earth plane and soldered to ground with short lengths of wire such as discarded component lead trimmings.

In the prototypes all connections to the board were made through connectors, to allow the module to be easily transferred between transceiver projects. Mutli-pole PCB latching connectors from Maplin were used for all DC and AF connections. The local oscillator and RF ports of the mixer were presented on miniature 50Ω SMB co-axial connectors. Where it is intended to install the module permanently in a project, some cost savings may be made by replacing all connectors with direct wiring.

The order of construction for this, or any other project, should be chosen so as to allow testing at various stages completion. Start with the audio stages, followed by the product detector, IF, crystal filter, bilateral amplifier and front end circuitry. This allows listening tests to be made as additional stages are added. Using this approach and a bit of cunning, the only test equipment needed to get the module working should be a multimeter and a grid dip oscillator to provide an RF signal source.

USING THE MODULE

THE MODULE IS easily applied to most SSB receiver or transceiver applications. The configuration shown in Fig 1 [last month - *Ed*] shows the peripheral stages and hardware needed to make a simple transceiver. A few design considerations must be made when applying the module to a specific transceiver design.



If a crystal ladder filter is used, the inherent asymmetric performance of the filter favours LSB operation for best filter response. The circuit board layout has been designed to accommodate a single crystal for LSB operation. However this does not limit the module to LSB use only, the local oscillator frequency must be chosen to provide the correct sideband; RF(USB) = LO+IF, RF(LSB) = LO-IF. Alternatively, sideband selection switching could be realised by using two crystals for USB and LSB; however, with this ladder filter, unwanted sideband rejection in USB mode would suffer slight degradation but would probably be acceptable for most uses.

The local oscillator can be a VFO for the lower HF bands, a heterodyned VFO for the upper HF bands or a VXO for the higher HF bands, and with multipliers for 50MHz and 144MHz. A slightly more elaborate LO could make use of a synthesiser such as the MC145151P with interpolation between channels being provided by 'pulling' the reference oscillator crystal, alternatively the newer DDS devices such as the AD9850, AD9851 and AD9852 offer simple multiband possibilities.

On the upper HF bands an RF stage may be needed to improve noise figure and sensitivity. This should provide only enough gain to cause the receiver noise to increase when the transceiver is connected to a resonant antenna - any more will simply degrade the excellent strong signal performance of the front end. Whilst the dynamic range will be reduced by the use of an RF amplifier, there is compensation in that unwanted local oscillator radiation from mixer leakage will be substantially reduced.

ON THE AIR

DURING ITS development I built three variants of this design, each of which I have used on 40m with a 2MHz VFO and 5W PA. My only antenna is a half-sized G5RV configured as an Inverted-V from the house chimney. The results have been most rewarding. On receive, the strong signal performance is excellent and the AGC is very effective. On transmit audio reports are very complimentary, with many stations expressing surprise that they are working a QRP station and (most satisfyingly) that it is home brew! The best DX so far is Kursk, about 300 miles south of Moscow.

AND FINALLY...

WHETHER YOU ARE a seasoned designer or a newcomer to home construction I hope you find this article interesting. I would be most interested to hear from anyone building this design and, in particular, suggestions or experiences in simplifying it further.

My thanks to Bob Edwards, G4BBY, for researching the references and discouraging me from pursuing my more wacky project concepts, and to Glen Holt, G8NOF, for persuading me to write this project up to share with others.

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[7] Farnell. Canal Road, Leeds, W Yorks LS12 2TU. Tel: 0113 263 6311. Web site: www.farnell.co.uk
[8] JAB Electronics. PO Box 5774, Birmingham B44 8PJ. Tel: 0121 682 7045. ♦

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*Reviewed by Ian White, G3SEK**

AN SWR ANALYSER is basically a signal source and an impedance bridge, packaged into a convenient hand-held box. Even a basic model can help you set up an antenna system very quickly, without having to cart a load of test equipment out to the garden or portable site. Thanks to the sheer convenience, you find yourself completing antenna experiments in a few hours that you wouldn't even have attempted before.

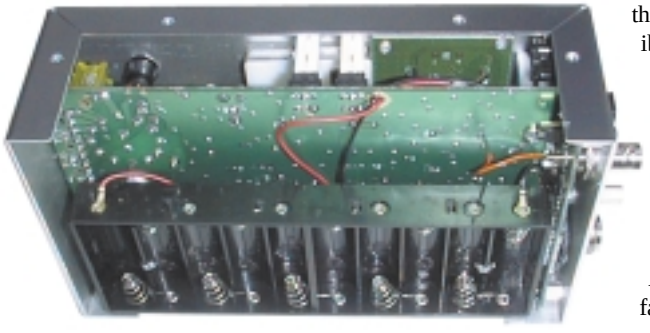
The latest generation, including the MFJ-269 reviewed here, can measure both resistance and reactance (R and X) of any unknown load, and those two measurements open the door to many more - all calculated for you, and selected by menu. The MFJ-269 is the third in MFJ's line of SWR analysers, and although it looks very similar to the basic MFJ-259 and covers the same basic range from 1.8 to 170MHz, the '269 makes R-X impedance measurements (introduced in the '259B) and has many more features. The novel feature of the MFJ-269 is that it also covers 415-470MHz in the same package, although with a limited range of measurements. In this review I will explain what the MFJ-269 can do, and also explore the vital question: how accurate is it? For an explanation of how SWR analysers work, see this month's *In Practice* column.

FEATURES

THE SIGNAL SOURCE of the MFJ-269 is essentially the same as in the original MFJ-259 and MFJ-259B, a simple band-switched oscillator tuned by a variable capacitor. The tuning rate is markedly non-linear, being comfortably slow at the LF end of each range, but quite fast and not very easy to set at the HF end. The 415-470MHz coverage is obtained by frequency-tripling from around 144MHz, which makes the tuning rate three times faster still. Fortunately the impedance of most test loads changes relatively slowly with frequency, and it is always possible to set the MFJ-269 with sufficient accuracy for the band in use. In fact the digital readout makes frequency setting look more difficult than it really is - on most bands it would be better to display one fewer digit.

The MFJ-269 is solidly constructed, with a sheet metal case about 170 x 100 x 60mm (6.5 x 4 x 2.5in) that sits well in the hand or on the bench. A shower-proof cover is also available for outdoor use. Inside are three machine-assembled SMD boards and a good-quality battery holder. The RF bridge itself (see *In Practice)* is immediately behind the N socket on the end of the box, and the same board carries the frequency tripler and amplifier that are switched in by the UHF button. This is different from the MFJ-259 and 259B, which had the bridge on the separate main board and used an SO-239 ('UHF') socket. The constant-impedance N socket is definitely the right choice to maintain the accuracy that the MFJ-269 is capable of providing, but for less critical uses an N-to-UHF adaptor is included as a standard accessory.

An unavoidable feature of all antenna analysers is that the batteries don't last very long. In order to prevent antenna measurements being swamped by strong incoming signals or falsified by harmonic content, the signal source has to generate significant RF power at low distortion, and this inevitably involves a heavy battery drain. Also, the microprocessor, frequency counter and support electronics draw significant current. The MFJ-269 is no exception - it draws about 135mA on HF-VHF, and this almost doubles when you press the UHF button. To compensate for this, the MFJ-269 offers highly flexible battery facilities. You can avoid using batteries completely and run the instrument from an external 11-16V DC supply; you can use ten 1.5V AA alkaline cells; or you can use ten 1.2V rechargeable NiCd AA cells. An internal jumper gives the facility to trickle charge NiCd cells from any external 14-18V DC supply. In addition, the MFJ-269 has a lower-power 'sleep' mode which it enters automatically after three minutes of non-use - you wake it up by pressing a MODE/GATE selector button. If you don't want the instrument to doze off every few minutes, sleep mode can easily be disabled at switch-on.



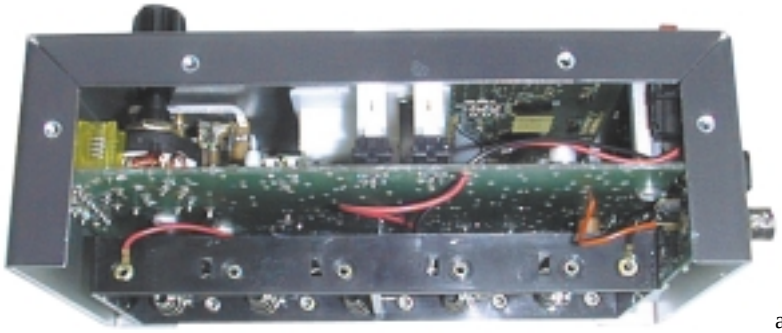
The holder for ten AA batteries inside the back of the MFJ-269.

MENUS & MEASUREMENTS

THE MFJ-269 HAS a large number of menu options, all of which are explained in the manual. Some require care in use, but the manual tries to teach you what you need to understand. It also gives plenty of warnings about the pitfalls, which is better than many manuals for 'professional' instruments that fail to warn you. The manual doesn't stop at describing the instrument itself, but also shows you how to use it for real-life practical tests. By the time you have mastered every option of the MFJ-269 and its manual, you'll know a lot about impedance measurements and transmission lines!

At switch-on, the MFJ-269 starts in its main menu, in 'Impedance R&X' mode. This displays frequency, SWR, and the resistive and reactive components (R and X) of the load attached to the N socket. As explained in this month's *In Practice*, an instrument like the MFJ-269 cannot distinguish between positive and negative reactance (inductive or capacitive), but the manual explains how you can usually determine this by noting what happens when you make a small change in frequency. This is a weakness of the MFJ-269, although I have also tried a competing instrument that *claimed* to give the correct sign for X but didn't always get it right - which in some ways is even worse.

* *52 Abingdon Road, Drayton, Abingdon, Oxon OX14 4HP. E-mail: g3sek@ifwtech.demon.co.uk*



Behind the battery holder, the PCBs.

The MODE button gives access to other measurement features in the same menu. 'Coax Loss' estimates the loss of an unterminated length of coax by measuring the SWR. This measurement is at its most accurate with quite lossy coax, but a short length of low-loss coax will produce a SWR that is too high to allow an accurate estimate of loss. 'Capacitance in pF' converts the X measurement into an equivalent capacitance at that frequency, and 'Inductance in µH' does the same for inductive reactance. At the same time, the IMPEDANCE meter displays reactance in ohms and the SWR meter is also active. Once again, it's up to you to decide whether the load is in fact capacitive or inductive and choose the correct option; the opposite option will give the inductance or capacitance necessary to series-resonate the measured reactance.

The final option in the MFJ-269's main menu is 'Freq Counter', which disables the internal signal source and impedance measurement, and counts the frequency of an input on a separate BNC socket. The GATE button lets you choose the gate time and counting precision, eg a 0.01s gate time will count to the nearest 10kHz, 0.1s to 1kHz and 1s to 100Hz. However, you should note that the internal clock frequency of the MFJ-269 is derived from an un-stabilised crystal oscillator. From this main menu, only SWR and 'Coax Loss' are available in the UHF band.

Further 'advanced' menus are available by pressing the MODE and GATE buttons at the same time, for several seconds. 'Advanced 1' includes impedance readout in Z-θ mode (magnitude and phase), and if you press the GATE button you can cycle through the alternatives of equivalent parallel impedance, Rp and Xp, or the series equivalent (Rs and Xs, same as in the main menu). Alternatively, the MODE button gives access to 'Return Loss & Reflection Coefficient' displayed in addition to SWR, a 'Resonance Mode' which helps you to find resonance (X=0) more quickly, and a 'Match Efficiency' option which displays SWR in terms of 'percentage of forward power'. At UHF, the 'Advanced 1' menu allows only 'Return Loss & Reflection Coefficient' and 'Match Efficiency' in addition to SWR.

The 'Advanced 2' menu contains a number of handy features for transmission-line analysis. The first thing it asks is 'Velocity Factor?' The default value is 0.66 for solid polyethylene lines, and can be stepped up and down by the GATE and MODE buttons. The next rather clever option is 'Distance to fault in feet'. This is the handiest way I've ever seen to estimate the length of coax on a reel. It takes advantage of the fluctuating impedance that results from a mismatch somewhere further down the line (see Figs 1 and 2 later). If you know the frequencies at which the first two impedance minima occur, then you can calculate the distance to the mismatch - or rather, the MFJ-269 will do it for you. Just follow the instructions on the display. All of

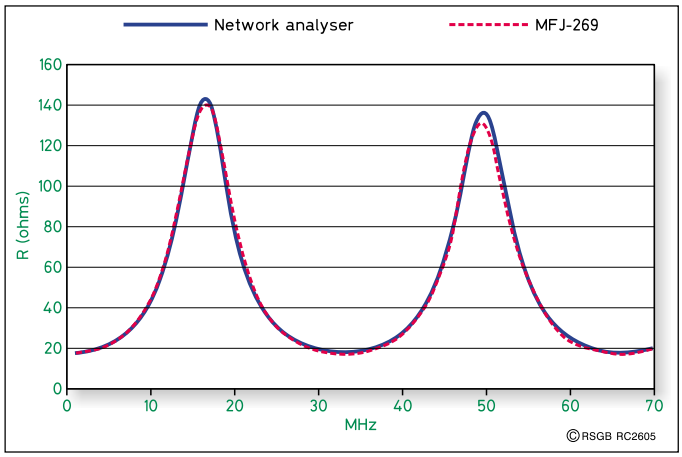


Fig 1: Comparison between R measurements by the MFJ-269 and the reference Hewlett Packard network analyser, using the standard test load [1].

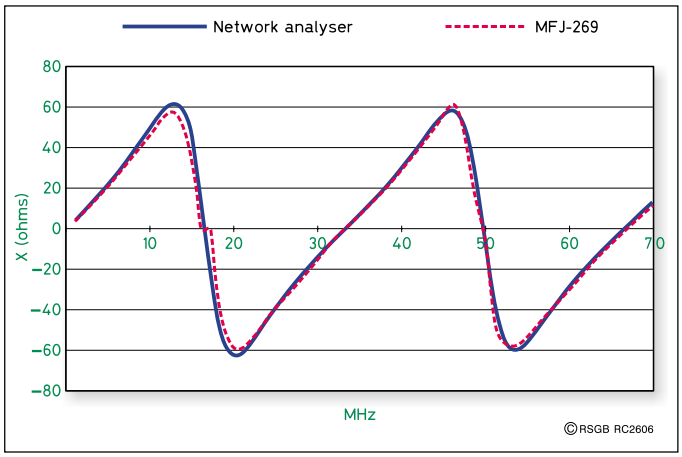


Fig 2: Comparison between X measurements by the MFJ-269 and the reference network analyser, using the standard test load [1]. For the MFJ-269, the sign of the X readings was determined from the network analyser results.

these features are available on UHF as well. Finally, the 'Advanced 3' menu (HF/VHF only) allows you to set a different characteristic impedance from the default of 50Ω, and then gives access to Rs, Xs and SWR measurements or the 'Coax Loss' feature.

ON TEST

ALL THE ACCURACY tests were done in the default Rs-Xs mode. Other output modes such as Rp-Xp and Z-θ would have given equally appropriate results, because they are all computed from the same voltage measurements. With an accurate 50Ω load, the MFJ-269 reported Rs = 50, Xs = 0, SWR = 1.0 at all frequencies from 1.74 to 162MHz, and then Rs = 49, Xs = 1 up to 174MHz. The SWR meter read exactly 1 and the IMPEDANCE meter just a touch above 50Ω. This is excellent - I've seen competing products that didn't even clear this first hurdle. On the UHF band there are no R-X readouts and the IMPEDANCE meter does not function, but the same 50Ω load gave an SWR indication of 1.1 on both the meter and the display, which is accurate enough for most normal purposes.

The next tests used an open or short circuit. These are extreme situations, which really stretch the abilities of any impedance analyser. An open circuit is rather difficult to produce because fringing fields inside the open N socket make it look like a capacitor at higher frequencies. The MFJ-269 reported Z>1500 at all frequencies up to 30MHz, and above that frequency it reported a capacitor with Rs=0 and a very high X value. A good-quality N short-circuit was reported as Rs=0 at all frequencies, and Xs only started to move away from zero at 50MHz. Both of these results are very creditable indeed - any small deviations may simply be because the open or short was at the end of the socket, not right at the bridge where the impedance is measured. For both the open and the short circuit, the SWR meter hit the stop and SWR was displayed as >31. On the UHF band there are no R-X readouts or IMPEDANCE meter display, only SWR, which was correctly reported as >31. Once again, these are very good results from extreme tests.

The next series of tests was with a mismatched dummy load of three paralleled 51Ω chip resistors at the end of 3.0m of RG58 coax [1]. This gives an SWR very close to 3 at all frequencies, decreasing slightly at VHF and UHF owing to cable losses. The effect of the cable is to make the phase angle of the mismatch go through cycles of changing R and X, and this is a good way to put an impedance analyser through its paces. **Table 1** shows the results on the amateur bands, comparing the readings reported by the MFJ-269 against results from a recently calibrated HP4195A Network/Spectrum Analyser with HP41951A Impedance Adapter. As already explained, the MFJ-269 cannot itself distinguish between positive or negative reactance, so the user has to supply the plus and minus signs from outside knowledge. Considering that the MFJ-269 only displays R and X to the nearest whole number, the agreement up to 70MHz is generally excellent for R and generally good for X. The agreement at 144MHz is poorer, and really the MFJ-269 can only be considered a semi-quantitative instrument for that band - but still good enough to give very significant insights into the way an antenna is behaving.

The final accuracy test was a sweep of R and X at 1MHz intervals from 2 to 70MHz. **Fig 1** and **Fig 2** compare the MFJ-269's results for R and X against the network analyser. The cyclical variation of both R and X is due to the length of cable between the mismatched load and the test point. Once again, the user has to supply the plus and minus signs for the reactances. Agreement with R is very good, as Fig 1 shows, especially considering that the results are rounded to the nearest whole number. However, the R results also show some signs of 'side-slip' around 50MHz and here the errors (measured vertically) become larger. The side-slip is even more apparent with the X results, and the errors are largest each side of the level spot around 16MHz. This seems to be because the MFJ-269 sometimes truncates low values of X to zero; yet in other cases (33, 50, 66MHz) the zero crossings are handled smoothly.

MHz	Network Analyser			MFJ-269		
	R	X	SWR	R	X	SWR
1.8	18.2	8.1	2.8	18	8	2.6
3.5	19.7	15.8	2.8	19	15	2.7
7.0	27.4	33.1	2.8	27	32	2.9
10.1	44.4	51.2	2.8	47	48	3.0
14.0	105.0	57.8	2.9	106	49	3.0
18.1	123.0	-46.7	2.9	122	-42	3.0
21.0	65.3	-60.5	2.8	67	-59	3.0
24.9	31.8	-38.7	2.8	31	-39	2.9
28.0	22.6	-22.3	2.7	23	-22	2.7
50.0	136.0	-10.1	2.7	131	-12	2.9
70.0	21.0	14.6	2.6	21	14	2.7
144.0	50.3	48.4	2.5	59	45	2.4

Table 1: R, X and SWR readings for the test load [1] on the amateur bands.

CONCLUSIONS

THE MFJ-269 IS a very sound and functional little test instrument. The features for impedance and transmission line measurements are extensive, and overall the measurement accuracy of the MFJ-269 holds up well against the network analyser that cost over a hundred times more (and seems to weigh over a hundred times more, too). There are few amateur applications that would need higher accuracy than the MFJ-269 can provide.

The list price is £299, and my thanks to Waters & Stanton PLC for the load of the review model.

REFERENCE

[1] *In Practice*, July 1997, Fig 5. ♦

inpractice

by **Ian White,** G3SEK*

http://www.ifwtech.com/g3sek E-mail: g3sek@ifwtech.com

SWR ANALYSERS

HERE IS SOME technical background to the review of the MFJ-269 analyser on page 34.

THE MFJ-269 USES a classic Wheatstone Bridge to measure an unknown impedance (**Fig 1a**). Three of the bridge arms are 50Ω precision chip resistors and the fourth is the unknown impedance Z, which Fig 1a shows as resistance R in series with impedance ±X. The tunable signal source feeds about 1V RMS into the bridge, and the instrument measures the four voltages V1-V4 using diode detectors (see below). Then the microprocessor does the necessary calculations and displays the results.

Fig 2a shows how an unknown impedance Z can be drawn graphically: resistance is plotted horizontally and reactance vertically, above or below the resistance axis. Positive reactance means inductance; negative reactance (below the resistance axis) means capacitance. The two axes at right-angles also show the magnitude of the combined impedance, |Z|, and ϕ (phi) is the phase of the voltage developed across it. The magnitude |Z| is given by the hypotenuse of the right-angled triangle formed by R and X:

$|Z| = \sqrt{(R^2 + X^2)}$

Fig 2b shows the situation corresponding to Fig 1a, when measuring an unknown impedance consisting of both resistance (R) and reactance (X). The voltages developed across R3 (50Ω) and the unknown R are in phase, and are plotted in a straight line. The voltage V4 measured across the unknown impedance is proportional to |Z|, and deviates by the phase angle ϕ. The total applied voltage V1 is proportional to the hypotenuse of the triangle made by (R3 + R) and reactance X. Therefore if you measure V1, V3 and V4, and note that V3 is developed across 50Ω, you can find both R and X by geometrical calculations. However, the magnitudes of V1, V3 and V4 give no indication whether the reactance X is positive or negative - for all we know from the voltage measurements, most of the vector diagram in Fig 2b could be below the horizontal line instead of above it.

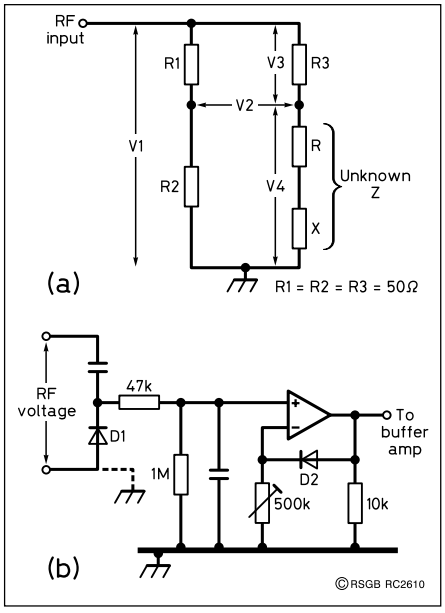


Fig 1: (a) Outline circuit of the impedance bridge. (b) Outline circuit of the diode detectors used to measure V1-V4, and the lineariser circuit.

Fig 2b shows a favourable situation for accuracy, where the unknown R and X are similar in magnitude, and both are comparable with the 50Ω standard R3. Measuring V1, V3 and V4 then gives an accurate 'triangulation' on both R and X. If either R or X becomes very large or very small, the accuracy of the triangulation will suffer because one side of the voltage triangle will become very short and the other two sides almost equal. All bridge methods of impedance measurement can be analysed in a similar way and suffer from very similar problems.

SWR measurements in the MFJ-269 are much more direct. The ratio V2/V1 gives the magnitude of the voltage reflection coefficient |ρ| (rho). The microprocessor then calculates SWR from:

$SWR = (1 + |\rho|)/(1 - |\rho|)$

This is also the equation that produces the classic non-linear scale on the analogue SWR meter. As with impedance, the accuracy of the SWR measurement is best in the middle range. Both low and high SWRs suffer from increasing errors.

In the MFJ-269, the voltages V1-V4 are measured by zero-bias Schottky diode detectors, which have a very low threshold voltage. Each detector is followed by a 'lineariser' circuit, to compensate for any residual threshold voltage and curvature in the diode characteristic (**Fig 1b**). The circuit consists of the detector diode D1, followed by an op-amp with a matched diode D2 in the negative feedback loop. This gives the lineariser an input-output characteristic directly opposite to that of the detector diode, making the output voltage of the whole circuit directly proportional to the applied RF voltage. In the MFJ-269, each lineariser has a factory-adjustable trimpot to give the best possible linearity, and is followed by a unity-gain buffer amplifier to avoid loading the output. After this processing, the V1 signal is used to control the output level from the two-transistor VFO, to ensure that a constant RF voltage is fed to the bridge.

The linearised and buffered V2, V3 and V4 signals are fed to three inputs of an analogue-to-digital converter (ADC). To compensate for even the smallest variations in the RF voltage applied to the bridge, the V1 signal is used as the voltage reference input of the ADC, so that all other voltages are measured as a ratio to V1. The digital outputs from the ADC are then fed to the microprocessor that does the calculations and drives the digital readouts. In addition, the MFJ-269 uses the V2 signal to feed the moving-coil SWR meter and the V4 signal to feed the IMPEDANCE meter.

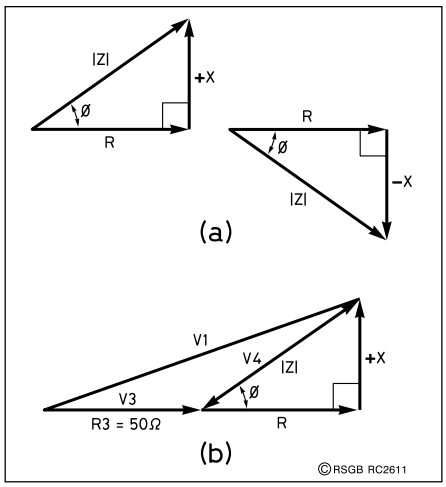


Fig 2: (a) Vector representation of an impedance Z as a resistance R in series with a reactance ±X. (b) How the bridge circuit of Fig 1a measures impedance.

This type of impedance measurement is vulnerable to two kinds of error that are caused by the bridge and detector circuits being very broadband. One is from harmonics of the signal source. For example, the feedpoint impedance of a low dipole can be very close to 50Ω, and should thus show an SWR close to 1. However, at the second harmonic the feedpoint is almost completely mismatched, so any second-harmonic content from the signal source will be reflected. The broadband detectors and the microprocessor cannot tell the difference from reflected power at the fundamental frequency, and will thus display an incorrectly high SWR. In different circumstances, the error could be in the opposite direction. Since harmonic filtering is impractical in a wide-range tunable oscillator, the solution is to avoid generating harmonics in the first place. The MFJ-269 uses an oscillator circuit with external level control, and operates the buffer and output amplifiers in class A at high bias currents to improve linearity.

The second source of error is direct pickup of strong signals during antenna measurements. For example, at Top Band an antenna could pick up very strong signals from a local MW broadcasting station, and strong signals abound at multi-transmitter VHF/UHF sites. The solution is to apply a larger RF voltage to the bridge, to swamp the effects of RF pickup in all but severe cases. Unfortunately the requirement for a higher RF level is opposed to the requirement for low harmonic content, and the best compromise usually involves more drain on the battery.

Alternatively, one can abandon the broadband approach and detect the signal source using a tuned measuring receiver. This synchronous detection approach has up to now been the province of full-performance network analysers, but the situation

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

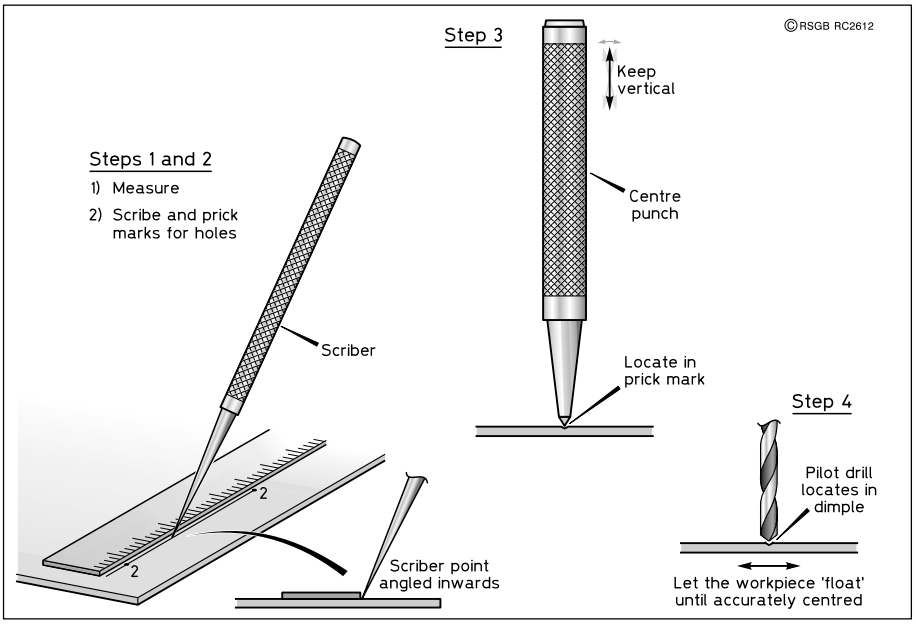


Fig 3: Marking and drilling pilot holes - steps 1 to 4.

is changing rapidly. There are already professional portable and hand-held synchronous impedance analysers on the market, and the price of the technology is coming down. In the meantime, the broadband 'lite' approach can be made to work very well, and has already brought real measurements into the reach of us amateurs.

LINING UP HOLES

HOWEVER MUCH I try, I can't drill lines of holes in two pieces of metal accurately enough to make them match up.

MAYBE YOU'RE USING the wrong methods for marking-out and drilling. For amateur construction it is not important that the holes are marked out in precisely the right places - the important thing is simply that that those two pieces fit together properly. Therefore you should only mark out *one* piece, and mark and drill the other from it. Otherwise you would need to mark and drill both pieces accurately, and that's probably what you're failing to do. As an example, here is the easy way to fix a lid to a flanged box.

1. Decide where the holes need to be in relation to the flange, and the size of the rectangle on which all the holes will lie. Work out how far from the edge of the lid the lines need to be.

2. Measure and mark this rectangle on the underside of the lid - no point in leaving your markings showing, if you can avoid it. For marking, you would normally use a ruler, square and a fine-pointed scriber (see *In Practice*, January 1998). You don't need to scribe at all hard, just enough to see clearly. Gently prick the positions of the holes (**Fig 3**).

3. Use a centre-punch to deepen the prick-marks so they will locate the point of a small pilot drill. Feel carefully for each dimple with the point of the punch, and be sure to tap the punch vertically (Fig 3). Take extra care if you're using an automatic spring-loaded centre-punch, because it's difficult to keep pushing in a straight line against the recoil of the spring. A plain punch with a small hammer can be more accurate.

4. Carefully drill each centre-punched hole out to say 1.5mm or 1/16in. If you are drilling freehand, always drill vertically downwards, and don't push too hard. Let the drill point find the centre of the punch mark, and then find its own way through the metal, otherwise you'll break the drill. It's better to use a drill press, and for this size of hole in a reasonably large piece of metal, you don't need to clamp the workpiece down. Rather the contrary - you should let the workpiece 'float' on the drill table until the drill has found the punch mark and is running straight. Then press to hold the workpiece firmly, and once again let the drill drop through the metal rather than pushing it [1].

5. De-burr the holes through the lid on both sides, using a 3mm or 1/8in drill twisted in your fingers. Again, keep this drill at right-angles to the hole and don't start to excavate the hole itself. You only need to get the ragged burr off so that it doesn't deflect the point of the larger drill in steps 7 and 8.

6. Carefully locate the lid exactly where you want it on the top of the box, and tape it down in at least four places so that it won't move. Still taking care not to disturb the lid, scribe through two diagonally opposite holes to mark their centres on the flange of the box. Remove the lid, centre-punch these holes and drill them using the same pilot drill.

7. Drill out the two holes in the box and the corresponding two holes in the lid to the correct sizes. The holes in the lid will almost inevitably need to be larger than the holes in the box - and certainly so if you are using self-tapping screws or intend to tap threaded holes in the box. When using the larger-sized drill, make sure the drill point is accurately centred in your pilot holes. Replace the lid and fit the two screws to hold it firmly in exactly the current position.

8. Now you can safely go around all the rest of the holes, drilling through with the pilot drill without any danger of the lid moving (**Fig 4**). There's no need to centre-punch the box, because your pilot holes act as a template to locate the drill. Warning: don't kid yourself that you can skip over step 7 and drill all the holes with just tape holding down the lid. It *will* move, and there's the end of your carefully aligned holes!

9. Remove the lid again, and open out all the holes.

You should now have a neat array of holes in the lid, that line up very accurately with the holes in the box. Unless you were extremely accurate in the initial marking-out, punching and drilling, the lid may only fit one way round, but that doesn't matter. Very often, there will be other reasons why you only ever want to fit the lid one way.

To recap: use a small pilot drill to make it easier to centre the drill accurately on your punch-marks; then do most of your drilling on the second piece using the first piece as a template. Take your time, treat it as a 9-step job rather than one single bash, and you'll be proud of the results.

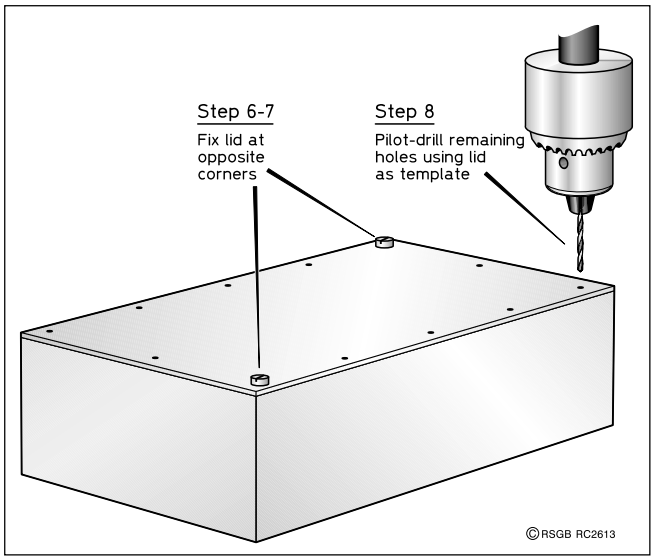


Fig 4: Using the pilot-drilled lid as a template - steps 6 to 8.

NOTE

[1] This sense of gentleness with metal, of 'letting the drill do the work', is something you can only develop by feel and experience - but when you've got it, you'll know it. (You can lose it again if you are hurried and stressed, but that's a much longer story.) ♦

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

eurotek

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

*After 25 years as Chief Editor of Electron (NL) and monthly contributor of 'Reflections by **PA0SE**', followed by three years of occasional articles, **Dick Rollema** now takes up where the late Klaas Spaargaren, PA0KLS, left off. The first of, we hope, regular 'Notes by PA0SE', investigates the matching of his **3.5MHz doublet on 1.8MHz**. From Electron 2/00.*

ON THE MF and all HF bands, PA0SE uses the antenna shown in **Fig 1.** The feedpoint in the centre of the radiator is 18m above ground level, the ends somewhat lower. In the horizontal plane, invisible in Fig 1, the angle between the two halves is 100°. On 14MHz, the V-beam effect gives a gain near 3dBd in the optimum direction. The open-wire feeder leads into the shack in the loft.

Looking into the feeder from the shack end, the impedance on 1.84MHz was measured to be the equivalent of a 2.6Ω resistor in series with a 190pF capacitor, ie low resistance, high reactance (-j455Ω). Great care would be required to keep tuning and matching losses to a minimum.

MATCHING TO 50Ω

THE SUBSTITUTE diagram of 2.6Ω in series with 190pF is shown in **Fig 2a**. To design the ASTU, it is easier to work with the parallel equivalent, which works out [1] to be 190pF in parallel with 80kΩ, **Fig 2b**. To tune this capacitive reactance out, an inductance of +j455Ω (39.3mH@1.84MHz) [2] must be connected in parallel with it.

This inductance is made from a fixed coil of 29mH in series with a roller-coaster of 18mH max. The fixed coil consists of 36 double-spaced turns of 1.5mm silvered wire, spaced over a length of 80mm on a 51mm diameter fluted ceramic former. The roller-coaster has 27 turns of the same diameter, spread over a length of 99mm. The Q of the two in series and set to 39.3mH was measured to be 175. See **Fig 2c**.

Link coupling is used to transform the high impedance of the parallel-tuned circuit to 50Ω; 2 turns of plastic-insulated 1.5mm² solid copper wire around the fixed coil proved to be just right, but more turns can be made to work by reducing the coupling, eg by placing a variable capacitor (of the valve MW receiver type) in series with the link. The link must be placed at the 'cold' centre of the inductance, which can be found by probing along the coil with a neon bulb. If this is done at the centre of the frequency range of interest, a match can be obtained over that range by adjusting the roller-coaster without seriously unbalancing the system.

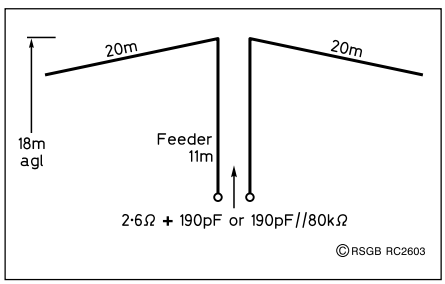


Fig 1: PA0SE's doublet. In the horizontal plane, the angle between the 20m legs is 100°.

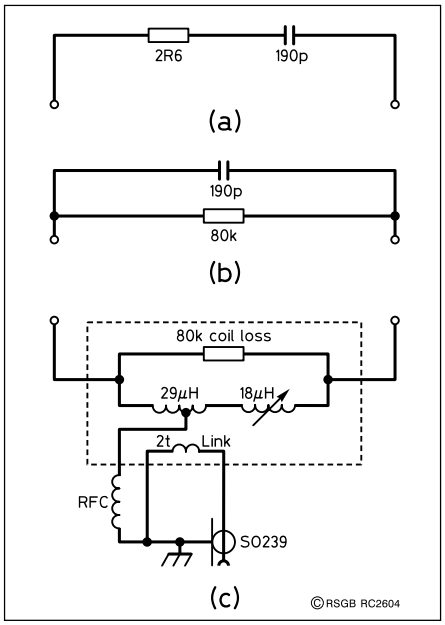


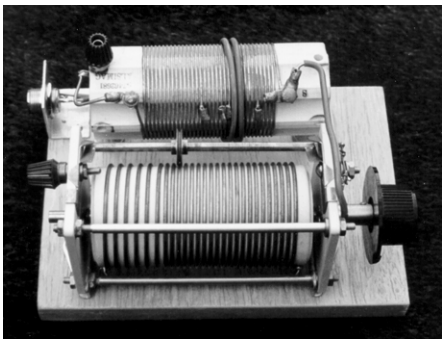
Fig 2: Matching to 50Ω. (a) Feed impedance measured in the shack. (b) The parallel equivalent of (a). (c) ASTU.

LOSSES

THE LOSS IN the coil can be expressed as a resistor across it, which can be calculated if, as here, the frequency, the inductance and the Q are known [3]. This loss resistance turns out to be 80kΩ, the same as the resistance of the load in Fig 2b. 3dB, half the transmitter power is dissipated in the coils!

The loss in the coils is not all. K6STI's computer program NEC/WIRES indicates that, above average earth, the loss in the radiator proper, using 1.5mm copper wire, is 0.9dB (with 3mm wire it would have been 0.5dB). An ARRL feeder program computes an SWR of 287:1 (!) and a feeder loss of 1.3dB.

The system loss is 3 + 0.9 + 1.3 = 5.2dB, almost a full S-point. This could be improved only by using heavier wire and larger, higher-Q coils, but that would be quite bothersome. As it stands, only 30% of the transmitter output of 125W, ie 38W, is being radiated. That is enough, however, to regularly produce S9+ reports from the UK and Germany.



PA0SE's 1.8MHz ASTU.

¼λ DIPOLES ON HF

HAVING NOTED THE big losses suffered, even in an optimized ASTU used with an undersized antenna, a 2 x 10m dipole with 10m of 600Ω open wire feeder was modelled at 3.65MHz. The figures turned out less ornery. Looking into the feeder from the shack end: 4 - j157Ω . Loss in the feeder and radiator: 1.5dB. Loss in a coil of +j157Ω with Q = 175: 0.9dB. (On 3.65MHz a much higher Q can be achieved without undue bulk) Total loss: 2.4dB, ie about half the loss of a ¼λ 1.8MHz dipole system.

THE MECHANICS [G4LQI]

125W INTO A load of 40kΩ produce a voltage of 2236V RF across the coils and the feeders. Serious burns can result from touching either. With the coils in a plastic (bread?) box and the indoor portion of the feeder made of RG213 minus outer jacket and braid, that danger is avoided. There also is a danger of dielectric loss, or even fire, from inadequate feed-though insulators from the shack to the outdoors; No wires squeezed between window and window frame, please! Two small holes through a glass or Perspex window pane, sealed with silicone, will be fine.

The current through the coil and into the feeder will be 2236/455 = 4.9A. Not terrible, but enough to burn an improperly made connection. Any connection must be mechanically sound before soldering. ♦

NOTES

[1] $R_pR_s = R_s^2+X_s^2$ and $X_pX_s = R_s^2+X_s^2$

[2] $X_L = 2\pi fL$

[3] $R_p = 2\pi fLQ$
$= 6.28 \times 1.84 \times 39.3 \times 175$
$= 80k\Omega$

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

Newcomers' News

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

SPRINGTIME is upon us and thoughts begin to turn to outdoor activities. I intend to take to the hills for some portable QRP activity and hopefully to work some of you on the air. As a Novice instructor, I am always very pleased to return calls from those who have finished their training courses and passed their exams. See you in the 50MHz Backpacker, perhaps?

SCOUT RADIO

THIS MONTH I received a copy of the newsletter *Scout Radio*. The magazine is published quarterly and is intended to keep scouting radio amateurs in touch with developments in Scouting and in amateur radio.

The issue I was given contains a wide range of material, including reports on Jamboree on the Air (JOTA) 1999, a communications hike organised by the Cheshire Radio Scouting Team, the future of Radio Scouting and lots more!

One rather sad piece in the newsletter is the demise of the Scouts' Radio Technician badge. It would appear that the Radio Communicator and Technician badges have been combined into a single award, but the Technician badge can still be awarded until stocks run out. Perhaps an additional incentive to get involved with JOTA 2000?

Subscriptions for *Scout Radio* cost £5 per year for UK addresses and can be obtained from Geoff Dellbridge, G0PMF, 19 Cleeve Close, Astley Cross, Stourport-on-Severn, DY13 0NY.

NOVICE CONSTRUCTION

SIX METRE construction seems to be of interest to many readers. I have had a steady stream of enquiries about the G4LPD modifications to the 50MHz transmitter from John Case's book *Practical Transmitters for Novices*, mentioned in the March column. The six metre band is, of course, the lowest VHF band available to all licensed radio amateurs and, whilst construction at VHF is not quite as forgiving as at HF, construction does not call for the specialist techniques required for UHF and microwaves. If any of you have tips or ideas for getting newly-licensed Class Bs on the air without breaking the bank, do not hesitate to let me know.

I have also been in correspondence with Ian Liston-Smith, G4JQT, whose frequency-modulated transmitter for ten metres was featured in the February and March 2000 editions of *RadCom*. I wondered if the six metre receiver in one of John Case's other books, *Practical Receivers for Beginners*, could be modified to work with Ian's transmitter on 29MHz. He believes it could, so another *RadCom* feature may be in the offing.

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

Jacob Howarth, G0FUW Junior Op No 3, building the Lake Novice Receiver (see 'Novice Construction').

NOVICE LEAGUE?

SHOULD THERE be a Novice league table? Colin Fallaize, 2U0ARE, has suggested that there should be 'tables' for the Novice bands using VHF squares and HF countries, similar to those run by Don Field, G3XTT, in *RadCom*'s 'HF' column. There is nothing to stop Novices from entering the existing tables and Colin actually features in Don's 28MHz Countries Table with 48 CW countries to date. Well done Colin!

What do you think? Should Novices have their own table? I would be quite willing to keep the scores and report progress from time to time. Who knows, we might even be able to find a sponsor for a small end-of-year trophy? Let me have your views and any ideas on how to score the tables. My contact addresses are given below.

NEWCOMER'S RECOLLECTIONS

JIM SMITH, G7WFP, is hardly a newcomer to the hobby, but he counts himself as a novice in the 'new world electronics and chips'. Jim has written to me to relate some stories of his early days as a radar mechanic in the Royal Navy during WW2 and his current struggle to get his Morse up to test speed in order to progress on to a full A licence.

Jim notes how different things are for today's newcomers and recalls the days when amateurs could get hold of 'bins full' of discarded valves to build their own equipment. However, his story of how he had burn holes each side of his finger for years from when a spark went through his hand after accidentally touching a transmitter output, serves as a stark warning for anyone starting out with valves or high powered transmitters! Jim is QTHR if anyone would like compare notes.

KIT COMPETITION

I HAVE now received the MW receiver kits from Alan Lake and Tim Walford mentioned in last month's column. The kits are currently 'under construction' and will be reviewed shortly. First impressions are that both would suit a newcomer to construction.

Both kits have kindly been donated and could be yours! All you have to do is tell me in about 500 words how you came to be interested in amateur radio and what you have done since you first became interested. I hope to publish the best two and the authors will receive either the *Radio Today Chedzoy* or the *Lake Electronics Novice MW Receiver* (please specify your preference). The closing date for entries by post or e-mail is 30 June 2000. ♦

Spread The Word!

Send your news and colour photos to: Steve Hartley, G0FUW (address opposite).

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

Down To Earth

An Introduction to VHF/UHF Range

By Richard Newstead, G3CWI *

MANY NEWCOMERS to amateur radio begin operating on the VHF or UHF bands. The frequency spans of these bands, shown in **Table 1**, are defined by the International Telecommunications Union.

We all know that during a 'lift', distances of 1000 kilometres or more are possible in the higher VHF and UHF bands, but how much range can be expected under 'flat' conditions? Even before starting to transmit, we all have some idea of the range we might achieve based on our experience of radio systems within the bands. For example, the FM broadcast band is in the region of 100MHz and anyone with an old style FM radio in their car knows that it generally needs to have the channel changed every 30 to 40km. Newer radios with RDS do the re-tuning automatically. The television band lies in the 500-800MHz region and the maximum range is usually about 50km. So what is it that determines the range that can be achieved? An expression that is sometimes used in these bands (particularly at UHF) is that propagation is "line of sight". However, this tends not to be very useful - even as a rule of thumb - and it's easy to see why with a few simple calculations.

Band	Lower Band Edge	Upper Band Edge
VHF	30MHz	300MHz
UHF	300MHz	3000MHz

Table 1: The internationally agreed limits of the VHF (Very High Frequency) and UHF (Ultra High Frequency) bands.

INDUSTRIAL PRACTICE

WHEN PROFESSIONAL engineers design radio systems they are usually interested in the range that can be achieved. It can be critical to get this right, as a underestimate of only a few per-cent would mean huge additional costs with cell-phone systems which have many thousands of sites across the country. The first stage in all these calculations is to work out how much signal you can afford to lose along the path between the transmitter and receiver, so that there is enough signal left to be readable. This is actually quite easy to work out. Let's assume your 50Ω receiver input needs 0.5 microvolts for a readable signal. Using the familiar equation $P = E^2/R$ we can calculate that 0.5 microvolts = 5×10^{-15} Watts (a very small amount of power). To make this easier to handle, we can turn it into decibels relative to 1 Watt, $10 \times \log(5 \times 10^{-15})$ = -143dBW. If we assume that the antenna system has no gain (or loss), then this is the signal level that we need for acceptable reception. Now, looking at the transmitter end, let's assume that it runs 10 Watts (10dBW) and again that the antenna system has no gain (so that the Effective Radiated Power is 10dBW). In this case we can tolerate a loss of 153dB (the difference between 10dBW and -143dBW). This loss is sometimes called the *Basic Transmission Loss*.

If we imagine our path is actually line of sight (ie from the transmitting antenna we can see the receiving antenna), we can work out how far we can communicate using the Free Space Path Loss Equation which is:

Path Loss (dB) = 32.4 + 10log(d) + 20log(f)

(d is the distance in kilometres and f is the frequency in MHz). With a bit of rearranging and calculating we can construct the range graph shown in **Fig 1**.

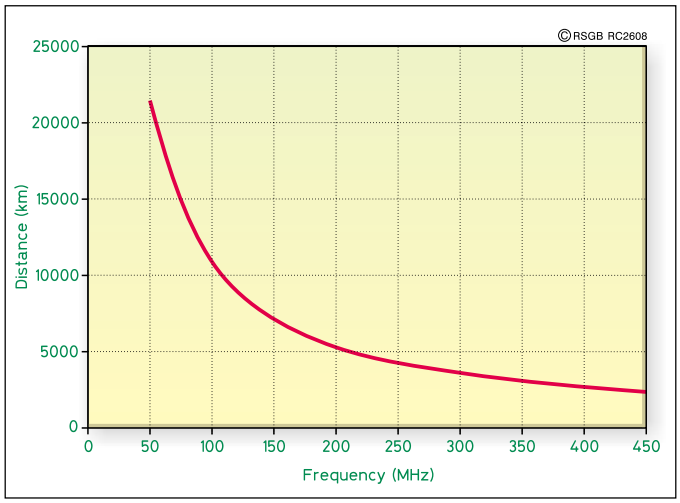


Fig 1: How far you can expect VHF and UHF signals to reach in free space.

Judging by this graph, on 6m (50MHz) you might expect a range of 22,000 kilometres and on 2m (145MHz) a range of around 7,000 kilometres. These distances would be accurate in space, but the actual ranges you might achieve here on Earth under flat conditions are much less, so the conclusion is that there are some other losses involved that we have not accounted for. These losses come from a variety of sources, but the two major ones are blocking of the signals due to terrain (the signals don't bend around hills very well), and blocking of the signal due to trees and buildings. The other major factor is that the earth is not flat. After the horizon is reached, the curvature of the earth itself gets in the way. Now we are into some much more complex calculations to work out the range.

ENGINEERS' APPROACH

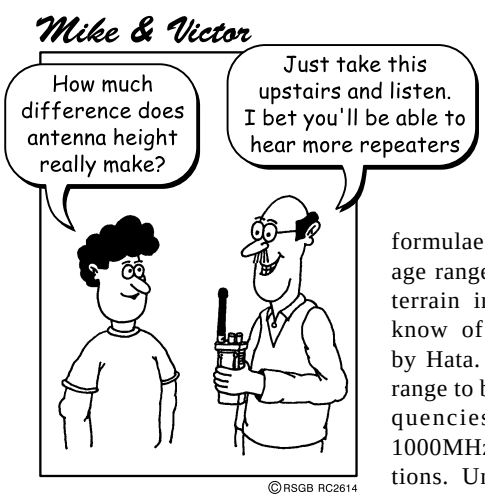
PROFESSIONAL engineers use a variety of techniques to estimate range, taking into account the various obstructions we have identified. The most commonly used techniques calculate the diffraction losses over the obstructions. This can be very laborious, because to calculate the range in any one direction the calculations need to be done for all the points along the path. Fortunately, computer programs take the hard work out of this. On the opposite page you can see three coverage predictions from a sophisticated software propaga-

*89 Victoria Road, Macclesfield, Cheshire SK10 3JA.

50MHz coverage map.

tion-modelling package. It uses terrain heights accurate to 1m, every 50m along each path. It also has details of other obstructions in the area, such as houses and trees. To generate these predictions I have selected a site somewhere in Cambridge and simulated a transmitter there with a vertical dipole antenna 10m above the ground. Using the figures above, the light blue shows where we would expect to get coverage with a probability of 90%. The grid on the plots is 10km. On 6m (50 MHz) virtually the whole area is covered. Moving to 2m (145MHz), there are some white patches indicating areas that are not covered to the standard we specified. On 70cm (435MHz), the range has dropped dramatically, with coverage only reaching about 10-15km in each direction.

144MHz coverage map.



Considering the modeling problems presented by the complexities of the environment, it is perhaps surprising that professional engineers have developed some fairly simple formulae for predicting average ranges that don't need any terrain information. The best know of these was proposed by Hata. His formula allows a range to be calculated from frequencies between 150 and 1000MHz in a variety of situations. Unfortunately it is not much use to radio amateurs, as the minimum antenna height that can be modelled is 30m.

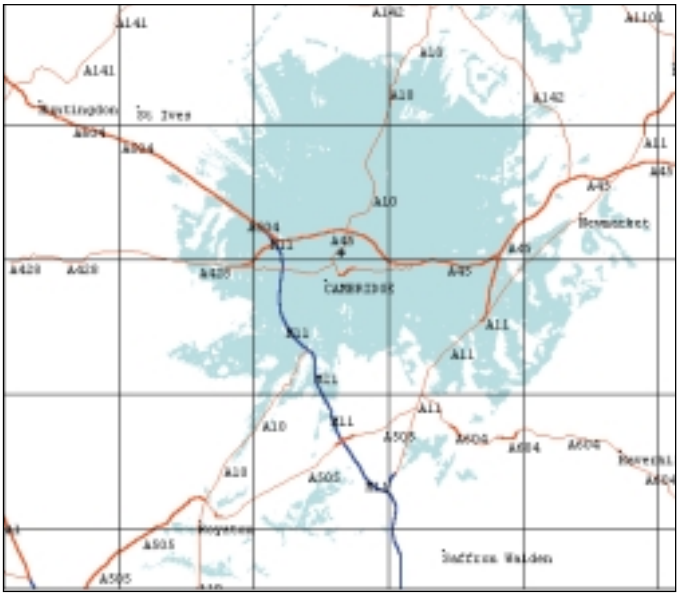
RULES OF THUMB

WHAT IS CLEAR is that, as a rule-of-thumb, range drops with frequency (all other things being equal). But that's not the whole story. In built-up areas, the higher frequencies tend to reflect better and can penetrate buildings better, as the shorter wavelengths can enter through windows. This effect is often quite marked in road tunnels, where 2m fades quickly whereas 70cm goes on much further. So, in built-up areas, higher frequencies may prove more effective.

Another factor to consider is that at the higher frequencies, due to the shorter wavelength, antennas become smaller. Consequently, for a given physical size of antenna, more gain can be achieved, countering the increased losses.

GETTING THE BEST

SO, HOW CAN WE get the best range? Getting your antenna as high as possible is the first thing to do. For the best range, it certainly needs to be clear of the rooftops and ideally clear of any other obstructions too. Antenna gain helps too. In general, gain can be achieved more easily with a Yagi than with a vertical such as a co-linear or ground plane. However, a Yagi must be rotated, making the whole antenna system more complex. Choosing the best co-ax you can afford to connect your antenna to your radio is the second thing to do. Losses in the co-ax reduce your transmit power, and you can lose those weak signals on receive too. For the ultimate in performance, use a masthead preamplifier - but choose one that won't get overloaded by strong signals. Finally, if all else fails, look for a house on top of a big hill - the extra height gained this way will make a *big* difference to your range on the VHF and UHF bands! ♦



432MHz coverage map.

Down To Earth

More From Your Dip Oscillator

By Ed Chicken MBE, G3BIK *

THE GDO OFFERS a quick and easy means of checking (to a degree of accuracy acceptable for experimental purposes) the inductance value of coils in the microhenry range and capacitors in the picofarad range, such as are commonly used in radio circuits. This can be very useful, for example, when constructing an ATU, a crystal set, a short-wave receiver, a VFO or a band-pass filter for a direct conversion receiver.

DETERMINATION OF L AND/OR C

FOR THIS purpose I keep with my GDO two fixed value RF coils of known inductance - 4.7µH and 10µH - and one capacitor each of 47pF and 100pF (but the choice of values is yours). You may decide to keep one or more of each, to be selected from **Table 1** and **Table 2**.

My personal choice of coil-type is the moulded RF choke (Maplin) or RF inductor (Mainline or RS). These are axial-leaded, ferrite based, encapsulated, easy to handle, and readily available at low cost in a range of fixed-value microhenries. The capacitors are 5% tolerance polystyrene, also axial-leaded.

To determine or verify the value of either an RF coil or a capacitor, simply connect the unknown component in parallel with the appropriate known component to form a parallel LC tuned circuit, ie an unknown L in parallel with a known C (or vice versa), then use the GDO to determine the resonant frequency of the parallel LC circuit. The value of the unknown component can then be obtained easily to an acceptable approximation, by using the relevant formula from Tables 1 and 2 and a pocket calculator.

The formulae were derived from the accepted formula for the resonant frequency of a parallel tuned circuit:

$$f_{Hz} = \frac{1}{2\pi\sqrt{LC}}$$

But note that in Tables 1 and 2, *F is the frequency in MHz as given by the GDO.*

* *Ivy Thorn Cottage, Hepscott, Morpeth, Northumberland NE61 6LQ.*

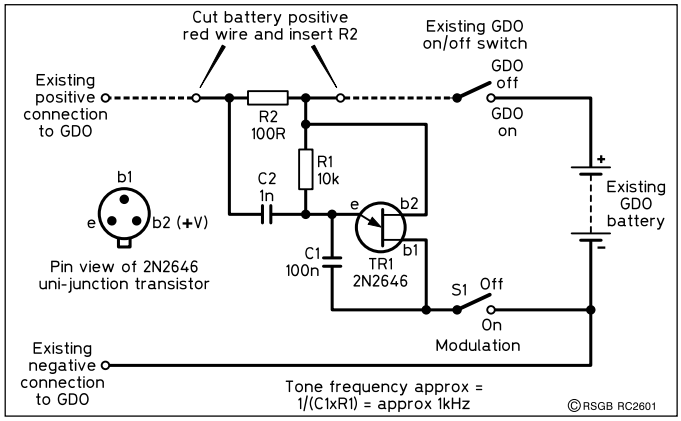


Fig 1: This audio oscillator adds a 1kHz AM tone to a GDO.

EXAMPLE 1

An unknown capacitor in parallel with my known 10µH inductor, produces a dip at 6.1MHz, hence F = 6.1

From Table 1, the value of the unknown capacitor is given by:

C_{pF} = 2533 ÷ F^2
= 2533 ÷ 6.1 ÷ 6.1
= 68pF

EXAMPLE 2

An unknown coil in parallel with my known 47pF capacitor, produces a dip at 12.8MHz, hence F = 12.8

From Table 2, the value of the unknown inductance is given by:

$L_{\mu H}$ = 539 ÷ F^2
= 539 ÷ 12.8 ÷ 12.8
= 3.3µH

Bear in mind that because the accuracy of results relies upon the frequency as derived from the GDO, it would be sensible to keep the coupling between the LC circuit and the GDO as loose as possible, consistent with an observable dip. This minimises pulling of the GDO frequency. Also, rather than relying upon the frequency calibration of the GDO itself, it might be useful to monitor the GDO frequency on an HF receiver or a digital frequency meter.

A final point worth considering is that each fixed-value inductor of the type mentioned might have its own self-resonant frequency, but these would typically lie above the HF range so should not be a problem. For example, the self-resonance of my own 10µH inductor is about 50MHz and that of 4.7µH is about 70MHz. You could quickly and simply find out the self-resonant frequency of an inductor, by taping it to each of the GDO coils in turn and tuning across the full frequency span.

It is best to make L and C measurements at frequencies much lower than the self-resonant frequency of your chosen test-inductor, but perhaps better be safe than sorry and stick with the lower µH values if your interest lies between 1.8 and 30MHz.

COMPONENTS

Resistors
R1 10k
R2 100R

Capacitors
C1 100nF
C2 1nF

Semiconductor
TR1 2N2646

for known L of:	1.0µH	2.2µH	4.7µH	6.8µH	10µH	22µH
unknown C_{pF} =	25330÷F^2	11513÷F^2	5389÷F^2	3725÷F^2	2533÷F^2	1151÷F^2

Table 1: To determine an unknown capacitor.

for known C of:	10pF	22pF	33pF	47pF	68pF	100pF
unkown $L_{\mu H}$ =	2533÷F^2	1151÷F^2	768÷F^2	539÷F^2	373÷F^2	253÷F^2

Table 2: To determine an unknown inductance.

TONE MODULATION

SOMETIMES IT IS useful to be able to hear an audio tone when using the GDO as an RF signal source in association with a radio receiver.

If your GDO does not have tone modulation, you might like to construct the simple add-on 1kHz audio oscillator circuit shown in **Fig 1**. It uses a unijunction transistor, the frequency of oscillation being given approximately by $1/(R_1 \times C_1)$. The 1kHz tone output connects via C2 to the positive supply line of the GDO, which it modulates. R2 acts as the modulator load and its value helps to determine the level of modulation. This produces simple but effective tone modulation of the GDO's RF signal, which can be heard on an AM or an FM receiver.

Fig 2 gives a suggested layout of the components on a small piece of stripboard, without the need for any track cutting. The finished board might conveniently mount onto one of the GDO meter terminals, provided care is taken to isolate the copper-tracks from the terminal. ♦

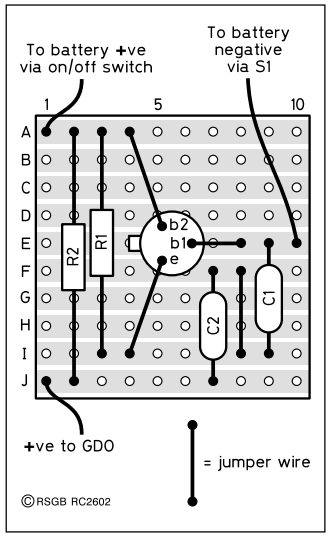


Fig 2: Stripboard layout.

bookchoice

BACKYARD ANTENNAS
by Peter Dodd, G3LDO

Described by RSGB Staff

TEXTS ON antennas abound. Some are highly theoretical, some are suitable only for the experienced plumber or mechanical engineer. Peter Dodd's book strikes the happy medium, adopting a thoroughly pragmatic approach to antenna choice and fabrication.

We all strive to achieve the best overall station performance, whether it is low or high power. In most cases however, the performance of the transceiver outstrips the performance of the antenna, usually because few of us live on farms and the 'real estate' available to us for our antennas is restricted.

This is not a comprehensive book about antennas, which Peter Dodd admits in the Preface. The number of antennas described is limited to those of which the performances are well-known. They are also relatively easy to put together.

Chapter 1 deals with long-term HF propagation prediction, because it may influence the type of antenna required. The limitations of locations and ways of circumventing them are also discussed.

Chapters 2 and 3 contain descriptions of various HF wire antenna designs, along with their advantages and disadvantages. Single-element HF antennas are classified (unconventionally) as transmission-line-fed, or end-fed, rather than simply horizontal or vertical. The reason for this becomes obvious as the chapter unfolds. Many antennas require an ATU, so the subject of ATUs is covered in a separate chapter, Chapter 4, to avoid repetition.

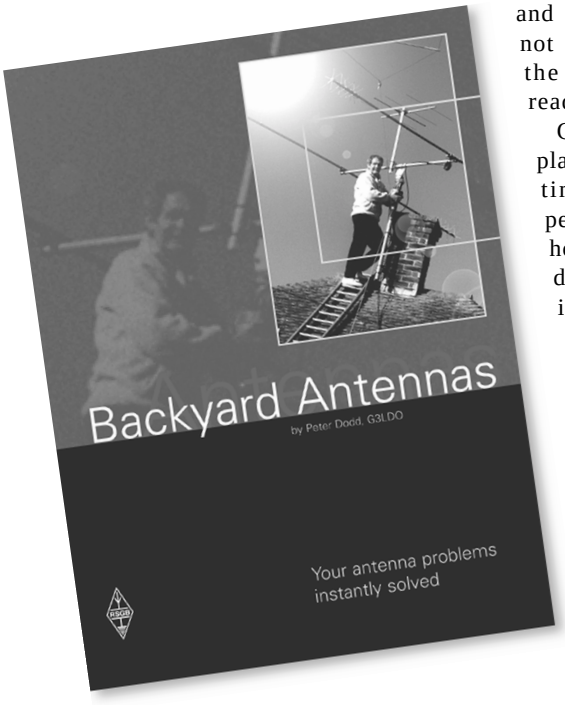
In these days of solid-state, fixed-impedance power amplifiers, an ATU is usually essential to the overall efficiency of an antenna system. Where the ATU becomes an integral part of the antenna itself, for example in end-fed systems, you will find its description with that of the antenna in Chapter 3.

Those constructors favouring the plumbing approach will appreciate the designs in Chapter 5, which covers compact loops, and Chapter 6, where small beams are described.

VHF and UHF systems are not forgotten. Chapter 7 includes antenna systems from 50 to 430MHz, with some practical designs for high-gain Yagis.

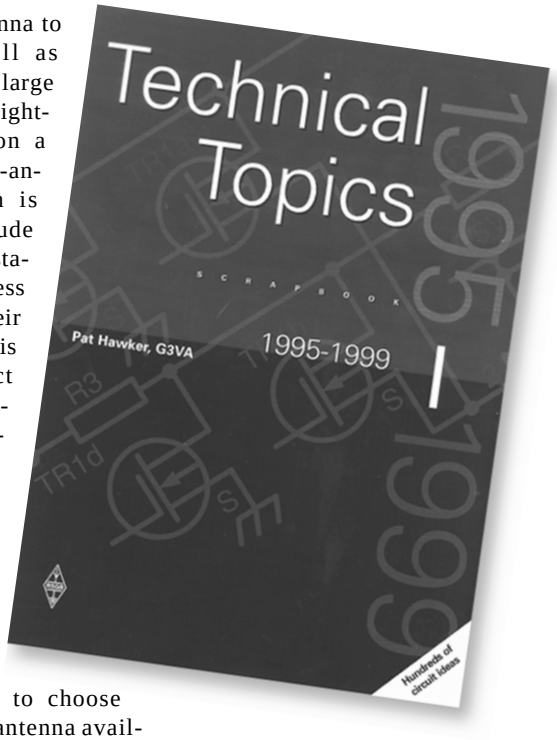
Chapter 8 gives some practical advice on where to find and how to use material for antenna construction. The all-important subject of fixing what you have built to your house is also covered.

Transmission lines are the subject of Chapter 9, with the minimum of theory and the maximum use of tables and graphs, so as not to deter even the most timid reader.



Chapter 10 explains how to estimate antenna performance and how to check it during or after installation.

Don't forget that if you are restricted to living in a semi-detached house with a 'post-age-stamp' garden, or in an apartment with no garden, you *cannot* expect your antenna to perform as well as someone with a large site and a six- or eight-element beam on a 25m mast. Small-antenna operation is largely an attitude of mind: mobile stations have even less room to erect their antennas, but this does not detract from mobile operation; QRP operators impose a different type of restriction, but low-power operation is immensely popular.



This book shows you how to choose and use the best antenna available for your site. The rest is up to you, to use it to the best of your ability.

RSGB, paperback, 244 by 177mm, 200 pages, ISBN: 1-872309-59-3
Non-members' price £18.99
Members' price £16.14

TECHNICAL TOPICS SCRAPBOOK 1995 - 1999
by Pat Hawker, G3VA

Described by RSGB Staff

THIS BOOK represents the third compilation of the pages of 'Technical Topics', produced by popular demand, covering the five years from 1995 to 1999.

Known almost universally (and reverently) as 'TT', it includes all the text, pictures and line drawings from the most popular column in the RSGB magazine *RadCom*. Pat Hawker's unique blend of excerpts from other technical magazines and journals with directly-contributed material, is interspersed with his own commentary, enriched by a lifetime of fascination for the technical aspects of radio, both professionally and as a radio amateur.

The pages are presented exactly as they appeared in *RadCom* and an index is provided. This invaluable collection of experimental antennas, circuit ideas and radio lore is a must for anyone keen on radio and electronics.

This new edition contains a brief CV of the author, which is as intriguing as the technical material. Pat obtained an 'Artificial Aerial' licence, 2BUH, at the age of 14, and a transmitting licence, G3VA, two years later. His wartime activities, including time with MI6, are mentioned, leading on to his experience as an editor and technical journalist. This included time with the RSGB, George Newnes Technical Books and *Electronics Weekly*. He joined the Engineering Information Service of the ITA (later to become the IBA) in 1968, until his 'retirement' in 1987.

Pat's more recent work for the RSGB has included some 15 editions of *A guide to Amateur Radio*, six editions of *Amateur Radio Techniques* and the 'HF Receivers' section of the 3rd to 6th editions of the *Radio Communications Handbook*.

1998 saw the 40th anniversary of the TT column, written since 1958 solely by Pat Hawker. He continues to make TT a fascinating column, mixing all the aspects of radio yet keeping it at a most practical and readable level.

There can be few radio amateurs who have never used a circuit or an idea from TT, or who have never learned from the wealth of information in these pages.

RSGB, paperback, 297 by 210mm, 314 pages, ISBN: 1-872309-51-8

Members' price £12.74

Listening to SAQ on 17.2kHz

*By Ted Crowley, EI3CY**

IN ITS November/December issue, *Echo Ireland*, *RadCom's* little Irish sister, announced "VLF Transmission from SAQ in Sweden, 1 January 2000, 1200 to 1300GMT, the old 200kW Alexanderson alternator on 17.2kHz, into a 2,200 metre long antenna, to be back on air to celebrate the new millennium."

CHALLENGE ACCEPTED

RECEIVING SAQ posed several problems:

1. My antenna and grounds were still terminated in the old, freezing garden shed; last summer's temporary, airy, 136kHz shack.

2. I did not have a receiver capable of tuning down to 17.2kHz. The digital display on a veteran Yaesu promised 17.2kHz, whilst the receiver itself proved to be guilty of gross breach of promise.

3. The transmission from SAQ was dependent on the local mains supply on New Year's Day.

PREPARATION WORK

TOGGED-OUT LIKE a once frost bitten and twice shy brass monkey, in freezing weather, I re-routed my sky and ground hooks to the warmth of the new shack. That done, I set about building a prototype receiver for 17.2kHz.

On the receiver I tried something different, having tired of inductors in front-ends, the winding of coils and the need to resonate them. Instead, I opted for passive filtering, using resistors and capacitors.

To avoid presenting readers with a cliff-hanger situation and the build-up of undue anxiety, I can say now that it's all over, I received SAQ through a poor antenna; a wire 40 metres long at an average height of 5 metres. Rather than being a long wire, it was a very short wire for a wavelength of 17,442 metres.

THE CIRCUIT

IT IS EVIDENT from the circuit diagram in **Fig 1** that the BiFET dual op-amp type TL072 was much favoured in this quick, off-the-cuff design.

IC1 and IC2 contain four op-amps. The passive circuit preceding each op-amp is identical. In the case of the first op-amp, after the antenna terminal, R1/C1 acts as a low-pass filter, 3dB down close to 23kHz. This, and three similar RC combinations immediately below it, define the upper band-pass of the front-end. Similarly, but in high-pass form, 3dB down at around 13kHz, R6/C5, and similar circuits below them, define the lower band-pass of the receiver. Each pair of filters together, say R1/C1 and R6/C5, drops the in-band signal level by about 4.5dB. The gain per op-amp is set at 6dB, hence an overall gain of 6dB between the antenna terminal and the output of IC2 at pin 7.

The part of IC3, pins 1, 2 and 3, acts as an inverter so that the mixer, IC5 (a 4051B) is fed with the incoming signal on pins 13 and 14 in anti-phase. The mixer is what came to mind as I wired furiously to be finished by Christmas Day. It worked extremely well.

The local oscillator consists of just one inverter in IC4 (a 40106B), oscillating at twice the required frequency so that it could be frequency divided by 2 to give a 1:1 mark-space waveform to the mixer. One part of IC6 (a 4013B) does the dividing. The oscillator frequency is set by RV1 so that the offset between the required incoming signal at 17.2kHz and the local oscillator signal, fed to pin 11 of the mixer, was close to 700Hz. The receiver is direct conversion, so you hear the audio frequency beat between the required signal and the oscillator signal to the mixer.

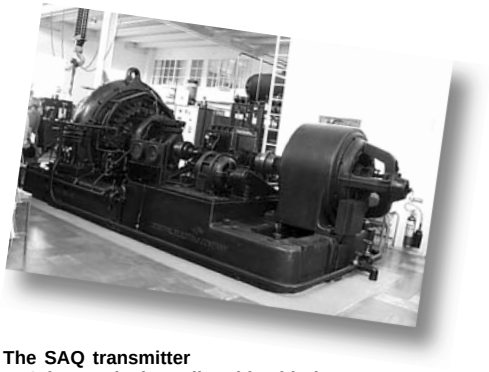
At pin 3 of IC5 the audio signal is present. A spot of low-pass filtering in R20/C10 gets rid of the incoming signal and the oscillator components to reveal the audio signal alone on all the pins of the remaining part of IC3, acting as a buffer.

The upper limit of the audio pass-band is set by the active filters in and around the four op-amps in IC7 and IC8. These filters are of the Sallen-Key equal component value types, yielding dramatic band limiting above approximately 800Hz, as well as a morsel of gain per stage.

The lower slope of the audio band-pass is defined by the simple 600Hz high-pass filters on the way into each of the four op-amps in IC9 and IC10. Thus, between IC7, IC8, IC9 and IC10 an audio band-pass peaking close to 700Hz was achieved.

The QTH of SAQ is at Grimeton. In October 1996 the 1922 station was listed as an Historic Establishment to be preserved for posterity. In 1997 it won the 1997 Industrial Heritage Award. This, all of this, is very much to the credit of the people of Sweden and in particular the dedicated enthusiasts at Grimeton.

You can read more about SAQ and Grimeton on the Internet, at: http://www.telemuseum.se/Grimeton/



The SAQ transmitter at Grimeton is, in reality, this elderly, beautifully engineered General Electric alternator.

FINAL STAGES

BEING THAT THE receiver was a prototype, for just one hour's reception, its output (from pin 7 of IC10) was fed to an audio test set, which has a reasonable speaker/speaker amplifier, a volume control and a calibrated meter showing signal levels in dBs. The audio test set is an old UK Ferrograph Professional, once popular in radio and television studios.

RESULTS

THE RECEIVER WORKED very well, in spite of the presence of shattering mains harmonics. There was no point in increasing the overall gain from the antenna input at 17.2kHz to the 700Hz audio output beyond the 67dBs achieved, because the result would have been to increase the level of the mains harmonics further still.

I heard SAQ calling CQ CQ CQ at 1200GMT on 1 January 2000. Throughout, until 1219, I could hear that old 1922 alternator sending nice CW, but due to the level of the mains harmonics I could make little of what the station was sending. I copied letters comprising of dashes more easily than ones consisting of dots alone. The digit '1' rang through clearly at times.

Between 1219 and 1230GMT I heard nothing apart from the mains harmonics. At 1230GMT, SAQ started up again, reception remaining much as before. Just as the clock ticked up to 1245GMT, I heard what I had to hear, to be sure that I was listening to SAQ, I heard "de SAQ SAQ SAQ" followed by an end of message signal.

SAQ was received over a distance of something like 1,125 nautical miles on a receiver without a scrap of inductance or resonance, connected to a woefully inadequate antenna. ♦

* *7 Trafalgar Court, Greystones, Co. Wicklow, Ireland.*

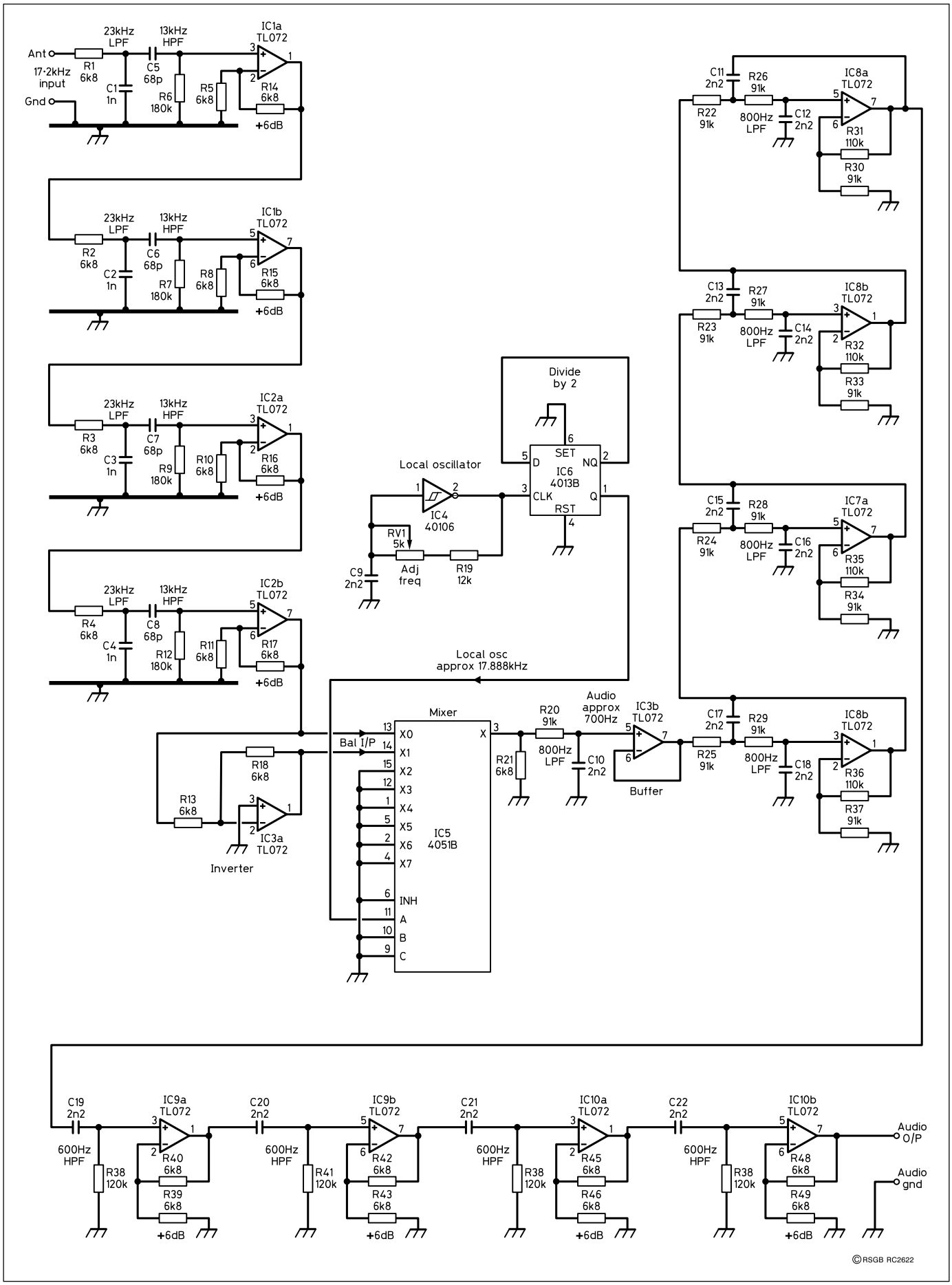


Fig 1: The experimental receiver which picked up SAQ on 1 January 2000. All TL072 pin 8s, +12V; pin 4s, -12V. 4015B pin 16, +12V; pin 7, -12V. 40106B pin 14, +12V; pin 7, ground. 4013B pin 14, +12V; pin 7, ground. Disable the spare parts of IC4 and IC6. Decouple positive and negative power rails. Measurements: When input = -54dB at 17.2kHz, output = +13bB at 700Hz, so overall gain = 67dB.

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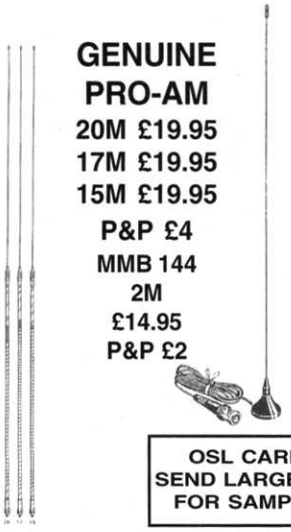

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technical topics

by **Pat Hawker**, G3VA*

THORIATED TUNGSTEN & THE 813 etc

DESPITE ALL THE predictions, valve technology still, in this new century, plays a continuing and not unimportant role in amateur radio - primarily for RF power amplification. Not only are valves still in widespread use in linear amplifiers used to supplement modern 100-watt solid-state transceivers, but there remain large numbers of hybrid semiconductor/valve transceivers and even all-valve stations on the air. But undoubtedly few of those who have come into the hobby in recent years have the detailed knowledge of valve technology that was at one time considered an important requirement for the transmitting amateur - and many of those of us who transmitted in what increasingly seems to have been the 'golden age' of the hobby have tended to forget the finer points of getting the most out of RF power valves such as those using thoriated tungsten filaments. During the post-war half-century, the thoriated tungsten filament has remained in use in many medium and high-power broadcast transmitters. The most famous example in amateur practice is the 813, which boasted a 50-watt filament (10V at 5A). Because of the large number of 813s manufactured during WW2 and subsequently available on the surplus market, they established a firm place in post-war factory equipment such as the Labgear LG300 and for home-built units such as the G2DAF linear amplifier design of the 1960s. Supplies are still available. In 1956, *Radio Handbook* noted that: "Developments have resulted in the highly efficient carburised thoriated-tungsten filament as used in virtually all medium-power transmitting valves today." This was before the introduction of the heated-cathode 4CX-series, but thoriated tungsten filaments continued to be used in such directly heated valves as the 3-500Z, 8877, 4-1000A, etc.

Thoriated-tungsten emitters consist of a tungsten wire containing from 1 to 2 per cent thoria. During manufacture the filament is burned for a short period at the very high temperature of about 2800 Kelvin to clean the surface and reduce some of the thoria to metallic thorium. Then, with the temperature at about 2100K, a thin layer of thorium forms on the surface of the tungsten. Next, at a temperature of about 1600K, some pure hydrocarbon gas is admitted to form a layer of tungsten-carbide on the surface of the tungsten to reduce the rate of thorium evaporation at the normal operating temperature, with the new thorium continually diffusing to the surface during normal operation. The carbonized layer on the tungsten wire also acts as a reducing agent to replace thorium lost by evaporation. A final manufacturing process consists of re-evacuating the envelope and then burning or ageing the new filament over a considerable period of time at the normal operating temperature of about 1900K. To convert Kelvin to Celsius, subtract 273 (eg 1900K = 1627°C).

Give long-life to your high-cost RF power valves. Careful management and feeding of the filament/heater and good ventilation will make you and your power valves happy. (Drawing from the QSL card of Andy Emmerson, G8PTH)

The 813 has always tended to be thought of as a rugged, reliable valve, up-grading from the lower power 807 of which it used to be said that the only way to cause one to fail was to hit it with a hammer. My earliest experience of the 813 was in the Whaddon Mk X transmitter, although I do recall one being broken when it jumped out of its socket during transit of our SCU9 signals vehicle en route from Paris to Brussels in October 1944. More recently, for the 25-years or so that I have been using for HF CW an LG300 (modified for screen keying of the 813 and using a separate screen PSU instead of the original KT66 clamper valve arrangement), I use a home-built 1200V PSU instead of the recommended 1500V supply.

During the past five years I have had to replace the original RCA 813 twice; once by a Mullard CV equivalent and most recently by a National Union 813, which is in current use. Both the failures were due to filaments going open circuit, the RCA valve having given many years of satisfactory service; the Mullard valve after little more than a year, believed to have been brought about primarily by the horizontal mounting of the LG300's PA valve. But over the years I have come to recognise that thoriated tungsten filaments are far more susceptible to abuse than the more common oxide-coated cathode/heater arrangement. The susceptibility of the thoriated tungsten filament to overloads, excessive heat, poisoning or temporary deactivation of the thorium surface layer can give rise to some curious effects that seem seldom to have been described in print.

A *TT* item "Use and abuse of valves" (June 1982, p498) reported on advice given by a Varian-Eimac engineer that a very significant extension of the average life of valves with thoriated tungsten filaments can be achieved by careful regulation and management of the filament voltage, provided that the peak emission is also derated to some small extent. On the other hand, excessively low filament voltage can very quickly cause loss of emission and a dramatic fall of output power: **Fig 1**. It was stressed that if the filament voltage cannot be regulated to within ±3%, the filament should always be run at its nominal rated voltage (to within at least ±5%), as indeed should the more common oxide-coated cathode valve types such as the 4CX250B etc. And such voltages must be measured *directly at the valve socket* with the valve in place. For the amateur, a difficulty in following this advice is that the domestic mains supply may vary by ±10% (or sometimes even more, if you are at the end of the local cable).

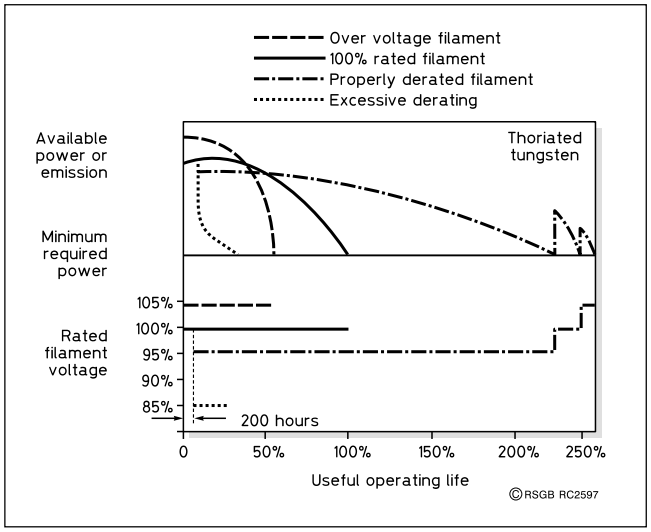


Fig 1: Showing the effect of good filament voltage management on high-power and medium-power directly-heated RF valves having thoriated tungsten filaments. Life can be more than doubled by very careful derating and control of the filament voltage, although for amateurs it is unlikely that it would be possible to regulate voltage to ±3%.

Even still-popular RF power valves such as the 6146B with highly emissive cathodes require care and attention if they are not to suffer premature loss of emission. Some advice once given in *RCA Ham Tips* included: check heater

*37 Dovercourt Road, London SE22 8SS.

voltages at the valve sockets; provide adequate ventilation; do not have shiny shielding surfaces so positioned that they reflect heat back into the valve; use circuits with lowest possible resistance in grid and screen circuits; check that the anode does not change current at full load; reduce HT or insert a screen resistor for tuning under no-load conditions; do not overload valves during tuning up; use adequate grid drive (too little drive can cause high anode dissipation); use flexible lead connections to anode caps to avoid strain; and, finally, keep within the manufacturer's [ICAS] ratings.

It should be remembered that from the moment a valve is put into use, the cathode or filament will begin to lose a little of its emissive powers - not surprising, as *TT* once noted, when one remembers that a current of even 10mA means that some one-hundred-sixteen-million-million electrons leave the cathode every second! Even the best material gets tired eventually, and this results in a gradual reduction in the mutual conductance of the valve and loss of power output. However, unlike a semiconductor device which either works or fails completely, the valve will often continue to work to some extent even after serious abuse. Emission of a filament or cathode can often be restored to some extent by the process called 'flashing', and this is especially true of valves which lose emission due to a temporary or accidental overload. In these circumstances simply run the filament for a short period (about 10 minutes) at the rated value with all other voltages removed, or for just a few minutes at about 20% above nominal.

In a 1949 RSGB publication *Valve Technique,* D N Corfield, G5CD, suggested that it was sometime possible to reactivate a thoriated tungsten filament by more drastic 'flashing' at about 2.5 times normal voltage for one minute. This reduces the unwanted layer of thoria to thorium and should be followed by a 15 to 30 minute run at about 1.5 times normal filament voltage, to give the new thorium a chance to diffuse to the surface. However, should there be no thoria left to reduce, such treatment will "flash-off" the existing thorium with no means of replacing it, and the valve will then be a definite "write-off".

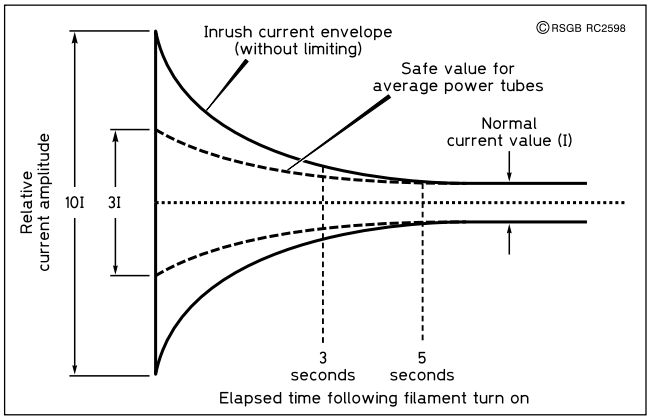


Fig 2: Graphic representation of filament inrush current as shown in W6SAI's 1983 article. With no protection, filament inrush current may be as high as ten times the normal value for up to 5-seconds duration (with valves of amateur power level). Most valves are easily capable of withstanding three times the normal filament current during switch-on, and this a good limiting value. Amateur type valves can be run at 60% of nominal filament voltage for two to three seconds, after which the voltage is raised to the nominal value. The suggested primary circuit resistor for typical valves is shown in Table 1**.**

Basically similar 'flashing' treatment can also be applied to valves with oxide-coated cathodes. In this case, as pointed out in June 1982, the technique is more likely to prove effective with valves that have failed prematurely due to surface poisoning. On the other hand, if the valve has already had a long life and the failure is due to loss of barium rather than surface poisoning, the flashing treatment is likely to hasten its decline. In general, running at excessively high temperature due to lack of good ventilation is a fairly sure method of reducing the useful life of a valve. It was recognised, long ago, that one of the most lethal devices ever produced was the standard aluminium shield used with so many miniature valves. Special dark shields or no shields at all increase valve life expectancy, and finned valve heat-sinks or heat exchangers can also be very effective in some circumstances. At higher powers, forced-air ventilation using fans will usually be required.

I must admit that with my modified LG300 with its VFO taking up to about 20 minutes to achieve thermal stability, and run from the same heater transformer as the 813 and the 5763 driver/multipliers, it was my custom to run the transmitter for up to 30 minutes with the early stages working but no screen or anode voltages applied to the 813. The grid drive to the 813 is metered. I began to notice that as the minutes passed the grid drive reduced to a marked extent, but could be restored to normal by switching off the drive for a second or two. For a long time I thought this was due to failing emission in one or more of the 5763 valves and duly replaced several of them. Rather to my surprise the situation stayed the same, with the 813 drive current tending to fall gradually. It took me quite a long time before I came to recognise that the problem lay not with the driver valves but with temporary over-heating of the 813 filament, producing a temporary thin layer of thoria instead of a thorium surface. It was not until I had several frights when the emission of the 813 during accidental overloads (resulting from parasitic oscillation) fell off dramatically and refused to return to normal for at least 24 hours (during which I thought the 813 had been permanently damaged) that it began to dawn on me how easily a thoriated tungsten filament can be temporarily damaged, even when the filament is being run at its nominal voltage.

It is clearly unwise to run thoriated tungsten filaments with grid drive but without anode or screen voltages applied. To this can be added excessive heat, under- or over-run filament voltages, excessive electrode cuerrents, etc, all of which can cause temporary or even permanent loss of emission. While these filaments are intended to run at about 1600°C and have an emission potential of some 30mA per watt of heating, it is easy to destroy the thin surface layer of thoria by overheating or excessive emission, and for this reason the average emission should be restricted to the order of 7.5mA/watt, hence the restriction of the maximum anode current of an 813 to under 200mA even with the 50-watt filament, and the reason why for maximum power output an HT supply of some 2kV is required. Remember also that the early 813 was designed to operate at maximum ratings only up to 10MHz.

By comparison, pure tungsten has a maximum emission of the order of only 4mA/watt of heating, but owing to the absence of any activating agent cannot be poisoned or deactivated. Its operating temperature of over 2000°C makes it a 'bright emitter'. The oxide-coated cathode may have an operating temperature as low as 700°C with an emission figure of the order of 200mA/watt of heating, but the average cathode current for Class A operation should not exceed about 20mA/watt.

Some useful housekeeping rules appeared in 'Long Life for Your Transmitting Tubes' by William I Orr, W6SAI (*QST*, April 1983, pp11-13, noted in *TT*, November, 1983, pp994-995). He covered not only filament management for thoriated tungsten filaments but also for indirectly heated valves (4CX250-series, 8873/4/5/7, etc) and emphasised the problem of switch-on current in-rush into cold filaments and heaters, mains supply variations, and arc protection. He noted that valve filaments and heaters, like electric-light bulbs, have a cold resistance little more than about a tenth of the value at their operating temperature. In-rush currents not only overload the filaments/heaters (see **Fig 2**), but can

Type of valve	Time delay	Resistor
3-500Z, 4-400A	2sec	50Ω, 50W
2 x 3-400Z, 2 x 3-500Z	2sec	25Ω, 50W
8873/4/5, 4CX250B	4sec	150Ω, 50W
2 x 4CX250B, 8877	4sec	75Ω, 50W

Table 1: Suggested switch-on delays and primary circuit resistors.

also create strong magnetic fields that can warp the filament and grid structures of very high power valves. Some form of manual or automatic 'stepped' switch-on is highly desirable, temporarily inserting a suitable resistor in the primary of the mains transformer.

ELECTRONICS & THE ENVIRONMENT

MOST OF US like to think of our hobby as reasonably benign in respect of environmental pollution. Admittedly not everyone approves of the visual appearance of masts and towers - but then some of us still use trees to support our antennas. EMC of course is a problem, but is usually curable and seldom damages the environment. Health hazards from biological effects of RF radiation, other than known thermal effects, are still largely unproven, despite public agitation and many years of investigation. One needs to take note of the toxicity of cadmium, beryllium, mercury, etc, the need to provide good ventilation when using some cored-solder fluxes which can induce asthmatic problems, the possible effects of strong RF on heart pacers, etc. However, before we seem to be unduly smug, it is worth remembering that the production of semiconductors involves extremely dangerous toxic waste. A few years ago Silicon Valley was described as the most polluted area on Earth - though the position is said to have been improved since.

I was reminded of the continued concerns by an article 'The Environment' by Tekla S Perry in the 'Technology 2000' round-up in *IEEE Spectrum*, (January 2000, pp81-85) with its introduction "Research into making today's increasingly pervasive electronic products more environmentally safe is being spurred by concerns at both the global level - environmental contamination that will last for generations - and the personal level - the health of an individual." This illuminating survey covers such questions as reducing the high lead content in printed-circuit boards; achieving more energy efficiency to fight global warming; the continuing health concerns raised on the use of cellular phones; the effects of low-frequency (50 and 60Hz) electromagnetic fields, which seemed to go into remission, only to resurge; and the elimination of the use of chlorofluorocarbons (CFCs) a family of chemicals that damages the ozone layer.

Printed circuit boards manufactured in their millions contain components which have lead-based surface finishes and are attached with lead solder paste and lead-based wave solder. The electronics industry uses and discards a huge amount of lead annually (some 7700 metric tons for solder applications). Although this is less than the lead used for car batteries, most lead batteries are recycled, seldom the case with the lead in PCBs. When taken out of service, most PCBs in personal computers go into waste dumps, along with leaded circuit boards in obsolete video games, portable tape players, broken VCRs, etc. "Lead, like cadmium and mercury, is toxic. In humans it affects the nervous system, blood circulation and kidneys. Placed in landfills or incinerated, it can leach into the groundwater, where it can get into the food chain. In recent years lead has been legislated out of, or restricted, in most uses in the USA and in many developed countries. No longer is lead found in paint, pipe solder or in petrol in many areas, but its use in electronics manufacture has not yet been restricted."

The growing mountains of computer junk is seen as a key environmental concern. In Europe, the European Commission has recently circulated the third draft of a directive on 'Waste Electrical and Electronic Equipment', which addresses the use of cadmium, mercury and some other toxic metals, along with lead. It currently schedules a phasing-out of the use of all these substances, exempting batteries and PCBs, by 1 January 2004, although this draft may be modified in an anticipated fourth draft.

Tekla Perry shows that some major companies, including Sony and Matsushita, are planning to eliminate lead solder from domestic products this year. Similarly, some firms in the USA are attempting to clean-up the large quantities of polluted water resulting from electronics manufacture. Possible alternatives to lead solder include tin, copper and silver in various combinations. It seems likely that tin/copper will be used for wave soldering, with tin/silver/copper used for solder paste. These alloys have higher melting temperatures than the current tin/lead solders, 220°C. Tin/silver/copper melts at about 240°C and tin/copper at a rather higher temperature.

IEEE Spectrum notes that efforts are being made to promote the use of energy-efficient products, including computers and peripherals, fluorescent light bulbs, with TV set-top boxes and telephone equipment soon to be targeted. But some of these energy-saving projects may be countered by the increased use of computers resulting from the popularity of the Internet.

Possible health hazards resulting from the proximity to the user's brain of cell phones (800 to 2500MHz) continue to be investigated, with results beginning to be reported from industry sponsored research, although not often proving reproducible, and in some cases contradictory. But clearly this is a topic that has still a long way to run. As James C Lin, professor of bioengineering and electrical engineering at the University of Illinois puts it: "Given the results published so far, I personally feel that the implications of cellular telephone effects are not horrendous. But cellular telephones are a recent phenomenon. For the first time in history, we are putting a microwave source right next to the head of millions and millions of people. So we need to get a consistent and dependable set of answers, and that will take time."

Unfortunately the public does not always distinguish between the closeness of the hand-held cell phone and the far more distant tower-mounted cellular base station antennas, and this can be readily translated into opposition to any clearly identifiable amateur transmitting antennas.

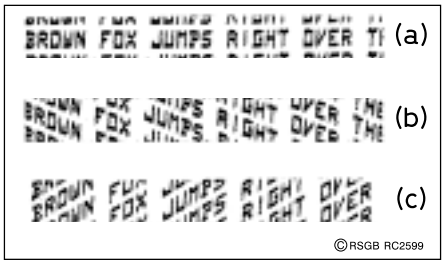


Fig 3: Appearance of Hellschreiber transmissions on a mechanical machine. (a) Transmitter and receiver running at approximately the same speed. (b) Receiver running slow. (c) Receiver running fast. (Source: G5XB's 1981 article)

RESURGENCE OF HELLSCHREIBER?

THE FIRST PRINTING radio-telegraph machine that I ever saw in action was in 1942-43 at Hanslope Park. This was a mechanical Hellschreiber, a system developed in 1929 by Rudolf Hell and which in the thirties came into use for press, diplomatic and military traffic. In WW2 a transportable Feldfernschreiber was used in conjunction with a conventional HF field transmitter for German military traffic. Transmissions were relatively broadband and could be readily identified by their characteristic throbbing sound (regarded as an unpleasant form of QRM by those struggling to receive weak Morse signals on or near the same frequency!). After the war, a few Hellschreibers remained in use, mainly in China, and a few amateurs acquired mechanical Feldfernschreiber or Hellschreiber machines and used them on the 3.5 MHz band - notably several Dutch amateurs and, in the UK, the late Stan Cook, G5XB, who had monitored German Hellschreiber traffic for Bletchley Park at Beaconsfield (later transferred to the BBC). G5XB wrote-up the mechanical Hellschreiber system in detail in *Radio Communication*, April 1981, pp 320-323, from which **Fig 3** is taken. After Stan went Silent Key, Bob ('Noz') King, G3ASE, acquired his Hellschreiber and continues to restore and experiment with it. [Incidentally, G3ASE (QTHR), is organizing another reunion for former RSS Voluntary Interceptors / SCU3 Operators, etc, or their friends or relatives, or anyone seriously interested in the wartime RSS and Box 25, at Bletchley Park on Sunday, May 14].

It might have been thought that in this day and age, this 70-year-old system - which is little faster than manual Morse and in which

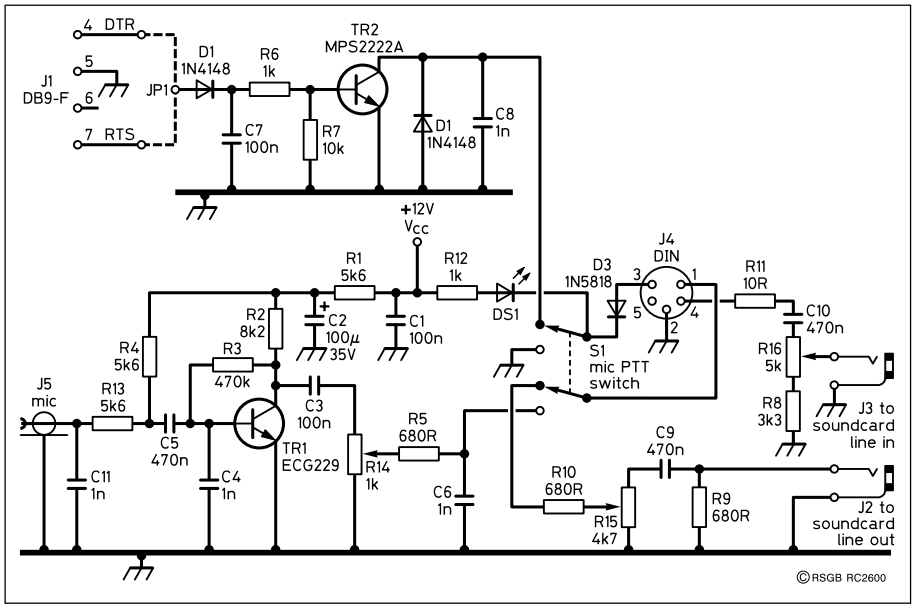


Fig 4: EB3NG's versatile PTTSound interface, providing adjustable levels between transceiver/computer and facilitating changes between speech and data systems including Hellschreiber. Full details in *QST*, November 1999.

the *shapes* of the letters are transmitted as a crude 'picture' created by a train of 'mark' and 'space' impulses synthesized in the receiver into a mosaic of black and white elements on a grid of closely-spaced parallel lines and displayed like a dot-matrix printer - would have been relegated to history. But this wideband system is remarkably immune to the effects of circuit noise and interference; and, to some extent, multipath; and does not have to be accurately synchronised. In recent years Hellschreiber has been given a new lease of life as an electronic, software-controlled computer/VDU system with improved 'keying' characteristics and is now attracting attention world wide. A useful review of the current situation is given by Murray Greenman, ZL1BPU, in 'Let's *See* you in Hellschreiber!' (*QST*, January 2000, pp52-54). It also featured in 'The 'New' HF Digital Modes', by Steve Meltz, N2QLQ (*QST*, April 1999, pp50-51), who drew attention to the increasing use not only of Feld-Hell but also Multi-tone Hell (MT-Hell) in which combinations of 7 to 16 tones are sent concurrently, allowing higher throughput, vertical characters, and the ability to use different fonts, underlining, bold, and italics. MT-Hell was devised in 1937 but not implemented until the coming of electronic systems.

Feld-Hell is still the most common mode, but MT-Hell seems set to catch up. The new breed of PC-equipped radio amateurs have revived and enhanced this interesting mode! ZL1BPU even suggests: "You do not need to understand how it works to enjoy this mode. Simply install the software, connect up your rig (probably the same cables you use for PSK31 and SSTV), set the signal levels and away you go!" This is not a sentiment I would endorse - I feel amateurs should at least have an inkling of the systems and technology they use, and I suspect that ZL1BPU feels the same.

ZL1BPU writes: "Of course there are plenty of new techniques to be explored (PSK31 is a current example); but old technology should also be understood and appreciated - and improved upon. After all, Morse is still in widespread use, and it dates from 1838! Hellschreiber has some important features and we have recently added Digital Signal Processing (DSP) to elevate it to a high-performance DX mode. It is not quite as sensitive as PSK31, but is much easier to tune, is tolerant of drift, and resistant to most interference except zero-beat carriers.

"The first DOS PC software for Feld-Hell, written by LA0BX, is still widely used. Recently it has been recognised that DSP could transform Hellschreiber into a highly sensitive mode and I proposed the term *Fuzzy Modes* to describe modes that are not really digital, nor completely analog, but provide important advantages of both by being human-readable. The first important improvement was to use a grey-scale display, rather than strictly black-and-white for reception. This significantly improves weak-signal readability. N1OWU and G3PLX used the Motorola DSP56002EVM evaluation module for DSP signal processing, while software for PC soundcards by G3PPT and IZ8BLY performs DSP inside the PC."

Peter Martinez, G3PLX, also improved the 1937 seven-tone MT-Hell and uses 16 tones with an FFT receiver - a system now called Concurrent Multi-Tone Hell or C/MT-Hell. This is less sensitive than Feld-Hell, but remarkably immune to all kinds of interference. It is narrow band (200Hz) and free of keying sidebands, since the keying is at column rate rather than dot rate. There is also another new multi-tone system, Sequential Multi-Tone Hell (S/MT-Hell), which can be transmitted with a Class-C PA (whereas the other electronic modes require a linear SSB transmitter). A difficulty with S/MT-Hell is that keying sidebands tend to become visible within the character matrix.

The latest 'designer' Hell mode is IZ8BLY's Duplo-Hell, closely related to Feld-Hell, but two columns of dots are transmitted at the same time, using two different tones. It has the same typing speed as Feld-Hell, achieved by sending the dots for twice as long. It provides enhanced noise rejection and multi-path effects are reduced by a factor of two. The bandwidth is a little wider than for Feld-Hell, but ZL1BPU considers Duplo-Hell is great for low-band DX.

Ronald Bee, G3SZS, and David Williams, G3CCO etc are successfully using the IZ8BLY software, which can be found as freeware on IZ8BLY's website: http://ninopo.freeweb.org

A versatile interface between transceiver and a computer sound card to work for RTTY, PSK31, SSTV, Hellschreiber and many other modes is described by Salvador Esteban, EB3NG (*QST*, November 1999, pp60-61 and another version in the Spanish Edition of *CQ Radio Amateur*, August 1998): **Fig 4**. 'PTTSound' is a simple interface that allows you to set the audio levels to and from the computer sound card independently. It not only includes the serial port keying interface, but also a convenient microphone input and push-to-talk switch to facilitate switching between voice and digital (or image) modes. It is hoped that the circuit diagram will provide sufficient information, but for full details on construction and alignment etc refer if necessary to the November 1999 *QST*.

MATTERS ARISING

GEORGE BADGER, W6TC, of Svetlana, remembers well from WW2 the impressive German military radio equipment, particularly the beautiful magnesium-diecast construction. He writes: "I was in the [US] infantry and because I was a ham and knew something about radio, my job was to destroy the enemy equipment as we came upon it. I look back on that and wish I could have saved some of it. I did save a key and a pair of headphones, which I still have. Everything else we burned. The magnesium-aluminium alloy burned like gunpowder, incredibly hot.

"When the hostilities were over, my job was to repair German radios; that was a great pleasure, and your notes brought back many memories of that superb equipment. Before the war, German civilian radios were taxed according to the number of valves, so that there was a strong commercial interest in making multi-function tubes for domestic radios. I recall repairing radios that had few valves, but each had four or five stages. We used to remove the base from failed multi-function tubes and run long wire leads to

American military valves such as the 6C5, 6H6, 6SK7, etc, to get those radios working, so we could listen to the BBC and the American Military Broadcasts. American programming at that time was planned to appeal to teenagers, of which I was then one. I also enjoyed the more classical music and speech on the BBC, where the speech was more truly King's English." George is particularly interested in the reference to the excellent German variometers mentioned briefly various times in *TT*, including June 1987, and with illustration in November 1987 (see also *Technical Topics Scrapbook*, 1985-89, pp174 & 202).

IN CONNECTION with the item 'Headphone Adapter' (*TT*, December 1998, p59), Rev. George Dobbs, G3RJV, draws attention to the 'High Impedance Headphone Adapter' available from Isoplethics (13 Greenway Close, North Walsham, Norfolk NR28 0DE, Tel: 01692 403230) which he points out is a firm offering a useful range of "real radio" products, including plug-in coil formers, interstage coupling transformers, etc. Isoplethics describe their THA1 headphone adapter as having been developed to allow modern 32Ω stereo headphones to be used in high impedance applications. This unit is claimed as ideal for use with simple receivers, especially valve TRF sets and crystal sets, and giving good results with older valve receivers and test equipment such as the BC221 frequency meter. The input impedance is around 8000Ω. Modern stereo headphones, as noted in the December item, vary considerably in sensitivity, but with examples having a sensitivity better than 100dBm the unit can provide a sensitivity approaching that of the 1950s Brown Type F 4000Ω headphones, The input transformer has been designed to simulate the peaky response of metal diaphragm headphones, in order to give good CW and communications grade telephony, with additional internal filtering to limit audio response to around 3kHz and with internal clipping to limit noise spikes to a safe level. The input is shunted to eliminate 'threshold howl' with regenerative detectors. The unit is housed in a black, isophthalic resin-moulded box with output via a standard stereo socket; input is a flying lead terminated in a 6.35mm jack.

LEAD-ACID BATTERY MONITOR

DURING 1998, a Spanish publisher began to provide a Spanish-language version of the American *CQ Radio Amateur* magazine (no longer available at the Science Museum Library). The January (Enero) 1999 issue pp14-17 includes a translation by Xavier Paradell, EA3ALV, ('Monitor de tension para baterias de plomo y acido') of an article by Derek Toeppen, WA0ZTI, of a means of continuously monitoring (during equipment operation) of the output voltage of a 12V lead-acid battery by means of an eight LED display and an automatic alarm tone when the voltage drops below the required value; **Fig 5**. Key to the system is a DigiKey PIC16C71-041 MPU 18-pin analog-to-digital converter chip. On first switching the unit 'on' the tone generator emits a brief signal to verify that the unit is working For 45 seconds the 8-LED display indicates from 'full' to 'empty', and then ceases to function, consumption drops to about 267µA. When the battery voltage drops to the 'empty' value, the tone generator then emits an intermittent alarm signal. At least, that is my interpretation of the detailed Spanish text, as the functioning of the device is clearly rather more complex than my brief summary may suggest: see **Fig 6**. WA0ZTI uses this with his two 85Ah batteries, building a monitor into each of the wooden carrying cases at a cost of about $15 per unit. The monitor voltages are temperature-sensistive. The full English text is in *CQ Amateur Radio*, January 1999, pp36-38, 40-41. ♦

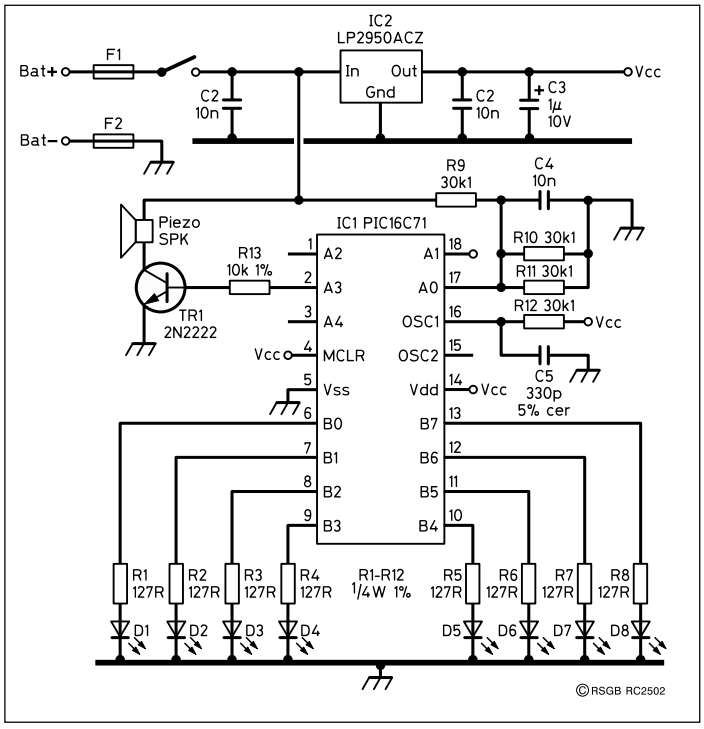


Fig 5: Circuit diagram of the battery monitor. IC1 = PIC16C71-041 MPU (DigKey).

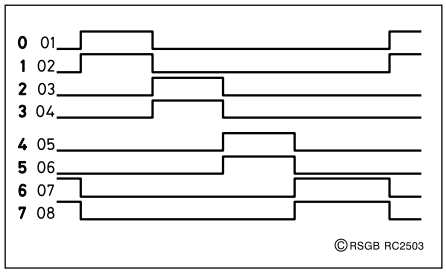


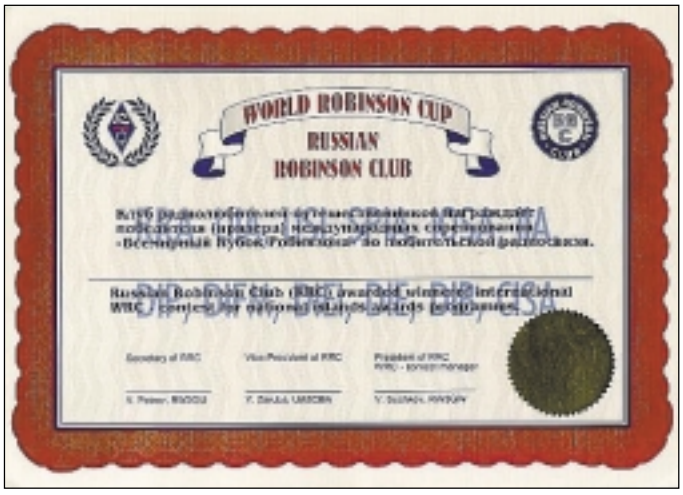
Fig 6: Analysis of the logic sequence for the LEDs mounted in a vertical line.

HF

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

BAND CONDITIONS DURING March were probably the best we have experienced so far during this new solar cycle, and certainly an improvement on the previous month. There were some excellent long-path openings on 10m to VK/ZL, which also coincided with some rare Pacific expeditions such as VP6BR on Pitcairn Island and T32B on Christmas Island. The FO0AAA Clipperton Island DXpedition also did a fantastic job and netted some 69,400 contacts, including 14,000 in the first 24 hours of operation. UK stations were able to work them on all HF bands and modes.

I managed to make a modest appearance myself as a DX station during March, operating as G3XTT/VP9 from Bermuda, including an effort in the Commonwealth contest. Running just 100 watts (an FT-900, kindly loaned by the IOTA Committee) to a Carolina Windom antenna at only 30ft or so, I made over 1100 QSOs in a day and a half, operating from the QTH of Ed, VP9GE. It's always an eye opener what you can achieve with a modest station when you are in a more southerly location or when you are close to the sea. In this case I was both, and the results were very satisfying. I was especially surprised at the strength of UK signals on 40m an hour or so before my sunset. My thanks to all of you who called me. QSLs are available direct or via the bureau. Incidentally, there is relatively little resident activity from Bermuda these days, but visitor licences are easily obtained on the spot if you have a UK licence. They are issued in less than 15 minutes and free of charge!



Russian Robinson Cup award - see 'Awards'.

DX NEWS

A GROUP OF Belgian Amateurs plan to operate from Texel Island (EU-038) starting 28 April. They are waiting to be assigned a special callsign and will use it until 1 May. Operators include Rudy, ON4CAO; Guy, ON4CBN; Marc, ON4CCR; Danny, ON4CDH; Marc, ON4VL; Gino, ON1DAN; Rudy, ON1DEW; Gabriel, ON1DLG; Wilfried, ON1BTW; and Danny, ON1DJW. They have a website at http://www.vra.be/texel/

Lee, F6HMQ, and Guy, F5BLN, will be signing homecall/P from Oleron Island (EU-032) from 6 - 13 May, with two stations on all bands. Also, French club station F6KOP will be activated from Brehat Island (EU-074) from 5 - 9 May.

In case there should be any confusion, SY1A, SY1D and other stations which may have been active recently using the SY prefix, are operating from Greece, although many logging programs and directories associate the SY prefix with Mount Athos. However, from 1 October until the end of the year, Monk Apollo, SV2ASP/A, will operate from Mount Athos as SY2A.

Olli, OH0XX, and Fred, G4BWP, at January's Contest Club Finland meeting in Helsinki.

G0WRE, G0VBD, G0VAX and a fourth operator will be signing home call/P from Hilbre Island (EU-120) from 26 - 29 May. They will be on 10, 15, 20, 40 and 80m. QSL via home calls

Nobby, G0VJG, will sign GU0VJG from Sark (EU-114) between 12 - 19 May with one of the IOTA FT-900 radios, a linear and two delta loops. This operation will be SSB only. A special QSL will be available for direct cards to his home address.

Peppino, I8IYW; Tony, IK8UHA; Tony, IK8VRH; Alex IZ0CKJ; Al, IK8YTF; Robby, IK7XIV; and Robby, IS0JMA, are planning to activate Giftun Island, Egypt (new IOTA) from 20 - 30 May. There is also a chance they will go to a second new IOTA, Tawila Island. A Web page is being set up at http://www.qsl.net/su9dx

Gus, K4SXT, has been on Guam for the past year and a half, mostly active on the low bands and especially on 160m (where he was worked by a number of UK stations). His assignment on the island is coming to an end and he now expects to be reassigned to Bahrain in late July or early August. Once in the Middle East, he will apply for a licence and plans to be mostly active on 40, 80 and 160m.

Fred Laun, K3ZO (HS0ZAR), reports that essentially all Thai hams who are permitted to operate on the HF bands have their QSL information listed at the following Web site: http://www.qsl.net/rast/text/Hscalls.html He says that there may be a few who have recently upgraded who are not yet listed, but almost all are. Incidentally, although Thailand now has some 175,000 hams, relatively few have passed the examination allowing them to use the HF bands. Almost of all hams in Thailand are limited to 2m FM operation only.

Nicola, I0SNY, and a group of Italians will again activate JT1Y (Mongolia) for a couple of weeks starting around 22 May. The team will also include Antonio, I1ZB; Alberto, I1QOD; Riccardo, IK0AZQ, and maybe a few others. During the CQ WPX CW Contest on 27/28 May they will use JU1Y.

Members of the Russian Robinson Club (RRC), the Trotting Radio Amateur Club and 'Polar World' are planning a trip to Ushakova Island (AS-NEW) and Uedineniya Island (AS-057) from 1 – 15 May.

Johnny, G3LIV, writes that he hopes to be active from Pangkor Island (AS-072) from 20 May - 1 June on 20, 17 and 15m.

There will be an expedition to Willis Island, starting around 6 May, depending on sailing conditions from Queensland. The callsign will be VK9WI. Willis is ranked 47th in the ARRL's 1999 Top 100 list. Willis is IOTA OC-007 and is located in the Coral Sea at 16º 17' south, 149º 57' east. The operators are VK4ZEK, David Gemmell, the skipper of the

boat; David (Harry) Holton, VK4DH; Alan Meek, VK4BKM and Nick, VK2ICV. Planned frequencies are 3,504, 7,004, 10,104, 14,024, 18,074, 21,024, 24,894 and 28,024kHz on CW and 3,790, 7,085, 14,195, 18,145, 21,295, 24,945 and 28,480kHz on SSB. The team will also be active on RTTY. Logs will be available at http://www.qsl.net/vk9wi/index.htm

Japanese operator Hiro, JK1FNN, and his XYL Mie, 7L1MKM, will be on the air from Saipan in the Northern Mariana Islands (OC-086) on 4/5 May. They will sign KH0/JK1FNN and KH0/7L1MKM on the bands between 10 and 20m CW and SSB. They also expect to operate from Manihi Island (OC-131), French Polynesia from 13 - 19 August. No callsign has been assigned as yet. QSL all operations via JK1FNN.

Dr. F. Curtis Lambert, KE3C, plans to operate from Jamaica, 6Y5, the week of 8 - 14 May on all bands 160 to 10m, CW only.

The latest from Alan, VK0MM, on Macquarie Island is that his operating times have had to be curtailed due to interference which he was causing to some of the scientific experiments on the island. Alan continues to put out bulletins on his Web page, with schedules for which countries he will be working and when. If you don't have Internet access this makes life difficult of course. He is also placing a limit of two QSOs per station, for example 20 CW and 15 SSB.

Mike, G3TEV, who is QSL manager for 9J2BO, writes that he does not accept cards via the QSL bureau. He says that "if a station really wants a card it must be worth a self-addressed, stamped envelope".

DXCC Entity: East Timor

Prefix:	4W	Latitude:	8° 36' S
CQ Zone:	28	Longitude:	125° 30' E
ITU Zone:	54	IOTA:	OC-148
UTC Offset:	+8h	Capital:	Dili
Continent:	Oceania	Other calls:	4U1ET

DXCC Starting Date: 1 March 2000

DXCC Entity: Chesterfield Islands

Prefix:	FK/C	Latitude:	19° 52' S
CQ Zone:	32	Longitude:	158° 19' E
ITU Zone:	56	IOTA:	OC-176
UTC Offset:	+11h		
Continent:	Oceania		

DXCC Starting Date: March 23 2000

MORE NEW DXCC ENTITIES

A RECENT NEWS release from the ARRL confirmed that East Timor has now been added to the DXCC list. The prefix block 4WA-4WZ has been allocated by the ITU for the use of stations operating within the UN-administered areas. UN stations themselves may also be assigned 4U prefixes, as happens elsewhere in the world where UN stations are active. A club station, 4U1ET, is active and there have already been several operations with 4W6 prefix. These include 4W6MM (by Thor, TF1MM) and 4W6UN (by Ross, VK8UN). A multi-national DXpedition, callsign 4W6DX, was due to take place in late March. For DXCC purposes, UN Temporary Administration of East Timor was added to the

HFF-LayerPropagationPredictionsforMay2000

	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz	28.0MHz
Time (UTC)	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802	000001111122 024680246802
*** Europe							
Moscow	88541...1167	888655455588	888776666788	...887777888	....888888..	1	...1......
*** Asia							
Yakutsk	.........1.	3.....1...33	5442.11.13.5	...43332..5.	.1..4444....	....	.....1.1...
Tokyo	.........11.	1..........	221111.1..13	.1211...2.3.	..1.2122....	....	....
Singapore	1	....	11	....11..1.12	.......122.	.1.....12..	..1.....1.
Hyderabad	2.........12	3.......1.3	442.......34	4.42...13344	...31112434.	.....22.33.1	....
Tel Aviv	6611....1.56	666321111366	666544444566	55555656	.........5..	.....1...	....
*** Oceania							
Perth	....	1.......1..	21.....1...	.........1.	....1.1.....	1.1.1.....	...1...1....
Sydney	....	.........11.	.........1...	....	1..111.....	...1.....	...1.....
Wellington	....	.........1.	.........13..	....123...1.	.1..........	..1.....1	.........1..
Honolulu	..1.......	....1.....	....	11	....	..1.....	....
VK9 DXpedition	....	....	.....1...1.	.........11.	..1...111..	1.1.....	....
W. Samoa	....	....	....1..1.1.	....111....	....	....	1.........1
*** Africa							
Mauritius	1.........1	2.........2	3.........22	..1.....1334	.....11233.	....1111233.	.1121..2..1.
Johannesburg	.1..........	....	1.........3.	.....1.2..	...1.1..124.	.....2.1....	.....22334..
Ibadan	543.....44	444.....54	446311.1.454	6665443345 66	66554444 5566	555555	.1.....5.5..
Nairobi	32.....123	4321....1.43	554.....355	4443211234 45	4..433334444	.....44.4...	.....44...5.
Canary Isles	7762.....67	8875444 4377	8887466456 88	8888777777.8	8...87778.88	....8888888.	.....8.8..
*** S. America							
Buenos Aires	11.1.......	222.....2	3331.....113	33.3..1...23	4443.1...133	4...1.111234	.....1.3..
Rio de Janeiro	331.....12	443.....23	4443.....44	4444.....144	4....2122344	54...3333445	.....44445.
Lima	.1.1.......	221.....1	2232.....11	33.21.....2	3...1.....12	.....1112.	..1.......
Caracas	343.......	444.....14	4544..1..1.4	55.44222345	5....3333445	..1.....41.	1...1.....
*** N. America							
Guatemala	1221.......	444.....1	44431.....23	44..32111244	1...1.333344	.....44.	....
New Orleans	.221.......	334.....2	4443..1..124	4.....22334	...1.1...34.	....	....
Washington	333.1.....1	444..1....2.	45542...1354	55....344455	444555	.....1.	....
Quebec	44411.....	555.....145	555..1233455	5.....444565	61	....	....
Anchorage	1..........	342.....22	44321...1233	....	....	....1.....1	.....1....
Vancouver	1...1.....	222....1....	3321.....123	2.........1	....	.....1..1	....
San Francisco	...1.......	..2...1....	2231...11123	3..11....232	3.........	....	....

Key: The numbers in the table represent S-meter reading on the average amateur rig, whilst colours represent availability. When the predictions are expected to be 67-100% certain, the numbers are blue; when 33-66% certain, red; when less than 33% certain, black.

The RSGB Propagation Studies Committee provides propagation predictions on the Internet at www.g4fkh.demon.co.uk The page is updated weekly.

The provisional mean sunspot number for March 2000 issued by the Sunspot Data Centre, Brussels, was 138.2. The maximum daily sunspot number was 188 on 24 March and the minimum was 95 on 17 March. The predicted smoothed sunspot numbers for May, June and July are respectively: (SIDC classical method – Waldmeier's standard) 101, 99, 97 (combined method) 117, 120, 121.

WARC BANDS TABLE 2000

Callsign	10	18	24	Tot
G0NXX	90	82	106	278
G4KHM	77	92	27	196
G4UCJ	56	38	43	137
GM4OBK	18	16	18	52
2U0ARE	51	0	0	51
G0TSM	10	10	17	37
M0CNP	1	13	11	25
M5AFA	0	7	11	18
G4FVK	0	6	6	12
M0CAL	0	3	7	10

DXCC List with the effective date of 1 March. QSL cards for QSOs made after that date will be accepted on and after 1 October. The 4W prefix was used in the past for Yemen, but since North and South Yemen combined, all operations have used the 7O prefix and it appears that the ITU has decided to re-use 4W. The information you will need to add East Timor to your logging programs is given in the box on the previous page.

The Chesterfield Island operation will be history by the time this appears, and we should know whether it has been accepted as yet another new DXCC entity. The group was due to sign TX8CI in the early phases of the operation, and TX0DX once official approval had been given. On the assumption that everything goes according to expectations, the information is given in the box on the previous page.

TABLES

I AM DELIGHTED to have an entry this month from David, M5AFA, who uses a TS-570DG to an end-fed wire and various dipoles. For many of his contacts he runs just 4 watts; also from G0KDS, who operates mobile and is hoping other mobile operators will participate. Congratulations to Colin, 2U0ARE, who holds up the Novice banner in the tables but who has now passed the RAE and is awaiting the callsign MU0FAL. Jim, G0CGV, is another new participant. He runs 100 watts (FT-990) to a 2-element tribander at 33ft, as well as a 7MHz folded dipole at 40ft. Jim says he found the pile-ups for FO0AAA very unruly, but was pleased to work ZK1XXC recently as a rare one on 14MHz.

CONTESTS

DMITRI, RW3FO, reports that the results of the CQ-M International DX Contest 1999 and rules for this year's contest are available at http://www.mai.ru/~crc/cq-m/cqmain_e.htm This year's event will take place over the weekend of 13/14 May.

The results of the 1999 CQWW 160 contests appear this month. In the SSB section, GJ2D (operated by G3SJJ, G3SVL, G3UEG, G7TAJ, GJ4CBQ and GJ0NYG) was World 2nd in the multi-op category. Very belatedly, and I offer my apologies for this, I am including the UK results of the 1998 CQ WPX CW Contest. GS2MP was World 9th on 14MHz, G8G World 8th on 7MHz and GI0KOW World 1st in the Assisted All-band category. The 1999 results should also be available shortly, and I promise to pass them on promptly this time.

CQ WPX CW 1998

Call	Cat	Score	
M8C	A	3,834,583	(G4TSH)
M8T	A	3,754,854	(G4PIQ)
GW8K	A	863,615	
GX4WSM	A	713,592	(G0JQN)
GS2MP	14	2,534,115	(G4FAM)
G8G	7	1,334,700	
M8M*	A	380,254	(G3SXW)
G3RSD*	A	355,366	
G3OOU*	A	352,137	
G3JJZ*	A	125,430	
G3HZL*	A	112,236	
G6QQ*	A	48,339	
M/NQ7X*	A	5,304	
G4OTY*	28	90	
G3ESF*	21	82,644	
G0MTN*	14	400,751	
GM3CFS*	14	301,252	
G5MY*	7	48,576	
GW3KJN*		7,080	
Assisted			
GI0KOW	A	5,413,376	(GI0NWG)

Category: A = all-band * = low power; operator in parentheses

CQ WW 160 SSB 1999†

G3NAS	95,700	246	22	44
G4VGO*	34,482	186	2	40
M4T*	2,496	33	0	16
G4NXG/M*	676	11	0	13
G0MTN*	432	12	0	9
Multi-op				
GJ2D	261,750	612	25	50
G6YB/P	120,645	369	19	44

CQ WW 160 CW 1999†

M2D (G4BYG)	456,855	798	31	64
GW3JXN	247,532	559	24	52
GM3CFS*	64,272	229	9	43
G3UFY	58,558	244	3	43
G3HZL*	45,360	201	7	38
M4T*	31,050	215	0	30
G3KKQ	16,544	103	0	32
M5X*	16,544	103	1	31
G0MTN*	3,496	38	0	19
Multi-op				
G3VGG/P	95,462	293	18	41

† Numbers after call indicate score, QSOs, W/VE mults, DXCC countries. An asterisk denotes low power.

QTH Corner

VK9WI	P.J. Garden VK4APG, 58 Minerva Court, Eatons Hill, Brisbane, Australia
4W6DX	Jarmo J. Jaakola, OH2BN, Kiilletie 5-C-30, 00710 Helsinki, Finland
4W6UN	S.R.Gregory, VK3OT, P.O. Box 622, Hamilton, Victoria, 3300 Australia

AWARDS

THE RUSSIAN Robinson Club is running an 'Islands Marathon' between 1 May and 30 September. There will be categories for island hunters, expedtioners and SWLs. The idea for the first and last of these is to work/hear as many islands as possible, including islands valid for the large number of island awards programmes which now exist, eg Canadian Islands, Italian Islands, etc). Expeditioners gain points for islands activated. The winners in the various categories will receive a cup, but all participants whose score is more than 10 will be eligible for a certificate. Logs go to: WRC, PO Box 3, 398000, Lipetsk, Russia. Entrants are encouraged to submit progress reports each month via e-mail to panoramatour@lipetsk.ru so that totals can posted on the Club's Web site: http://rrc.sc.ru I can provide more detailed information if required.

The Sydney Olympics special event callsign, AX2000 is now being aired at regular intervals as a warm-up to the Olympics. The New South Wales Division of the Wireless Institute of Australia (www.wia.org.au/vk2) has authorised a number of NSW amateur radio clubs to use the callsign during 2000. Visitors may apply to operate the station by contacting the VK2 Divisional Office by one of the following means: Postal: Wireless Institute of Australia (NSW Division), PO Box 1066, Parramatta NSW 2124, Australia, Phone: +61 2 9689-2417, Fax: +61 2 9633-1525, e-mail: vk2wi@ozemail.com.au or vk2@wia.org.au Also, an award will be issued to commemorate the Sydney Olympic and Paralympic Games. The award is for contacts between stations anywhere in the world and stations in the state of New South Wales (VK2 or AX2), Australia. There are three classes of award: Bronze for contacts with four VK2 stations, Silver for contacts with eight VK2 stations and Gold for contacts with 12 VK2 stations, including one with the official Olympic station, AX2000, during the Games. The award is valid for contacts made between 14 September (the date of the first Olympic soccer match) and 29 October (the date of the closing ceremony of the Paralympic Games). Charges for the awards have yet to be announced, but the certificate will be a full colour photograph of the Olympic stadium at Homebush, suitably emblazoned with the appropriate logos, contact info, etc. For more information about the award, please contact the New South Wales Division of the WIA.

28MHz COUNTRIES TABLE 2000

Callsign	CW	SSB	Mixed	
G4DUW	120	168	200	
M0BZQ			115	
G0NXX	108	0	108	
G3MDH	0	85	85	
G0VHI			80	
GM4CHX			75	
G4UCJ	68	0	68	
M0BIB	0	60	60	
G4IDL	56	0	56	
G0TSM	23	32	50	
G0CGV	44	0	44	
M0CAL	0	42	42	
G0URR			31	RTTY
G0CAS			30	
G0KDS/M			30	
G0NCS			21	PSK
M0CNP			18	
M0ASJ			17	
M5AFA			17	
GM4OBK			6	

THANKS

MY THANKS TO all who have provided information. Special thanks go to the authors of the following for information extracted: *OPDX Bulletin* (KB8NW), *The Daily DX* (W3UR) and *425 DX News* (I1JQJ). Please send items for the **July** issue by **13 May.** ♦

VHF/UHF

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

ANNUAL VHF/UHF TABLE - JAN TO DEC 2000

Callsign	50MHz Dist	50MHz Ctr	70MHz Dist	70MHz Ctr	144MHz Dist	144MHz Ctr	430MHz Dist	430MHz Ctr	1.3GHz Dist	1.3GHz Ctr	Total Points
G3FIJ	2	1	18	3	32	9	14	6	1	1	87
G4APJ	3	1	-	-	42	7	25	3	-	-	81
M0CNP	-	-	-	-	1	1	-	-	-	-	2

The District Codes are the those listed on page 83 in the RSGB *Yearbook 2000*. Up to 6 different GI stations and up to 3 different GM stations in each Scottish district may be counted. Countries are the current DXCC ones plus IT9. The deadline for the next issue is 18 May.

IN THE PAST month there were a few tropospheric openings on VHF and some propagation to central and southern Africa on 50MHz. There is news of proposed moonbounce (EME) operation from Greenland. The 2000 Annual Table starts this month, but with few entries. In the 'Reports' section, an asterisk (*) after a call sign indicates a CW QSO. All times are UTC.

REPEATERS

A NEW 70cm repeater became operational (QRV) on 29 January. GB3WA is located near Wincanton in Somerset and transmits on 433.025MHz (RU242). Its keeper is Dave Boniface, G3ZXX.

The February issue of *LENS*, the newsletter of the Leicester Repeater Group, reports that the AGM will be held on 27 April. Since publication, the venue and time have been confirmed as the Greyfriars Sports and Social Club - formerly known as the EMED Sports and Social Club - in Aylestone Road, Leicester at 8pm. There is no news about any of the group's repeaters and beacons, but their web site is quite informative - see the panel.

The front cover of the March edition of the Kent Repeater group's *Newsletter 97* has the bold message 'Use it, or lose it. You have been warned!' It refers to an advert by the Radiocommunications Agency (RA) on page 90 in the February issue of *RadCom* for Radio Specialist Trainees.

There is news of the two VHF and five UHF repeaters. GB3CK was still QRT at the time of editing because the previous keeper still had not signed the NoV form. There is a useful list of all their repeater call signs, locations, managers and output frequencies (QRGs). All should be accessible by a 1750Hz tone, if immediately followed by several seconds of audio, and most can be accessed by a CTCSS tone of 103.5Hz.

The KRG has no secretary at present, but it is hoped that the post will be filled at the AGM on 9 June at a venue to be announced. The treasurer is John Wellard, G6ZAA, whose address is in the current RSGB *Yearbook 2000* (QTHR) and he can be e-mailed at krg@zetnet.co.uk

PROPAGATION

IN THE JANUARY issue of *The Six and Ten Report*, the first six pages are devoted to 10m propagation. One conclusion is that last winter's Sporadic-E (Es) season was rather poor. Jeremy Whitfield, G3IMW, collated the 6m data, and he reports very few Es events. As for DX propagation, he writes "All one can say under this heading is that we are still waiting!"

The 'Meteor Scatter' (MS) section is devoted to the Quadrantids shower, the bulk of the reported contacts being made in the 0800-1400 period on the 4th. Auroral activity was reported on six days. Commenting on the lack of a very large aurora, co-editor Steve Reed, G0AEV, suggests it is probably because we are still on the upward side of the sunspot cycle and that solar activity so far is not very intense.

The table of daily solar and geomagnetic data shows that the solar flux peaked at 211 on the 15th, the minimum being only 126 on the 28th to give an average for the month of 158.3 units. There are 6m reports from observers in continental Europe, Africa, the Americas, Asia and the Pacific.

The *Report* is an activity of the RSGB's Propagation Studies Committee (PSC) and is edited by Dr Steve Reed, G0AEV, and Prof Martin Harrison, G3USF. Subscription inquiries should be addressed to Steve (QTHR) whose e-mail address is g0aev@explore.force9.co.uk

The January issue of *SunMag* arrived just too late for coverage in the April *VHF/UHF*. There are two opening articles, the first entitled 'Solar Cinema', describing the beautiful solar prominence on the 18th as recorded by the Solar and Heliospheric Observatory, SOHO. SOHO is situated 1.5 million kilometres from Earth between our planet and the Sun, and if you want to see what it saw, have a look at the NASA pictures - see the panel for web site details.

The second article, 'Yukon Meteor Blast', describes another event on the 18th, when a large meteor streaked over the Yukon Territory in Canada. Witnesses reported two sonic booms, a foul odour and sizzling sounds heard all the way from Alaska through northwestern Canada. Fragments of this meteor have since been recovered and returned to the NASA for detailed examination.

The February *SunMag* begins with 'Solar Smoke Rings', describing a series of dramatic solar coronal mass ejections (CMEs) as the Sun belched out billions of tonnes of hot gas into interplanetary space. One on 31 January displayed swirling loops reminiscent of smoke rings, but none affected Earth.

Other articles are concerned with solar phenomena. On 5 February one of the brightest optical flares of the current cycle erupted at 1928. A flare on the 17th was accompanied by a CME apparently headed towards Earth, but in the event nothing much happened.

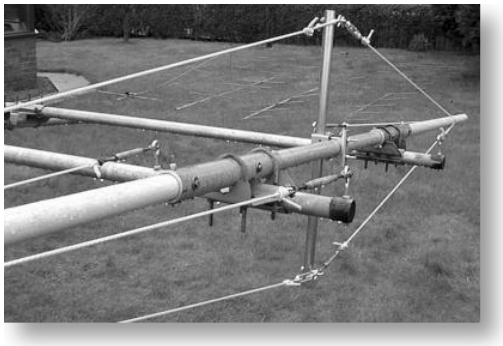
There is an article giving details of the IMAGE spacecraft, which was due for launch on 15 March. This Imager for Magnetopause-to-Aurora Global Exploration is designed to study the global response of Earth's magnetosphere to changes in the solar wind. This should help us understand more about auroral propagation phenomena.

SunMag includes tables of daily solar, geomagnetic, particle and sunspot group data, a solar flare list and other graphs and tables. It is compiled by Neil Clarke, G0CAS (QTHR). His e-mail address is neil@g0cas.demon.co.uk and he has a web site - see the panel.

SPORADIC-E

CORRESPONDENT Austin Uden has been studying propagation at VHF for many years, particularly with regard to meteor shower count rates and possible inter-related phenomena. He refers to data from the Jodrell Bank radio astronomy observatory, which show some correlation with Es openings. He has also studied world thunderstorm maps since these storms have been suggested as possible triggers for Es events.

For the benefit of newcomers to the VHF scene, Es is a fascinating propagation mode affecting the lower VHF part of the spectrum. It is mostly a summer



GM4JJJ's web site includes detailed information and photographs relating to the construction of four dual-polarity antennas for 144 MHz EME.

phenomenon, the 'season' being longest on the 6m amateur band, shorter on 4m and shortest on 2m. As the name suggests, it is an E-layer - altitude 90-120km - phenomenon so, provided the electron density in the E-layer is high enough to reflect or refract signals back to Earth, long distance contacts are possible.

On 6m the season usually starts in the early part of May - eg the first significant opening last year was on the 16th, with almost daily events in June and July, then tailing off by early September. On 2m mid- to late-May openings do occur, but June and July are the main periods for these events. Although spasmodic openings have been reported up to mid-September in the past, relatively few occur after late-July.

During the peak 6m Es season, the band is open to some parts of Europe for long periods so perhaps 'sporadic' is not all that appropriate since the maximum usable frequency (MUF) can be over 50MHz for long periods.

However, it is a much truer description on 2m when many openings are quite brief and then only between geographically small areas. 1999 was a frustrating year for UK 2m operators, since the reflecting regions in the E-layer were often too far to the east. A study of reports in *Dubus Magazine* reveals several instances of paths between Germany and Russia; Switzerland, the Low Countries and Germany to the Balkans; and Scandinavia to Italy and the Balkans, but nothing at all for the UK.

E-layer ionisation sufficient to sustain propagation on 2m is due to several factors, which makes it very difficult to predict openings. It helps to monitor the 4m band for signs of Polish FM broadcast stations, some of which are still QRV, and to monitor the FM broadcast band, 88-108MHz. Sometimes, when listening to a local low power FM station on Band 2, it can be completely swamped by an Italian station for several minutes. If this occurs, it is well worth listening on 2m for possible Es contacts. Es propagation is well covered in various handbooks and manuals, such as *The VHF/UHF DX Book* and *The VHF/UHF Handbook*.

Even so, nothing is perfect! A 4 x 17 Cue Dee array after a 100mph storm in December 1998. Also from GM4JJJ's web site.

MOONBOUNCE

AMATEUR ACTIVITY from Greenland is relatively rare, so the proposed EME operation from OX is very welcome news. A group of 25 Danish amateurs plan to operate OX2K from 29 May through 6 June.

On 6m they will use a 4CX1500 amplifier and a 4-ele Yagi; on 2m a similar PA, four long Yagis and low noise amplifier (LNA); on 70cm 3CX800A7 PAs, four Yagis and an LNA. They will have the use of a 32m dish on 23cm, but will have to share it with other services.

They will be QRV on the HF bands 24 hours a day, operating around the IOTA QRGs. Frits Jensen, OZ2Q, is responsible for sponsorship and fund raising and his QTH is Naurbjergvej 62B, DK-4622 Havdrup, Denmark. Tel/fax numbers are respectively +45 4613 4052 and 4053. The group will have a web site operational - see the panel.

In his March *432 and above EME News*, editor Al Katz, K2UYH, reports that during the 11/12 March sked weekend there was extremely low libration with very sharp polarisation on 70cm. Signal quality was good but 'Faraday' required a 90° rotation. There are reports from Peter Blair, G3LTF (IO91), Iain Barnetson, GM0ONN (IO87), and Stuart Jones, GW3XYW (IO71).

6/7 May is the next suggested sked weekend and the VK3UM program gives the following data for London latitude stations: over 32 hours of Moon time, declination varying from +19.22° to +21.58°, 144/432MHz sky temperatures 464/35K to 575/44K, signal degradation, referred to perigee - 0.08dB to 0dB. This is a perigee weekend, but Sun noise could be a problem as the Sun's offset at Saturday midnight is only +36°.

David Anderson, GM4JJJ (IO86), sent a review of his 1999 2m activity which resulted in 44 'initials' - stations worked for the first time. His antenna array consists of four 10-ele crossed M^2 Yagis on a hybrid aluminium and fibreglass H-frame with AZ/EL control. Full details are on his web site - see the panel. He has the 8J1RL (KC90) report for 20 November 1999 that shows he was the first UK station to work Antarctica, a QSO completed at 2022. G4YTL made it two hours later for the first G.

METEOR SCATTER

THE NEXT reasonable meteor shower is the Eta Aquarids, which has a zenithal hourly rate (ZHR) of around 60. This shower is active for about a week and usually exhibits several maxima with peak reflections expected in the early hours of 5 May. In future I do not propose to give any 'best times' data since serious MS enthusiasts will have access to comprehensive computer programs, such as OH5IY's MSSOFT.

BAND REPORTS

50MHz

Ted Collins, G3UPS (EX), reports that Ron, 7Q7RM, has now moved to Blantyre in Malawi and made his first QSOs from the new QTH on 8 March. Larry Erwin, TZ6VV, left Mali on 24 February bound, eventually, for his home in the USA. Anyone still needing a QSL can contact him at 3850 Willomet Ave, Fort Worth, TX 76133, USA.

Ted copied ZS6PJS (KG46) at 1222 on 20 February and worked F6IFR (JN09) at 0848 on the 27th. On 8 March there was a large solar burst at 0908 and from about midday, several ZS6s were heard with ZS6AVP (KG44) worked at 1217. Weak ZS6s were copied from about noon on the 14th for nearly an hour.

Jamie Ashford, GW7SMV (NP), worked ZS6PJS at 1222 on 20 February. On 8 March, 1117-1224, he contacted ZS6AXT and ZS6RWD (KG33), ZS6WB (KG44), ZS6PJS again, but best DX (ODX) was ZS3C (KG21) for a new grid. Next morning at 1147, 3C5I answered his CQ call on an apparently dead band. On the 13th TR8CA (JJ40) gave him DXCC country number 87 at 1224; his QSL route is via F6CBC. Gordon Wyatt, GW8ASA (CF), worked ZS6AXT, ZS6PJS and ZS6WB on 8 March.

Mike Foubister, ZL3TIC (RE66), reports that ZL2KT and ZL2AGI worked EH8BYR on 50.115MHz at 2100 on 15 March, a distance (QRB) of 18,210km. Peter Taylor, H44PT, e-mailed a revision to his web site. He mentioned the period 28 March to 9 April and says that his log, audio clips and pictures would be available - see the panel.

70MHz

Mike Johnson, GU6AJE (GY), has been quite busy on the band with his 10W and 2-ele beam based on an HB9RZ design published a couple of years ago in *RadCom*. In the Cumulatives session on 13 February he worked GW8ASA/P (IO81), GD4GNH, G3ZJY (IO90), G4NNS (IO91) and GU6EFB. Conditions on the 27th were 'pretty awful', but he managed to contact GD4GNH, G4ZAP

(IO81), G3ZJY and GU6EFB. The GD4 is workable under most conditions, even though the Welsh mountains are in the way.

GW8ASA operates /P from IO81FP and by moving just 20ft, Gordon can be in another area for WAB folk. In the Cumulatives he has been averaging 35-36 QSOs per session, with GD4GNH and GU6AJE being ODX.

144MHz

Ken Punshon, G4APJ (BL), was QRV in the contest on 4/5 March, thus boosting his table score. On 23 February he worked GM4LBV (DD) who was only running 10W at the time while working a newcomer, MM1ERK, who had just received his licence that day.

Back on 5 February, Paul Guilbert, GU0DXX (GY), caught the good opening to Germany and Spain when his ODX was EA1CRK at 675km. GW7SMV worked EB1DNA and EB1DPB (IN53) at 2216 on 10 March and on the 12th, EA1CRK, six Fs in IN94, JN04, 05 and 06 with ODX F4CIB/P (JN02) for a new grid. He runs an FT-100 with a 7-ele ZL-special.

GW8ASA reports 'a very dull period from the home QTH, with only PE1EWR and ON4CGX being worked under flat conditions'. On 10 March, Gordon contacted EB1DNA and EB1DPD - GU0DXX states DPB, who's right? - but the beacon was not heard. North/south conditions were excellent on the 12th but activity was poor; EI5FK and EI3EBB (IO51) were both worked in the 1100-1200 period.

USEFUL WORLDWIDE WEB SITES

LRG	http://www.metalmike.free-online.co.uk/lrg
NASA	http://spacescience.com/headlines/y2000/ast20jan_1.htm
SunMag (G0CAS)	http://www.g0cas.demon.co.uk/main.htm
Greenland Expedition	http://www.qsl.net/ox2k
GM4JJJ	http://www.braeside.demon.co.uk
H44PT	http://www.qsl.net/h44pt/
DUBUS	http://www.dubus.org
EA6VQ (VQlog)	http://www.qsl.net.ea6vq/vqlog.html

430MHz

G4APJ was QRV in the 4/5 March contest and was pleased when GU3EJL in Alderney came back to a CQ call. GU0DXX is QRV on the band with his FT-100 and a 12-ele ZL-special antenna. In the contest, GW8ASA worked PE0MAR/P (JO21), PI4ZID (JO11) and ON5IE/P (JO20) among others. Gordon reports that their activity nights are going well and he lists 13 stations as participating.

Brian Williams, GW0GHF (CF), is a participant in this activity, but writes that they avoid nets, preferring to call on 432.200MHz then QSY for individual chats for, say, 10min. Listen for them on Mondays, Wednesdays and Fridays from 8pm local time. He has been experimenting with a corner reflector antenna with 15dBd gain in the loft and, running 40W, has got an S4 report from G3LQR in Ipswich.

FINALE

IAN WHITE, G3SEK, advises that there is now an official worldwide *DUBUS* web site with links to *DUBUS* archives and other sites. It is written and hosted by its UK agent Roger Blackwell, G4PMK - see the panel. Philip, G0ISW, has discovered the popular EA6VQ shareware logging program, VQlog 2.1 and is very impressed. It can be downloaded from Gabriel's web site - see the panel.

The deadline for the July issue is **18 May** and for the August edition it's **22 June**. My telephone answering and fax machine is on 020 8763 9457 and the CompuServe ID is g3fpk. ♦

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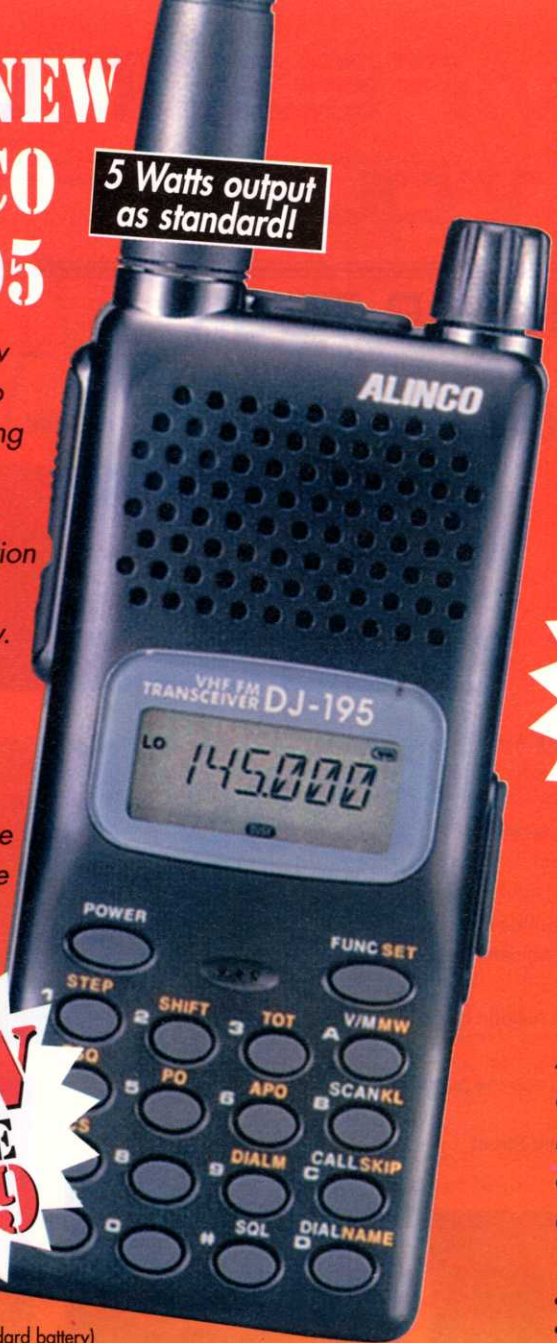

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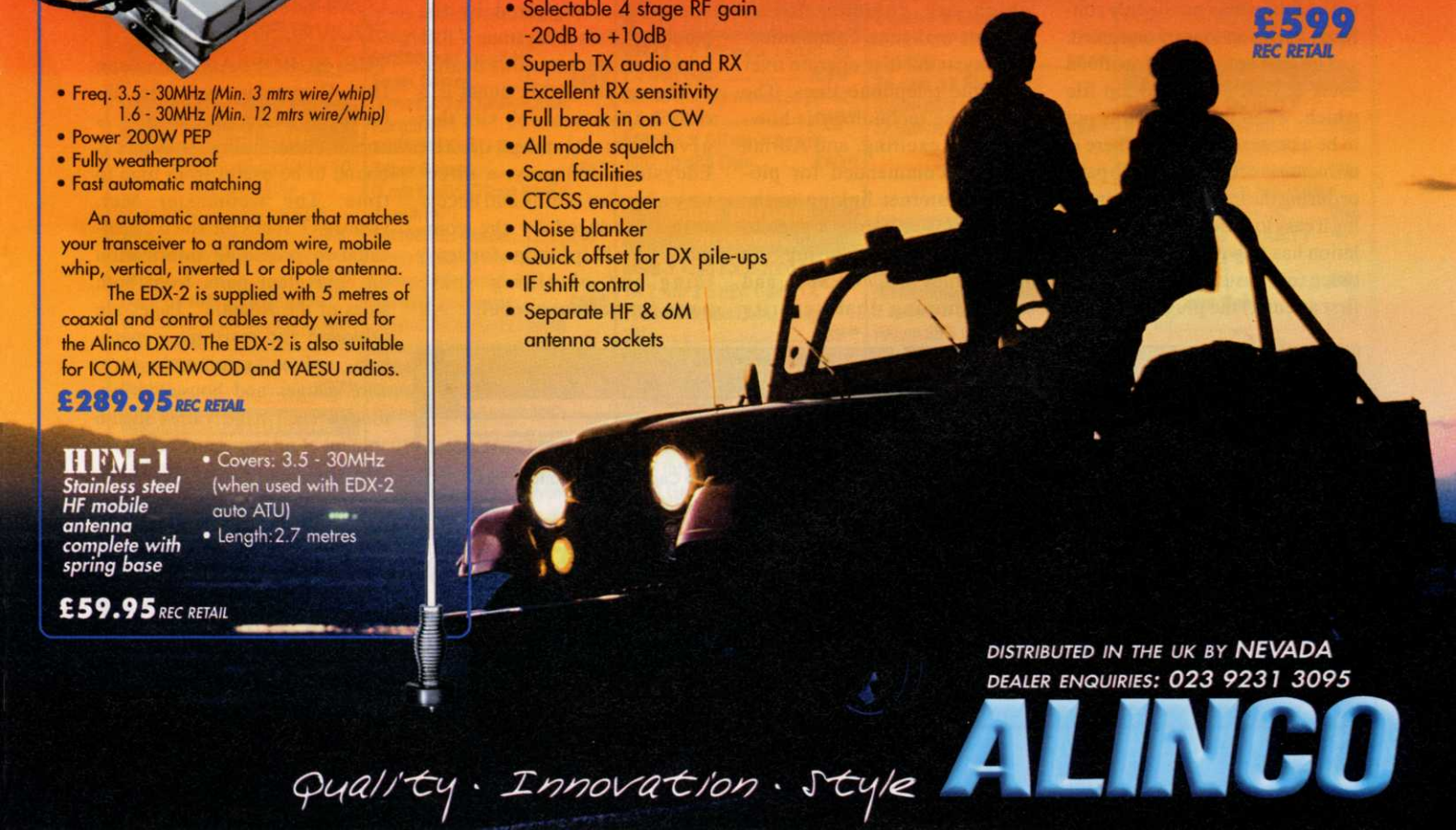

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WWW

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THE FIRST INTERNET-to-amateur radio repeater link in the UK is now up and running, thanks to the efforts of Adrian Robinson, G7WFM. Based in Nottingham, the link provides real-time audio access to local users on the 70cm band, connecting to similar systems world-wide. A portal into the link is provided by the G7WFM web site [1], which also describes how the link was established by close co-operation with the Radiocommunications Agency. The theory of the system is explained using an assortment of maps and diagrams, supplemented by a six-minute Real Audio interview with Jeremy Boot, G4NJH. Unfortunately, the explanations are not as clear as they could be, so the best way to understand the system is to use it.

At the heart of the Internet part of the system is a collection of conference rooms, each associated with a different repeater from around the world. To use a conference room, an audio interface is required; these are based on Vocaltec software, links being provided to allow easy download of the required programs. This is where things become slightly confused, as two options are presented.

The first option is to download 'Surf & Call', a 1.7MB zip file which, when installed, turns out to be a browser plug-in. There is no mention of this on the web page or during the install process, making it easy to believe that the installation has failed. After installing twice (my system crashed on the first attempt) the plug-in worked fine with Internet Explorer 4, though I cannot verify that it works with any other browser. Surf & Call uses a task bar which appears below the conference room windows, enabling the user to listen to the conversations in the conference rooms, although so far I have only heard activity in the G7WFM-R room. How it would cope with multiple rooms is unclear. Right-clicking the task bar gives the user the opportunity to enter personal details, such as name and nickname (callsign), and a 'push to talk' button then allows users to talk directly to the conference rooms, and hence to anyone else connected to the system.

The second option for using the system is to install Vocaltec's Iphone software, once again a link being provided for downloading the 4.5MB file. Indeed, there are messages all over the conference room page stating that the system will not work unless Iphone is installed (this is a commercial program for which payment must be made), however the Surf & Call plug-in appears to function adequately without Iphone, and is a much shorter download too! In use, the audio quality is remarkably good, although it does suffer from dropouts which are common to all Internet real-time communications systems that operate over analogue telephone lines. The underlying technology is however very exciting, and Adrian is to be commended for pioneering Internet linking in the UK. This is certainly a page to watch, especially during the on-air times of G7WFM-R, and here's hoping that security does not become an issue, allowing the repeater to operate unattended in the future.

G7WFM's pioneering Internet-to-amateur radio link.

REFERENCES

[1] http://www.crosswinds.net/~g7wfm/ (G7WFM Internet repeater)
[2] http://www.qsl.net/eddystone (Eddystone Radios)
[3] http://www.euramcom.freeserve.co.uk/ (EurAmCom)

EDDYSTONE RADIO

RARELY CAN A web site be described as a true 'labour of love', but I feel this label is wholly appropriate for the Eddystone Radio site [2] produced by Alan Clayton, G7HZZ. First announced via a press release in January this year, Alan describes the site as being a result of several years of collecting magazines, articles and historical information about this famous British marque, triggered by the purchase of an Eddystone 730/1 from a military surplus dealer.

The result of this quest is a truly impressive web site that gives the history of the Eddystone company, a directory of major radios and accessories produced by the company, plus helpful tips for servicing and obtaining spare parts for various models. All this is supplemented by items of related material, ranging from pointers to additional sources of information, to a page describing the history of the Eddystone Lighthouse. The site is extremely well constructed, made even more impressive by Alan's statement that this is his first attempt at authoring a web site, and is quick to load despite the variety and quantity of relevant and entertaining graphics. This is an unofficial site with no connection to the Eddystone company. However, as an historical record of Eddystone radios, the site is unlikely to be surpassed. Highly recommended.

COMPONENT EQUIVALENTS

THE EUROPEAN/American Ham Community web site, abbreviated to EurAmCom [3], is one of those 'utility' sites that is bound to be useful from time to time. The webmaster Mel, GM6JAG, states the site is "dedicated to providing information on equivalent parts from both sides of the Atlantic". Pages are provided for resistors, capacitors, valves, semiconductors, wire gauges and house wiring, though each page varies in the amount of reference material presented.

The site does contain a significant amount of useful information and appears to be constantly growing. In all, a useful reference work that sticks to its core subject well and deserves to be supported with continuous input from the amateur radio community. ♦

Everything you need to know about Eddystone Radios.

Component equivalents listed at EurAmCom.

LF

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

A TEAM OF Swedish amateurs, including LF notables SM6PXJ and SM6LKM, operated from a disused LF station at Karlsborg in February. The 210m high T-antenna was obviously quite efficient, so the team sought and received special permission to use an ERP far in excess of the usual 1W. The signal was excellent at 599 over most of Europe and nearly 60 QSOs were made. The best 2-way DX worked was Italy, whilst cross-band calls to 80m added Estonia and Romania to the tally.

73kHz CROSSBANDS

WITH THE DATE of expiry of the notices of variation approaching, there has been something of a resurgence of activity on 73kHz. Several continental stations have been receiving Gs on 73kHz and calling them on 136kHz, usually using QRS. Distances of over 1000km have been worked in this way. It makes me wonder just what could have been achieved on the 73kHz band if it had been an international allocation.

Remember that the 73.3kHz Rugby transmitter usually goes QRT for maintenance on the morning of the first Tuesday of each month. This is an opportunity for G stations to work without QRM. It seems strange that we have such difficulty working each other when it is operational, but can still be heard all over Europe!

MORE EASTERN EUROPEAN ACTIVITY

LAST TIME it was OK1FIG making the headlines, this time it is OM2TW from the Slovak Republic. Richard has been operating on 136kHz over several weekends and has worked into HB9, SM (7S6SAJ), G (G3KEV), DL, S5 and OE. Other stations active from the region include: S57A who has worked into Switzerland, Slovakia and Italy; YO2IS and HA6PC.

SM6BBM, SM6LKM and SM6PXJ on site at Karlsborg, with one of the large loading coils in the background.

THE FRENCH CONNECTION

WE HAVE BEEN eagerly awaiting the arrival of France on LF for some time. The position is still not clear. Mark, F6JSZ, who is editor of French *CQ* magazine reports: "The LF regulations in France have been published by the ANF, the French frequency co-ordination agency, in the *Journal Officiel*. The band is allocated to the amateur service on a secondary basis, as per the CEPT recommendation. However, the band has not yet been officially opened for use by amateurs. In the meantime, I have contacted our ministry of telecommunications (once again), who told me that we *can* start using the band from now on, although there's still a signature missing but the document is circulating in the offices. So, we *can* use the band, but *cannot* use the band... It's up to us!". It appears that most French LF enthusiasts are taking the cautious approach because none has been heard as I write. Surely it can't be much longer?

TRANS-ATLANTIC TESTS

ALTHOUGH NO amateur signals have yet been received across the pond, some tests have been going on to assess the likelihood of making a contact with 1W ERP. There are commercial transmitters near (or inside) the 136kHz band which give us a very good idea of the propagation conditions. The Canadians and Americans have been hearing DCF (Mainflingen, Germany) on 138.8kHz, believed to have an ERP of around 50kW, whilst the Europeans have good reception of CFH (Halifax, Nova Scotia) on 137.0kHz with an ERP of about 10kW. If a 10kW signal were to be received 40dB above the noise, then a 1W signal would be at the noise-level and be quite workable on normal CW. So far, the best we have seen from CFH here is around 6dB short of this figure (in 100Hz), but this would still give us a readable QRS or slow PSK signal. The preparations for some serious attempts at this feat next autumn are in full swing.

SUMMER JOBS

THE MONTH OF May brings the possibility of some good weather and with it, the dreaded QRN. When the band is too noisy to use, the weather should encourage those aerial and earth improvements that couldn't be done in the cold. Here are a few tips:

Height is important, average height even more so. Adding low wires to aerial systems in order to increase the length can be counterproductive.

Insulation is critical. Don't let the wire touch anything except insulators and keep it well clear of lossy things like buildings and trees. Remember that the feeder to a T or inverted L is part of the aerial too, and apply the same rules. Build the aerial to withstand 30kV and keep children, postmen and pets away!

Use your earths. If you have copper water main or similar underground metalwork, run a cable from it to your feed point and join it to the earth system. If you need some in-depth advice, try ON7YD's web site at http://www.qsl.net/on7yd/136ant.htm ♦

μWAVE

SIMON LEWIS, GM4PLM
181 Kent Drive, Helensburgh G84 9RX
E-mail: uwave.radcom@rsgb.org.uk

WITH ALL THE exciting news from the Amateur Satellite Corporation (AMSAT) this month, the column focuses on this new and exciting microwave opportunity.

PHASE 3D

JULY THIS YEAR should see the launch of a new amateur satellite. Nothing new in that I hear you say, but this satellite, known simply as Phase 3D, is different from any other satellite launched previously. It is a high-orbit satellite and will be able to see large areas of the earth's surface at any one time. More interestingly to microwavers, not only will the satellite carry microwave equipment for a number of bands into space, allowing microwave communications between small ground stations over vast distances, but the way in which it is being achieved is very useful to newcomers to microwaves. It will offer a strong and very stable signal source on which to learn new techniques. So what can Phase 3D offer microwavers, and what is required to become active on it?

As this column has limited space I am not capable of going into too much detail, but what I will try to do is to show you some of the basics of the Phase 3D systems and then give you some pointers to find more information that is all easily available.

Phase 3D is the latest in a series of high elliptical orbit amateur satellites. The Phase 3 programme has been a long, hard road for AMSAT: Phase 3A ended up in the sea after a failed launch; Phase 3B became OSCAR 10 (Orbital Satellite Carrying Amateur Radio), still operating in a limited capacity after its onboard computer failed; Phase 3C became OSCAR 13, which burned up after its orbit decayed. Phase 3D is a new venture for AMSAT, however. Never before has an amateur satellite carried so many transponders in the microwave bands. The reasoning behind this move is one of physics. VHF/UHF antennas are large, the technology is bulky, and antenna gain is hard to generate in small spaces. The VHF/UHF bands are noisy and crowded by terrestrial interference. AMSAT believes the only way to ensure reliable, low-noise communications is to move upwards into the microwave bands. The move, I believe, will be a revolutionary one for amateur satellite communications and an amazing opportunity that will regenerate interest in microwave amateur radio.

EQUIPMENT

A TYPICAL microwave station for Phase 3D will consist of a few small helical-wound microwave aerials and perhaps one or two small 18-in dishes. These could be mounted on a small elevator/rotator system based on a satellite TV positioner and a standard amateur rotator. All this can be operated at ground level or on a small mounting, to move it above head height in the garden. Compare that to a typical pre-Phase 3D station of large crossed Yagis for 2m and 70cm with their associated elevator/rotator.

Transmitting/receiving equipment can be mounted at the rear of the dishes or below the mounting point. This is not unusual for microwavers who wish to remove the losses involved with long feeder lengths. IF signals at 2m and 70cm can then be sent back to the shack over much longer cables, with no major loss in signal strength or quality. Typically, equipment for the terrestrial microwave bands will be ready to move up in frequency to the satellite bands. Downlinks at 24GHz and 10GHz can use any transverter currently on the market, by recrystalling and re-alignment of the local oscillator and RF stages. 2.4GHz can use a commercial converter or a modified satellite TV unit, like the Drake 2880. Uplinks to Phase 3D will require around 20-30 watts at 1.2GHz and significantly less at 2.4 and 5.6GHz. Don't forget that the use of a high-gain parabolic dish will negate the use of a high power transmitter. The older VHF/UHF modes will exist, but who would want all the troubles they bring?

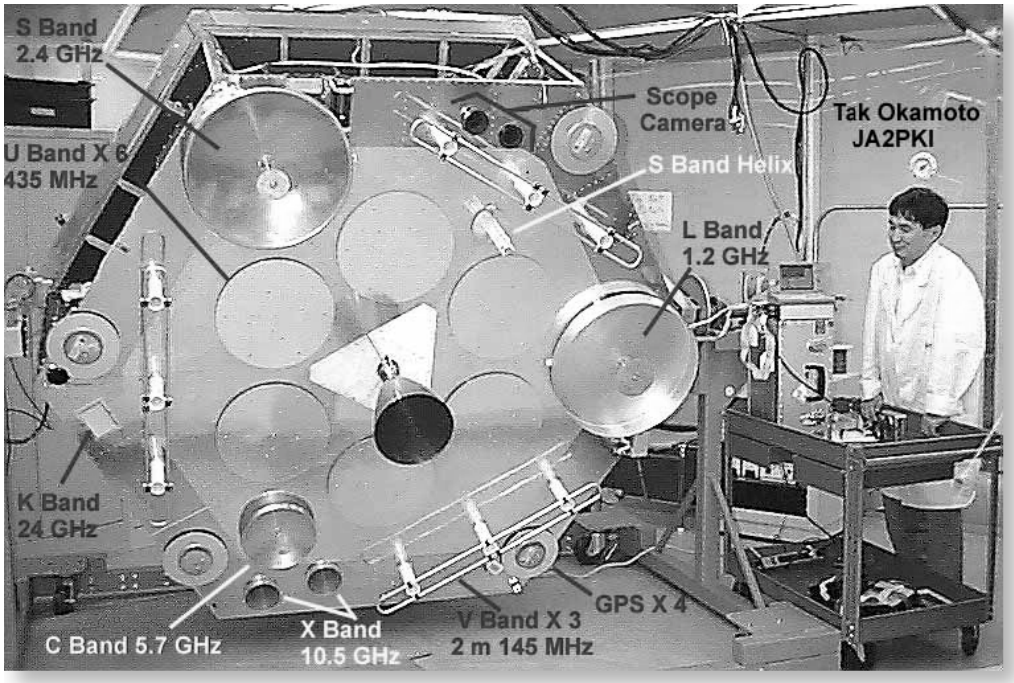
Apart from standard analogue transponders, the satellite will also carry a digital mailbox and digital communications experiments at up to 56Kbaud under the RUDAK project title, an onboard quality video camera experiment. Numerous other digital experiments will also be aboard.

I hope this gives you a taste of how important this satellite will be to the microwave world, bringing worldwide, high-quality communications to small, low-cost and - more importantly - compact, ground stations. If all goes well in July, the world of microwaves will become a very exciting place.

If you like what you see here, please see the AMSAT homepages for further detailed information on the whole project. AMSAT can be found at http://www.amsat.org

OPERATING NEWS

I AM PLEASED to announce that the UK's first 76GHz complete 2-way contact was made on 19 March. The contact between John Hazell, G8ACE, and Chris Towns, G8BKE, over the short distance of 1km was made at a site in the New Forest called Ocknells. Signals were good at this short range, with both FM and sideband exchanges at S9 strength. Ground clearance was only 3-4ft and pedestrians and cars crossing the path reduced the signal, as you would expect. John also states that this a precursor to a longer path contact. Well done! I look forward to hearing more of your adventures and congratulations on your groundbreaking progress. ♦



Phase 3D in the laboratory, showing the impressive array of microwave, 2m and GPS aerials. The size of the satellite may be judged with respect to JA2PKI standing alongside.

QRP

REV GEORGE DOBBS, G3RJV
St Aidan's Vicarage, 498 Manchester Road, Rochdale OL11 3HE
E-mail: g3rjv@gqrp.demon.co.uk

THE FOURTH Red Rose QRP Festival is to be held on Sunday 4 June 2000 from 11am to 4pm at the Formby Hall, Alders Street (off the High Street), Atherton, Manchester. The aim is to promote interest in low power operating and home construction. The event takes place at a large spacious hall at ground level with disabled facilities and a large car park. Refreshments and a bar will be available throughout the event. The stands will include lots of junk, radio parts and a large, inexpensive Bring and Buy section. Details can be obtained from Les Jackson, G4HZJ, 1 Belvedere Avenue, Atherton, Manchester, M46 9LQ. His telephone number is 01942 870 634.

UNIQUE W1FB STATION ON AIR

ANYONE WHO knows anything about QRP must know the work of the late Doug DeMaw, W1FB. For many years the Technical Editor of QST, Doug produced an amazing output of technical articles and books on QRP radio construction. His books are still part of the standard QRP literature.

On the last weekend in February, the newly-formed Central Connecticut QRP Club and the ARRL inaugurated the W1FB Memorial Station, an all-QRP station using Doug's old callsign. The first QSO from the station was conducted by his son, Dave DeMaw, N8HLE, using a Tuna-Tin 2, one of Doug's classic designs. This first QSO was with his mother, Jean DeMaw, W1CKK, on 40 metres.

Later, the W1FB station operated on 20 metres, also using QRP. In the pile-up that resulted, the station was worked by well-known UK QRPers, George Burt, GM3OXX, and Peter Barville, G3XJS.

SARA LOW POWER SPRING SPRINT
International HF Event

Organiser:	Slovak Amateur Radio Association (SARA) - QRP Section.
When:	Easter Monday, 24 April 2000. (yearly every Easter Monday).
Time:	1400 - 2000 UTC.
Operators:	Single operator only.
Mode:	CW (A1A, telegraphy).
Bands:	1.8, 3.5, 7, 14, 21 and 28MHz on IARU-recommended contest band segments.
Power categories:	A, 1W; C, 5W; Q, 25W; X, 50W; Y, 100W; these are maximum outputs.
Band categories:	1, single band; 2, three bands; 3, all bands.
Exchange:	RST, IARU locator (first four designators), and power category (example: 579 JN98 C); reception of RST is sufficient from non-contest stations.
Points:	3 points per QSO with own continent; 9 points per QSO with other continents; 18 points per QSO with OM stations.
Multipliers:	These are scored per band and consist of: (a) IARU locator - first four designators (example : JN98); (b) prefix (according to WPX rules).
Scoring:	1. The final score is the total QSO points for all bands added together, multiplied by the number of multipliers from all bands added together; 2. unmarked duplicates are penalised by deduction of ten times the QSO points claimed; 3. cross-band contacts do not score.
Logs:	1. Separate logs, with separate page numbers, for each band; 2. log sheets must be headed with Callsign, Band and page x of n; 3. log pages should contain at least 40 QSOs, with columns as follows: Date, Time (UTC), Callsign worked, RST, Exchange sent, Exchange received, New Locator, New Prefix, and QSO points; any RST column left blank will be taken as 599; 4. logs from bands used but not entered in a particular band category will be treated as check logs; please mark them "Check Log"; 5. sample Log and Summary Sheets are available from the adjudicator on request; send an envelope with your address on it, alternatively, use your own Log and Summary sheets; check logs from all stations not submitting an entry will be highly appreciated.
Summary:	Showing contest, date, number of valid QSOs, points and multipliers on each band, final score, entrant's name, callsign and address, power category, band category, IARU locator, output power, rig/antenna description and signed declaration.
Entries:	Entries must be sent to the adjudicator, Radioclub OM3KFV, PO Box 129, 03601 Martin 1, Slovakia, Central Europe, and postmarked no more than 30 days after the end of the contest; indicate "SS Contest" on the envelope.
Adjudication:	Points may be deducted or entries disqualified or excluded for any breach of the rules or spirit of the contest; the decision of the SARA is final; only one power/band combination category per entry is permitted.
Awards:	Certificates will be awarded to the highest-scoring station in each power/band combination category.

Dave DeMaw, N8HLE, operates his father's *Tuna-Tin 2* transmitter in the W1FB Memorial Station at ARRL Headquarters. The first QSO was with his mother, Jean, W1CKK (below).

VK ON 160 METRES WITH QRP

WORKING VK on160 metres with under 5 Watts is an achievement by anyone's standards and Ian Keyser, G3ROO, did exactly that in the Christmas holidays. I will let Ian tell his own story.

"This story started on Christmas Eve when the storm broke my Quad up! With Christmas upon us, there was no time to do repairs and so I was left with LF bands for the G QRP Club Winter Sports. I am very fortunate that I have a 60ft tower and several high trees. I soon realized that the tower and one of the trees would support a Marconi Tee. This was soon up with a 55ft vertical section and a length of coax laid upon the lawn. The natural resonance was found to be at 2.1MHz. With a little inductance and a 1500pF variable to make an L-match, I had 1:1 in the shack.

"That night conditions were excellent, and with 100 Watts I had worked 22 countries by 2100 UTC. Tuning around 1821kHz I found a weak station calling CQ; it was VK6HD! I called him with 100 Watts and he came back giving me 569. The next few days were spent building a remote ATU and gearbox so I could tune the Tee over the whole band from within the shack. The following weekend I went looking for Mike and found him, this time getting 579 on the first call.

"This prompted me to ask for skeds with other 160m QRP stations on the G QRP list. Several responses resulted, the first QRP/QRP QSO being with Vitas, LY2FE. This started some chat about working VK6HD on 160m on the G QRP internet list, and with my QRO signal reports being 569 and 579 it was obvious that my report should be in the region of 549, or 449 if conditions were good.

To help the chances, I dropped a note to Mike by post asking him to listen for QRP calls. 3 February 2000 was the first time I had heard Mike and suddenly there he was calling CQ at 559. My first call was lost beneath an SM station and as he finished I followed with QRP…QRP K. Mike immediately returned with QRZ so I then sent my callsign. He returned with 449 and I gave him 559 QRP 5W. He had trouble getting that, but did so in the end! The transceiver that I was using at the time was a TS-570D set at the 5 Watt level. Afterwards I checked into my dummy load using a Diawa CN-620A power meter which showed just under 4 Watts.

I am now hoping that Mike will reply to my note and that will give me the opportunity of asking him to announce that he is listening for QRP stations. I now want to do it with 1 Watt. That may seem a little optimistic, but not really. Mathematically, I will be 229, but my aerial resonance is 2.1 MHz, meaning that there is a lot of aerial current within the ATU that could help with the radiated power. Also, my ground is not at all perfect. My longest earthed radial is 200 yards to the west, but I have the facility of putting about 400 yards to the north with multiple earth spikes and half a mile to the south. I have excellent neighbours!

"For those people wishing to listen for Mike, I seem to hear him on Friday, Saturday and Sunday evenings between 2100 and 2130 UTC between 1821 and 1824kHz." ♦

IOTA

ROGER BALISTER, G3KMA
La Quinta, Mimbridge, Chobham, Surrey, GU24 8AR
E-mail: iota.hq@rsgb.org.uk

THE IOTA 2000 programme got off to a good start in January, with some stations working over 100 islands and all 7 continents in the month - enough to qualify for the basic IOTA 100 award.

January was a tough month in which to collect premium points, since the qualifying islands were those just to the west of the International Date Line. Propagation from northern Europe was not good, but despite this several stations report having worked over 10 'premium pointers'.

February has shown a different picture, as all the Japanese islands and many others in the Far East and in Oceania have been very active. Quite a few rare JA and YB8/9 islands have been on the air. Some stations report having worked over 30 premium pointers.

In March we expect a good deal of activity from Asia and Oceania and from the remaining parts of Indonesia. It should be possible to pick up another 15 to 20 premium pointers this month.

The IOTA 2000 Programme gets easier as we move towards the middle of the year. In June and July, nearly all the European islands count for premium points.

Remember, it's still not too late to start. You can find all the information you need on the CDXC website at www.cdxc.org.uk A list of the regularly-activated island groups counting for premium points for May/June 2000 is shown in the panel.

IOTA Millennium Programme: regularly-activated islands counting for premium points in May and June 2000

MAY 2000

AF-013 5R	Madagascar
AF-016 FR	Reunion Island
AF-024 S7	Seychelles
AF-032 5H	Zanzibar Island
AF-049 3B8	Mauritius
AN-015 8J1RL	Ongul Island, Queen Maud Land
AS-002 A9	Bahrain
AS-004 5B, ZC	Cyprus / UK Sovereign Bases
EU-019 R1F	Franz Josef Land

JUNE 2000
There are over 100 European counters in June. See the CDXC web site: www.cdxc.org.uk

ACTIVITY REPORT

THE SECOND new IOTA of the year came up on 8 March when Bernhard, P29VMS, reached Nissan Island, Green Islands group, in the far east of Papua New Guinea (OC-231/Prov). Unfortunately on arrival and throughout his five day stay, he had serious health problems and was forced to restrict his operating time. However, he managed to make about 350 QSOs, a creditable effort in the circumstances. Let's hope that there will be another operation from this new one in the near future. Details of forthcoming new ones are given on the IOTA Manager's web site at http://www.eo19.dial.pipex.com/index.htm

REVIEW OF THE IOTA ISLAND LISTINGS

IN READINESS for the next IOTA Directory, we have carried out a major review of the island listings. The purpose was two-fold - to identify all qualifying islands for as many of the listed IOTA groups as possible and at the same time to review, amend and correct where necessary the current group coverage in an attempt to achieve greater accuracy as well as fairness and consistency of approach in the treatment of countries worldwide. This has led to the withdrawal of groups where there are no known valid islands and their replacement by a broadly similar number of new groups (to maintain the cap on programme size). It has also involved the deletion of a few islands from the list which have been found on closer examination not to meet qualification criteria. All action has been consistent with the current structure of a listing based on island groups, rather than on individual islands and with the existing qualification criteria. In reaching its decisions, the Committee has taken account of representations made by the IOTA community.

The exercise is almost complete. Such has been the depth of map-work involved that it is not expected that it will ever have to be repeated. We have now achieved our objective - the boundaries of each group carefully determined by precise geographical co-ordinates and, for the majority of groups, all valid islands listed by name.

NEW IOTA DIRECTORY

THE NEW DIRECTORY will be published in the middle of June. If you are an active IOTA participant, or indeed a closet island chaser, you will certainly need a copy. The changes are sufficiently significant that, without it, you will be at a real disadvantage of not being able to track changes. This benefit aside, copyholders will know instantly whether the island worked counts for IOTA - because if it is not listed, it probably won't. They will know instantly on which island to target their next DXpedition - no need to check first with IOTA HQ. They will know instantly how to maximise the use of their time and to target their green stamps most effectively, to get those IOTA QSLs.

Watch for an announcement in June about the publication date. Copies will be available from RSGB, price to be announced.

HF & IOTA CONVENTION 2000

PUT THE DATE in your diaries now. This year's RSGB HF and IOTA Convention will be held over the period 13 - 15 October at Old Windsor, Berkshire. An interesting programme - with plenty of IOTA content - is under preparation, with a number of well-known speakers lined up. The IOTA Committee will explain the background to the changes mentioned above and will touch on future developments in IOTA as it enters the new Millennium. You really mustn't miss the occasion. We are already gathering an impressive list of visitors. Stand by for more information later. ♦

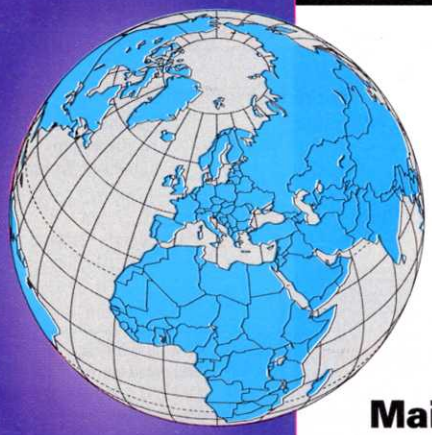
NEW REFERENCES

AS-144 Myanmar: XZ Mergui Archipelago (Thahtay Kyun)

OC-231/Prov Papua New Guinea: P2 Green Islands (Nissan Island)

Alan, BA1DU, joint leader of the BI7Y DXpedition, with his Premier IOTA Award Plaque.

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



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SP21 base station loudspeaker £65

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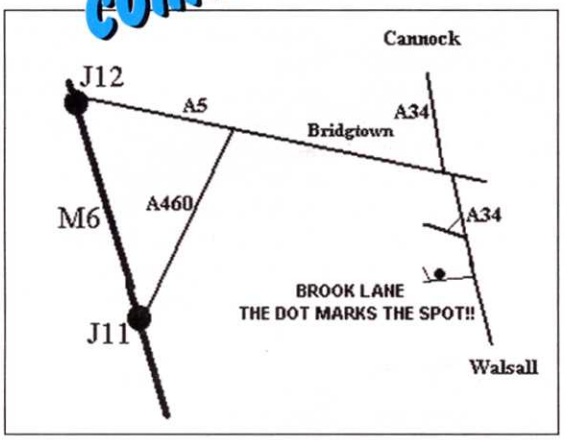

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THE MOST exciting development over the recent weeks has to be the news that Phase 3D is scheduled to fly on Ariane 507. The rumours suggest an early July lift-off, but that has yet to be confirmed. It looks very likely that the launch can be watched on www.arianespace.com using the latest version of 'Quicktime'. It has apparently become the custom for all Arianespace launches to be shown in this way. As the flight number suggests, the rocket will be an Ariane 5 which is currently capable of lifting some 6.5 tonnes into geostationary orbit. By 2005 the load capability should have been improved to 11 tonnes, gained by developing new upper stages and enhancements to the other stages. The Arianespace web site is well worth a visit in its own right, especially as they have an interest in the Franco-Russian company Starsem which operates the Soyuz launcher.

Should the Arianespace launch broadcast not be forthcoming, another possibility is the Bavarian Astra station, BR, which broadcasts 'spacenights' after midnight and usually runs live coverage of Ariane launches with English commentaries. The vital statistics are 11.141GHz, horizontal polarity and stereo at 7.02/7.20.

MIR

ALTHOUGH UNMANNED at the moment, Mir is once again in the news. It is surprising how this ageing spacecraft stays in the limelight. Apparently, some foreign backers have agreed to finance further missions to Mir to the tune of $20M and the new crew should already be aboard by the time you read this. The mission is expected to lift-off on 3 April. The fears of Russia's space station partners will once again be re-kindled. They are worried that reactivation of Mir could divert scarce Russian financial resources from the International Space Station project which is already slipping. Acting President Putin has urged the Russian government to find funds to preserve Mir without prejudice to their commitments to ISS. Russian-built living quarters for the International Space Station are due to be launched from Baikonur in Kazakhstan later this year.

ISS

IT IS HOPED that the International Space Station (ISS) will have a full-time crew from September this year, after the living quarters module, Zvezda is delivered by Russia. The Russian engineers have already applied for an amateur radio club callsign in anticipation of the installation and use of amateur radio equipment. The call allocated is RZ3DZR.

There has been quite a lot of discussion at both Guildford and San Diego over possible call-sign allocation to the ISS. No conclusions were reached because ISS is not owned by any one nation. However, the Russians licence allows the use of commercial as well as home-brewed amateur radio equipment in the Russian-supplied modules. It is not likely to be the last call allocated, because there has been talk of a United Nations callsign – it would seem that such an application has already been made by one of the radio clubs for a UN licence.

The question of licensing operations on ISS has exposed the anomalies in the various 'Third party traffic' agreements and national laws governing the relay of messages to and from non-licensed operators. For example, at present, Russians on ISS could be considered as on a Russian ship at sea by American amateurs, simply because no 'Third Party' arrangement exists between Russia and America. Actually, the major problems could be with the educational programme; here contacts are proposed between schools and the occupants of the Space Station. Let's hope the question is resolved fairly soon. If it isn't, there will a lot of operational pressure on the American astronauts!

The space station is now in its fifteenth month in orbit and continues to operate well. However, storage battery No 1 - of six - in the Zarya module, has been giving some trouble and will be replaced when the Shuttle docks on the next mission. A maintenance mission is scheduled after 13 April, but before the arrival of the Zvezda module, to provide living quarters for the crew by September. Shuttle mission STS-106 has been approved as the flight to follow the incorporation of the Zvezda module. The shuttle will be docked for a week whilst supplies are transferred and some of the systems activated. The actual docking of Zvezda will employ the fully-automatic Russian 'Kurs' system. It has been successfully tested twice recently without exposing any problems.

If you wish to view the transit of the ISS, full information is available on the web site http://spaceflight.nasa.gov/realdata/sightings/

FM SATELLITES

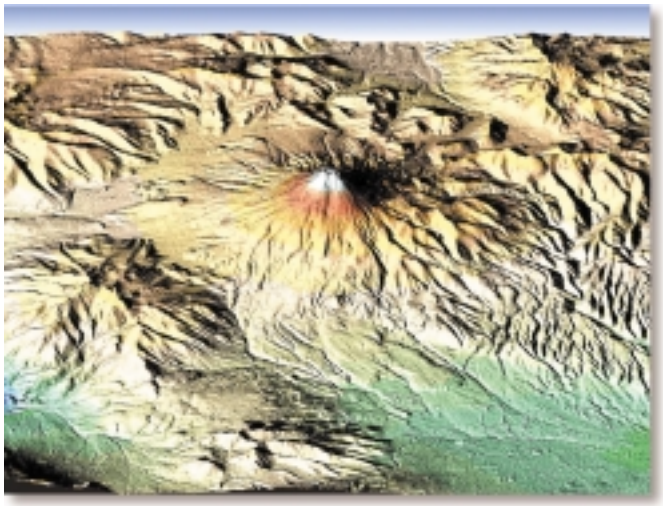
OSCAR 27 HAS BEEN joined by UoSat/Oscar-14 in the FM transponder satellite service. UO-14 was launched in January 1990 and spent a year and a half as an amateur radio store-and-forward satellite prior to the launch of UO-22. It was then transferred to use by VITA – Volunteers in Technical Assistance – for messaging in Africa. The computer used for that service has now failed and the satellite is no longer able to perform the tasks to which it was assigned. UO-14 has now been configured to perform as a single-channel FM repeater with an input on 145.975MHz. and a downlink on 435.070MHz. This mode is often referred to as 'bent-pipe operation'. The satellite will be left in this configuration for several weeks. If it is useful, it will most likely be left running by the spacecraft controller Chris Jackson, G7UPN. If not, it will be switched over to providing telemetry only.

SPACECRAFT GYMNASTICS

STILL WITH THE UoSat stable, UO-22 has flipped. It is flying upside down, a deliberate manoeuvre on the part of the control team to offset partially the heating effects of the spacecraft entering full sunlight. It proved difficult due to the gravity boom, but was completed. The temperature of the critical systems, such as the batteries, has been reduced by some 5 to 10 degrees by this ploy, but of course the downlink is now weak because the antennas are pointing away from earth.

STS-99

ANOTHER LANDMARK was reached when the shuttle *Endeavour* sped into space in February with a crew of six astronauts on a 'Radar Topography Mission'. A 200-foot rigid mast was deployed for a radar mapping mission of the earth's surface at C- and X-bands. Received data will be processed to provide three-dimensional maps, which are expected to be thirty times more accurate than anything to date. X-band images are currently posted to the German Space Agency web site at www.dfd.dlr.de/srtm/html/newtoday_en.htm ♦



Mount Cotopaxi in Ecuador, as seen by radar topography. See 'STS-99'.

Photo courtesy of the DFD web site quoted right.

SWL

BOB TREACHER, BRS 32525
93 Elibank Road, Eltham, SE9 1QJ
E-Mail: brs32525@compuserve.com

WELL, WEREN'T conditions during the WPX contest superb? Simon, RS177448, and I did a serious multi-single entry into the CQ WPX SWL Contest. We amassed a score of over 3.5 million points from 1,907 loggings. We heard 816 different prefixes during the weekend. Although 28MHz was in good shape - ZLs at 0030 UTC - the star band was probably 21MHz. The band was open well past midnight, but 14MHz stayed open for the whole 48 hours and I was surprised at the strength of the Stateside, Caribbean and South American stations - especially in the last hour of the contest - on 7MHz.

This really was a weekend for the listener who collects prefixes. It is usual for South American stations (especially Argentinian and Brazilian) to flood the bands with exotic prefixes, but it was nearer home that the surprises came, with Spanish stations, for example, using AM, AN and E. Further afield we had 7A0 (Indonesia) and 6G0 (Mexico).

Two new DXCC entities were born, too, and the bands were fizzing with activity from the hordes chasing TX0DX (Chesterfield Island) and 4W6DX (East Timor). At the time of writing I had still to hear either country!

2001 *YEARBOOK* LISTING

IF YOUR POSTAL or e-mail address is not already in the RSGB *Yearbook*, now is the time to act. I will soon be collating details to include in next year's edition. Simply write or e-mail the details you want to appear. SWLs need to retain a presence in the *Yearbook* now that the facility has been made available, so it is important that you let me have your details as soon as possible.

RSGB CONVENTION

AFTER AN ELEVENTH-hour call to man a stand at the 1998 RSGB International HF and IOTA Convention, the Society asked for a greater SWL presence last year. Mick Toms, BRS31976, and I produced an informative stand and gave a talk about SWLing techniques. I often hear listeners complaining that they have no voice in Society affairs. Last year's Convention provided the perfect vehicle to show that SWLs are interested in HF affairs, but listener attendance was poor. You have one more chance! Mick and I are beginning to look at ideas for this year's SWL stand. We need *your* input on the type of display that you feel we should present. The 'information' theme last year could be repeated, supplemented by an 'activity' theme, but we need to know the type of information and activity you would like to see. I'm also interested to hear from our licensed colleagues about what they would like to see covered to inform everyone about the role of the SWL. A few pointers there. The ball is firmly in your court - no feedback, no stand!

SWL CHALLENGE RESULTS

SWL	DXCC	Mult	Score
I4YA-179	124	55	6820
ONL383	104	52	5804
GW5218	99	53	5247
OM3-27707	98	52	5096
BRS46566	90	55	4950
G11195	84	53	4452
F-14368	84	51	4284
BRS25429	84	45	3780
SM3-8055	100	36	3600
F-12921	66	53	3498
F-17126	67	46	3082
F-15223	70	43	3010
BRS95258	61	47	2867
DE8JOH	75	36	2700
SWL-F	63	42	2646
F-20553	60	35	2100
F-17789	48	41	1968
BRS5252	67	28	1876
DE1MLB	49	26	1274
F-10141	28	39	1092
F5NLZ	52	20	1040
F-15828	29	28	812
F11556	21	21	441
DE7ANE	16	5	80
F-17028	31	2	62
F-11676	34	1	34
F-10255	19	0	19
F-14846	14	0	14

28MHz CHALLENGE RESULTS

FRANCK PARISOT, F-14368 (www.chez.com/swlcontest), sent the results of the recent Challenge. 27 logs were received, including six from the British Isles, and the best five logs are to receive a small gift from the Challenge sponsors - CQ RadioAmateur and Icom, France.

BALTIC CONTEST

A REMINDER THAT this contest takes place over the third weekend in May. It is an 80m CW/SSB contest where SWLs must log ES, LY and YL stations.

2nd SLP CONTEST 2000

Call	SLP1	SLP2	Total
OM3-27707	0	15480	15480
NL-7280	14758	0	14758
NL-7403	8208	4176	12384
GW-5218	8284	0	8284
NL-12089	5610	0	5610
ONL-383	0	5268	5268
NL-290	3706	0	3706
OE1-0140	1496	1952	3448
F-11734	2258	0	2258
NL-11099	1974	0	1974
NL-9723	250	1540	1790
NL-11976	0	1749	1749
F-17789	0	754	754
PY2-80124	0	551	551

I entered in 1998 and found it great fun. I was surprised how much activity there was from the Baltic countries. The time is different this year, as it takes place from 2100 to 0200 UTC. This means getting all your chores done during the day and playing radio at night!

SMC SWL CONTESTS

AS SOUTH MIDLANDS Communications has closed its Retail Division, it has discontinued its support of the popular LF Bands Contest. Not only that, but David Whitaker, BRS25429, has stood down too. I'm not sure which news is worse! Anyway, the contest needs another sponsor. David is waiting to hear your ideas. You can e-mail him at brs25429@compuserve.com or write to him at 57 Green Lane Harrogate, North Yorkshire HG2 9LP. It really would be a shame if this popular contest were to die.

SLP RESULTS

LAMBERT Wijshake, NL-10175, sent the results of his second SLP contest 2000. I must congratulate Lambert on having the results available so quickly. There was only one British Isles entrant, but I hope we can redress that in the coming months.

BAND REPORTS

ONCE AGAIN Robert Small, BRS8841, reported recent conditions. All reports this month have remarked on the upturn in band conditions - the Solar Flux Index has regularly been over 200 - such that the various DXpeditions have been relatively easy to hear. Robert heard the VP6BR, VK9X, VK9Y and CE0Z trips for new ones on various bands. 14MHz provided an all-time new CW country, thanks to VK0MM on Macquarie Island. Most DX on 20m had been heard early and late in the day. He logged ZS8D (Marion Island), 8P6MR, A41LI and XW2A. CE0Y/UA6AF was new on 18MHz, as was H44MS (OC-158). There was an enormous amount of 15m DX in Robert's report – the best being BV2TL, YI2CL, 5X4M, 9M2JO, DU9BCD, S21AR and 6M0MM. On 24MHz, VK9CP, VP6BR, 9N7RN and VK9XU on SSB, plus CE0ZY and 9G5CW on CW were new, but that band also produced XE1D, KL7HF, VK9CN, YS1/OH2BAD, VK9CO, S21VJ and PT2BZ/PY0F. 28MHz had been good, with the best of a really exciting list being VP6BR, FK8VHY, BV4VE, CE0ZY and BX6AA.

Responding to the item on QSL returns, Robert took a look at his old logbooks. He has a good 50 to 60% QSL return rate for direct and bureau cards combined. He remarked how many have commented "Thanks for my first SWL report". ♦

Certificate won in the Baltic Contest, 1998.

CONTEST

TIM KIRBY, G4VXE
11a Vansittart Road, Windsor SL4 5BZ
E-mail: tim@ukgateway.net

YOU MAY REMEMBER the sad story of our computer problems during the ARRL RTTY Roundup, following the logging program's rather violent reaction to a /2K suffix. At the time I did not identify the station concerned, because it wasn't his fault that the problem occurred and I didn't want to embarrass him!

A day or so after *RadCom* appeared, I had an e-mail from Ian, G0KRL, saying that he thought he must have been the person that I was referring to and would I publish an apology to any RTTY contesters that had experienced a problem resulting from his special call. This I'm very happy to do, of course, although I reiterated that he had nothing to feel guilty about. Ian joked that perhaps his score would be a winning one, following the problems that other people had with their logging software!

A little more now on the subject of 'high speed CW' in contests, which we didn't have room for last month. Mike, G0KDZ, wrote a really excellent letter which came from a different perspective from the original letter from M0AVN, which I felt was so good that I've included in its entirety.

"I jumped straight into the CQ WW CW contest in my first year, having just passed the 12WPM test with difficulty. In fact, contests are the very best way to rapidly increase one's speed. Usually, to begin with, we can send a bit faster than we can receive, so sending our callsign and appropriate response is perhaps no problem, particularly if it is only '5NN 14 TU'.

"As contest stations tend to sit on the same frequency calling repeatedly 'Test Test de callsign', we can listen to this over and over again until eventually we can puzzle it out, even when being sent fast. Then it is only necessary to make our response at whatever speed we like. If slower than he is sending, never mind. He is glad of the extra point.

"I found that this, continued hour after hour, produced a significant increase in receiving speed by the end of my first contest weekend. But yes, I can remember the frustration of hearing what was initially totally unintelligible CW. As there are contests on most weekends, they proved for me to be by far the easiest way to learn fast CW. In a normal QSO it is easy to lose the message if the incoming CW is a bit too fast, and end up making a quick exit to cover our confusion. In contest QSOs this does not arise. On each band the slower contest stations anyway tend to be found at the top end of the CW section, so it is easier to start at the top and drop down as one's ability increases. Using contests for practice, I was up to 45WPM in under 2 years and I am sure that I would never have managed it merely through normal QSOs. With snappy contest QSOs it is so much easier the break through the barrier of writing down incoming CW. Many operators never progress beyond this and are still writing CW down after 20 years, therefore they are not happy operating above writing speed. I found it is a bit like learning to ride a bike. Suddenly in some contest you realise you are listening to the CW like language, have no need for the pencil, and after that you never look back."

This year, I've been able to take part in the RSGB 70MHz Cumulative sessions for the first time in many a year. I've been pleasantly surprised how much activity there is and what can be worked with a very simple setup. The 70MHz antenna at G4VXE consists, I am somewhat embarrassed to say, of the HF long wire with an ATU. Happily, here in Windsor, I have the benefit of being able to use aircraft scatter to make contacts at VHF which might not otherwise have been possible. The moral of the story, really, is that if you have a multi-band rig such as a FT-847, do have a listen on VHF from time to time, even if you don't have a 'proper' antenna. You may be very surprised at the results that you achieve. And during contests, the 'serious' participants will be very pleased to make a contact with you!

This is what Field Days are all about! Tony, G8JAY, and Ian, G4PDS, operate the Cheltenham ARA station, G4ERP/P, during VHF NFD 1999.

Now is the time of year to start planning-out the contests that you'll take part in over the summer. NFD beckons on the first weekend in June. Your club *has* registered for it, hasn't it? For those who enjoy VHF contests, don't forget the excellent Backpacker series, on both 50 and 144MHz. Make a note of the dates now and plan to be active for at least a few of the sessions.

Finally, a small request. I have received one or two enquiries recently regarding the rules for contests. Please note that I cannot supply this information. RSGB contests are administered by either the HF Contests Committee or the VHF Contests Committee and your queries should be directed to the chairmen of these committees and not to me. Your co-operation is much appreciated.

1.3GHz/2.3GHz TROPHIES AND UHF, 1999

FROM THE COVERSHEET comments, this was clearly a dreadful weekend for a contest. The Five Bells group (G5B) sent some pictures to back up its comment of 'Wet Wet Wet!'. Driving rain and gale force winds killed off almost all operation on the higher bands with aiming dish antennas owing as much to fortune as intent. The Parallel Lines group commented 'could have been worse (only kidding!)'. It was unable to put up all the antennas because of the wind; nevertheless, it was a clear leader across the board.

On 1.3GHz, Parallel Lines recovered the trophy it lost to the Northern Lights last year, with Villa CG (a subset of the Colchester club) making a strong showing to come in second. On 2.3GHz, Villa held everything together to win the trophy; G8P was pleased with its score given that it blew up both the masthead preamp and the transverter front end, while G0EMG commented 'it just didn't work'.

In the Fixed Station sections, G3XDY's station and location contributed to a dominant position on the lower bands, while on the higher bands it must have been a struggle for anyone to eke out any contacts at all. We can only hope for better things next year.

Steve Thompson, G8GSQ

432MHz Multi Operator

Pos	Callsign	Score	QSOs	Locator	Power	Antenna	Best DX	km	Norm
1	G8P	106882	288	01QD	400	4x21Y, 2x21Y	OK1KIM	850	1000
2	M1CRO/P	79375	236	01PU	400	4x21Y	OK2KKW	818	743
3	G0EMG/P	74267	209	02OD	400	4x38Y	OK1KIM	864	695
4	G8OHM/P	10255	53	82QL	50	4x19Y	DH8VH	765	96
5	G4SJH/P	1886	13	91PF	50	19Y	PA6NL	344	18

432MHz Single Operator

1	G3XDY	21328	60	02OB	250	28Y	OK1KIM	867	1000
2	PE1EWR	12608	56	11SL	25	2x21Y	HB9MS	622	591
3	G6DER	7474	14	93GN	400	21Y	DG3FK/P	852	350
4	G4AEQ	4043	15	93PE	250	2x19Y	DK7MP	489	190
5	G4PMK	3267	12	91IP	50	19Y	PA6C	534	153
6	2E1GUA	2499	21	01FS	10	23Y	DK0MU	464	117
7	G4APJ	1885	9	83UB	25	19Y	G8P	373	88
8	G8ZQB	1293	7	92JN	25	19Y	PA6NL	368	61
9	G4LRT	1071	5	92LJ	300	2x18Y	OT9M	369	50
10	G4KNZ/P	805	6	02TD	10	10Y	DK0MU	395	38
11	G1WAC	184	3	92BJ	25	21Y	M2A	66	9

1296MHz Multi Operator

Pos	Callsign	Score	QSOs	Locator	Power	Antenna	Best DX	km	Norm
1	G8P	32524	113	01QD	400	8x23	DK2GR	699	1000
2	M1CRO/P	22311	89	01PU	100	4x23Y	DL0UL/P	499	686
3	G0EMG/P	18868	69	02OD	400	4x55Y	DF9QX	506	580
4	G5B	10331	35	03CE	200		DF0OL	612	318
5	G3OHM/P	6397	38	82QL	150	55Y	DF0HS/P	618	197
6	G4SJH/P	988	11	91PF	18	23Y	G5B	227	30

1296MHz Single Operator

1	G3XDY	17124	65	02OB	300	8x23Y	DL0UL/P	715	1000
2	G7LRQ	8394	42	91TQ	100	4x55Y	DK0FLT	785	490
3	PE1EWR	3384	20	11SL	10	2x25Y	PI4GN	313	198
4	G8ZQB	2800	17	92JN	120	40QLY	DF0HS/P	526	164
5	G4AEQ	2784	17	93PE	25	55Y	F6KPL	401	163
6	G4PMK	2086	13	91IP	50	23Y	PA6NL	374	122
7	G6DER	944	2	93GN	60	1.4m	PA6C	529	55
8	G3WZR	558	6	91AI	10	24Y	G4AEQ	221	33
9	G4LRT	151	3	92LJ	150	27QLY	G3OHM/P	107	9

2320MHz Multi Operator

1	M1CRO/P	7519	33	01PU	40	2x55Y	PI4GN	416	1000
2	G8P	3284	18	01QD	30	2m	PA0EZ	290	437
3	G5B	3253	15	03CE	20		ON4CD	399	433
4	G3OHM/P	1535	11	82QL	25	1.2m	M1CRO/P	276	204
5	G0EMG/P	1188	8	020D	25	88QLY	ON4CP	297	158
6	G4SJH/P	438	5	91PF	0.6	18"	G5B	227	58

2320MHz Single Operator

1	G3XDY	3610	19	02OB	50	44QLY	DK2MN	416	1000
2	G8ZQB	662	8	92JN	20	60Y	M1CRO/P	187	183
3	G4KNZ/P	414	5	02TD	1	6ftQLY	PA6NL	173	115
4	G4AEQ	390	4	93PE	2	76Y	M1CRO/P	201	108
5	G4PMK	227	3	91IP	5	0.6m	G3OHM/P	130	63
6	G4LRT	151	3	92LJ	10	45QLY	G3OHM/P	107	42

3400MHz Multi Operator

1	G8P	3009	12	01QD	6	1.2m	PI4GN	452	1000
2	G0FDZ/P	1325	6	02OD	20	1m	DK2MN	415	440
3	G8IFT/P	680	4	82QL	30	1.2m	G8P	312	226

3400MHz Single Operator

1	G4PMK	130	1	91IP	5	0.6m	G8IFT/P	130	1000
1	G4KNZ/P	130	2	02TD	1	6ft QLY	G8P	111	1000
3	G4LRT	107	1	92LJ	1	4ft	G8IFT/P	107	823

5700MHz Multi Operator

1	G8P	2937	11	01QD	3		PI4GN	452	1000
2	G8IFT/P	918	6	82QL	6	1.2m	G8P	312	313
3	G0FDZ/P	15	1	02OD	10	1m	G4DDK	15	5

5700MHz Single Operator

1	G4KNZ/P	303	3	02TD	6	2ft	PA6NL	173	1000
2	G4LRT	220	2	92LJ	8	6" horn	G0HNW/P	113	726
3	G4PMK	130	1	91IP	0.12	0.6m	G8IFT/P	130	429

10,368MHz Multi Operator

1	G8P	10621	46	010QD	15	1.2m	PI4GN	452	1000
2	G0EMG/P	2989	15	02OD	15	0.6m	DK2MN	415	281
3	G3OHM/P	2484	18	82QL	15	1.2m	G8P	312	234
4	M1CRO/P	1664	13	01PU	2	0.45m	PA0EZ	272	157

10,368MHz Single Operator

1	G4KNZ/P	356	5	02TD	3	2ft	PA6NL	173	1000
2	G4LRT	329	3	92LJ	1.2	17"	G0HNW/P	113	924

24,000MHz Multi Operator

1	G8IFT/P	44	1	82QL	25mW	0.3m	G4MAP/P	44	1000

24,000MHz Single Operator

1	G4KNZ/P	3	1	02TD	0.3	2ft	G3LQR/P	3	1000

47,000MHz Multi Operator

1	G8IFT/P	3	1	82QL	0.1mW	0.3m	G7VDE/P	3	1000

47,000MHz Single Operator

1	G4KNZ/P	3	1	02TD	20mW	2ft	G3LQR/P	3	1000

Overall normalised results

Pos	Group	432	1.3	2.3	3.4	5.7	10	24	47	Total
1	Parallel Lines	1000	1000	437	1000	1000	1000	-	-	5437
2	S Birmingham RS	96	197	204	226	313	234	1000	1000	3270
3	Villa CG	743	580	1000	-	-	157	-	-	2480
4	Northern Lights	685	686	158	440	5	281	-	-	2255
5	5 Bells CG	-	318	433	-	-	-	-	-	751
6	G4SJP/G1EHF	18	30	58	-	-	-	-	-	106

Single operator

1	G4KNZ/P	38	-	115	1000	1000	1000	1000	1000	5153
2	G3XDY	1000	1000	1000	-	-	-	-	-	3000
3	G4LRT	50	9	42	823	726	924	-	-	2574
4	G4PMK	153	122	63	1000	429	-	-	-	1767
5	PE1EWR	591	198	-	-	-	-	-	-	789
6	G7LRQ	-	490	-	-	-	-	-	-	490
7	G4AEQ	190	163	108	-	-	-	-	-	461
8	G8ZQB	61	164	183	-	-	-	-	-	408
9	G6DER	350	55	-	-	-	-	-	-	405
10	2E1GUA	117	-	-	-	-	-	-	-	117
11	G4APJ	88	-	-	-	-	-	-	-	88
12	G7WZR	-	33	-	-	-	-	-	-	33
13	G1WAC	9	-	-	-	-	-	-	-	9

1296MHz Trophy Multi Operator

Pos	Callsign	Score	QSOs	Locator	Power	Antenna	Best DX	km
1	G8P	20795	77	01QD	400	8x23Y	DK2GR	699
2	M1CRO/P	14697	61	01PU	50	4x23Y	DL3YEE	498
3	G0EMG/P	14202	54	02OD	400	4x55Y	F1ANH/P	481
4	G5B	10331	35	03CE	200	-	DF0OL	612
5	G3OHM/P	5461	33	82QL	150	55Y	DF0HS/P	618

1296MHz Trophy Single Operator

1	G3XDY	11161	48	02OB	300	8x23Y	DK2MN	416
2	G7LRQ	7242	37	91TQ	100	4x55Y	DK0FLT	785
3	G3MEH	5108	32	91QS	100	2x35Y	DF0HS/P	470
4	G4AEQ	2383	16	93PE	25	55Y	PA6NL	353
5	PE1EWR	2277	15	11SL	10	2x25QLY	PI4GN	313
6	G8ZQB	1984	13	92JN	120	40QLY	DF0HS/P	526
7	G4SJH/P	988	11	91PF	18	23Y	G5B	227
8	G4PMK	769	8	91IP	50	23Y	G5B	199
9	G3WZR	558	6	91AI	10	24Y	G4AEQ	221
10	G4LRT	130	2	92LJ	150	27QLY	G3OHM/P	107

2320MHz Trophy Multi Operator

1	M1CRO/P	4141	20	01PU	40	2x55Y	DB1BX	415
2	G5B	3253	15	03CE	20	-	ON4CD	399
3	G8P	2477	13	01QD	30	2m	PA0EZ	290
4	G3OHM/P	1278	10	82QL	25	1.2m	M1CRO/P	276
5	G0EMG/P	1188	8	020D	25	88QLY	ON4CP	297

2320MHz Trophy Single Operator

1	G3XDY	3357	17	02OB	50	44QLY	DK2MN	416
2	G3MEH	847	8	91QS	15	67Y	G5B	168
3	G8ZQB	624	6	92JN	20	60Y	M1CRO/P	187
4	G4SJH/P	438	5	91PF	0.6	18"	G5B	227
5	G4AEQ	390	4	93PE	2	76QLY	M1CRO/P	201
6	G4PMK	227	3	91IP	5	0.6m	G3OHM/P	130
7	G4LRT	107	1	92LJ	10	45QLY	G3OHM/P	107

CLUB CALLS CONTEST, NOVEMBER 1999

CLUB CALLSIGNS certainly got a good airing this year with 34 club stations submitting logs, and other clubs joining in but not submitting an entry. The event proved to be popular for beginners to contesting, with 10 Class B, Novice, or Class A/B Operators working under supervision at club stations. There were also a further 18 newly-issued M-series operators taking part. There's something to satisfy all abilities in this friendly contest. Richard, G4ERP, from Cheltenham ARA sums it up: "Great fun, it does lots for the spirit within the club."

Three operators, G3ZGC, G3RVM and G3KLH at Newbury and District ARS Club station, G3WOI/P, pulled off a substantial lead ahead of other club stations, to win the Ariel Trophy and the certificate for the leading club station. Located near Salisbury, an inverted-V antenna with apex at 70ft served them well; size and performance *does* count.

Richard Marshall, G4ERP, from Cheltenham ARA, with a perfect log and way out in front of others, is awarded the leading individual club member certificate. Again, an inverted-V was used. Mark Hill, G4FPH, is awarded the leading individual non-club member certificate. Although Mark was the only entrant for this award, he should be given full credit for high achievement in obtaining second place amongst all other contestants.

Cheltenham ARA, Echelford ARS and Horsham ARC qualified to enter the David Hill, G4IQM, Memorial Trophy, which was won again by Cheltenham ARA, the winners of this award last year. Best-scoring logs were selected from each club to obtain

CONTEST CALENDAR

HF Contests

Date	Time	Mode	Contest
13/14 May	*1200-1200*	*RTTY*	*Volta WW RTTY*
13 May	*1700-2100*	*CW*	*FISTS Spring Sprint*
20 May	*1500-1859*	*CW*	*EU Spring Sprint*
27/28 May	*0000-2359*	*CW*	*CQ WW WPX CW*

VHF Contests

Date	Time	Mode	Contest
6 May	1400-2200	CW/SSB	RSGB 432MHz trophy
6 May	1400-2200	CW/SSB	RSGB 10GHz trophy
6/7 May	1400-1400	CW/SSB	RSGB 432MHz - 24GHz
21/22 May	1400-1400	CW/SSB	RSGB 144MHz
22 May	1100-1500	CW/SSB	RSGB 1st 144MHz Backpacker
28 May	0900-1200	CW	RSGB 70MHz CW

The full rules of RSGB HF and VHF/UHF contests were published in the RSGB Contesting Guide in October 1999 *RadCom*. Brief rules for non-RSGB contests, which are listed in italics above, can often be found in the *HF* and *VHF/UHF* columns.

CLUB CALLS 1999

Pos		Callsign	Club	Status	Stations	Members	No Club	QSOs	Score
1	=+	G3WOI/P	Newbury	S	39	74	15	128	1717
2	+	G4FPH	None	NC	36	66	17	119	1557
3	+*	G4ERP	Cheltenham	M	39	55	8	102	1556
4		GW4CC	Swansea	S	37	56	8	101	1496
5		G3WSC	Crawley	S	34	64	12	110	1488
6		M0CMU	Central Contest	S	37	54	11	102	1486
7		G3SAD/P	Stevenage	S	40	40	9	89	1452
8		G5BK	Cheltenham	S	33	61	8	102	1424
9		G4PQL/P	Wisbech	S	32	60	14	106	1415
10		G3NKS	Cheltenham	M	36	47	3	86	1387
11		G3RAL/P	Loughborough	S	34	53	8	95	1361
12		G4RCG	North Wakefield	M	34	51	11	96	1357
13		G3SNN	Cheltenham	M	34	41	3	78	1280
14		G3WOR	Worthing	S	34	38	6	78	1271
15		G3WZT	Horsham	M	29	54	14	97	1268
16		G4AYM/P	Gloucester	S	30	49	11	90	1265
17		G3VRE	Chippenham	S	29	53	10	92	1251
18		G4TSH/P	Echelford	M	34	36	4	74	1240
19		G3ZME/P	Telford	S	34	33	5	72	1231
20	#	G4AHG/P	Shirehampton	S	30	54	18	102	1222
21		G0RGH/P	Harwich	S	33	39	4	76	1218
22		G4HRS/P	Horsham	S	33	37	6	76	1217
23		G4ENA	Cheltenham	M	30	42	9	81	1188
24		G0VDZ	Echelford	M	32	33	4	69	1172
25		G3UES/P	Echelford	S	30	37	7	74	1157
26		G4ADV/P	Newquay	S	29	40	11	80	1156
27		G4PDQ	Cheltenham	M	30	36	6	72	1137
28		GC0VJS	Mid Glam	S	23	57	14	94	1130
29		G3XYZ	Kings Lynn	S	32	27	5	64	1106
30		G0SWI/P	Sudbury	S	29	32	5	66	1080
31	*	G3SKY	Isle of Wight	S	32	20	7	59	1077
32		G0SOA/P	Stratford on Avon	S	29	27	3	59	1036
33		G0RAF	RAF Waddington	S	26	32	10	68	1002
34		G3KKQ	Echelford	M	27	31	4	62	998
35		M0BRM	Wisbech	M	29	21	4	54	989
36	#	G4NOK	North Wakefield	S	31	39	8	78	958
37	*	G0DZM	GQRP	M	29	16	2	47	946
38		G4LRP	Horsham	M	27	16	6	49	866
39	*	G4FBS	Horndean	S	25	14	3	42	821
40	#	G0FDX/P	Central Lancs	S	31	27	9	67	780
41		G4HRC/P	Havering	S	23	15	1	39	767
42		G4FQR	Horsham	M	24	11	2	37	748
43		G3WWT	Echelford	M	22	15	1	38	733
44	*	G3SZS	Cheltenham	M	21	15	2	38	714
45		G0VYR	Farnborough	M	22	10	1	33	699
46		G3YDD/P	Hereford	S	22	13	1	36	696
47		G4WAC	Wythall	S	21	12	2	35	660
48		G3SWC	Horsham	M	19	16	1	36	654
49		G4BP/P	Scarborough	S	21	11	2	34	649
50		G3FIJ	Colchester	M	20	10	1	31	640
51		G3NJA/P	Torbay	S	18	17	2	37	637
52		G0JSH	Echelford	M	17	16	1	34	604
53		G0MTN	Wythall	M	18	7	2	27	557
54		G4SLE	Worthing	M	16	13	2	31	555
55		G3LQI	Worthing	M	17	8	2	27	534
56		G3GMM	Stockport	M	16	11	1	28	521
57		G3PYC	Horsham	M	16	9	2	27	520
58	*	G2HS	Echelford	M	14	15	2	31	518
59		G3JSR	Havering	M	17	4	1	22	502
60		G0BOF	Havering	M	14	8	1	23	446
61		G4VTO	Torbay	M	14	5	1	20	432
62	*	G3HBZ	Echelford	M	12	8	2	22	406
63		M0AHJ	Farnborough	M	13	1	2	16	369
64		G4MVO	Cheltenham	M	11	5	1	17	351
65		G0GAZ	Stevenage	M	11	4	2	17	346
66	*	G0OUR	Open University	S	11	4	1	16	343
67	*	G3EAO	Echelford	M	8	13	1	22	331
68		G3IFB	Cheltenham	M	9	10	1	20	326
69		M0AJM	Echelford	M	9	9	0	18	324
70	#	G4FUR/P	Coulsdon	S	25	24	6	55	317
71	#	G0AQH	Worthing	M	18	18	1	37	291
72		G4GVZ	Cheltenham	M	8	7	1	16	274
73		G0PZR	Penzance	S	9	4	1	14	242
74	*	G4BJM	Open University	M	8	1	1	10	235
75		G4JHI	Horsham	M	5	6	0	11	188
76		G4BGW	Cheltenham	M	3	6	0	9	132
77		G3NDJ	Worthing	M	3	4	0	7	113
78	*	M0AEJ	Wythall	M	3	1	1	5	95

+ Certificate Winner * Perfect log # Unmarked dupes = Trophy Winner

the highest aggregate score of five individual club members. This was competitive and a total of 25 individual members from these three clubs submitted logs and gave their clubs support. Other clubs had three or four individual club members submitting logs, but unfortunately five members are needed for the club to qualify for entry. Next year, maybe?

Mid-Glamorgan ARG club station was operated by an MW0 operator who used the callsign GC0VJS wrongly, instead of using the callsign specifically issued to them - GW0VJS (rule 2). The HFCC believes the use of the GC callsign may have given the station an unfair advantage and has therefore deducted 10% from the final marked score.

Thanks to GM4OBK, a member of the GM DX Group, for a very useful checklog. Unfortunately it was received too late to be included in the adjudication.

Mike Thayne, G3GMS

144MHz UK CUMULATIVES, 1999

THIS SERIES of contests was characterised by variable conditions and fairly high activity levels, and the results show trends different from those observed in more 'conventional' events. For the second year running, a station in NW England won the Single Operator section – this time it was achieved with less than 25W. The highest scores were achieved in sessions where propagation conditions were reportedly average. During the last session there was good propagation to central and southern DL, but that probably hindered those looking for maximum points and multipliers, and scores are generally down compared to the earlier sessions.

This event is starting to attract a different cross-section of the contesting fraternity, providing a more viable alternative to the maximum-distance events for some entrants. Frank, PE1EWR, must have had a struggle attracting QSOs, but that didn't stop him putting in an entry. There were many more stations active than submitted logs, including several portables – hopefully the 2000 rule changes will attract some of those as entries next time. The standard of logging was high this time, with a mixture of paper and computer logs submitted. Congratulations to the certificate winners and see you again – lets have some novice entries this year!

Note: To save space only the normalised scores are shown here, a more detailed set of results is available on the VHFCC website, at http://www.blacksheep.org/vhfcc

Steve Redfern, G4AEQ

144MHz UK CUMULATIVES 1999

Open Section

Pos	Callsign	Locator	Power	Ant	16/8/99 Norm	31/8/99 Norm	15/9/99 Norm	30/9/99 Norm	15/10/99 Norm	Total Norm
1	M0AFC/P*	IO84SA	25	13Y	599	1000	955	0	1000	2955
2	G1WAC*	IO92BJ	400	18Y	1000	725	1000	0	0	2725

Single Operator Fixed

1	G4HGI*	IO83PL	20	11Y	1000	1000	952	1000	1000	3000
2	G7ULL*	JO01AK	100	11Y	266	513	988	849	448	2350
3	G0CPE	IO91PF	25	10Y	616	597	908	578	592	2121
4	G8ZRE	IO83NE	80	8XY	506	560	664	531	759	1983
5	G0GCI	JO10ED	140	13Y	718	493	547	424	0	1758
6	GI6ATZ	IO74AJ	400	13Y	2	583	198	0	579	1360
7	G4JTJ	IO92SD	50	9Y	426	395	414	483	399	1323
8	G7RAU	IO90IR	400	2x9Y	0	0	1000	0	0	1000
9	G0DVJ	JO01MX	50	5Y	210	341	275	192	307	923
10	G4APJ	IO83UP	25	9Y	0	184	210	0	463	857
11	M0COP	IO92BK	100	8/8Y	0	0	415	176	253	844
12	G1TWS	JO01HO	25	11Y	285	192	355	128	0	832
13	G1KHX	IO81MI	80	9Y	12	223	243	230	256	729
14	G0GJV	IO91OK	100	8Y	263	235	0	211	201	709
15	G3FIJ	JO01KV	15	10Y	19	163	93	0	141	397
16	G7NBE	IO92GS	80	9Y	32	70	144	144	88	376
17	G4XPE	IO92GU	10	10Y	47	109	0	79	141	329
18	G0TIB	IO82XJ	25	6Q	95	0	0	0	151	246
19	M1CFI	IO92BK	100	8/8Y	108	0	0	0	0	108
20	PE1EWR*	JO11SL	25	10Y	2	74	0	0	19	95

* Certificate Winner Checklog received from G3MEH with thanks

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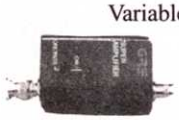

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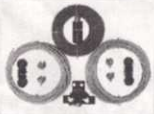

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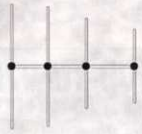

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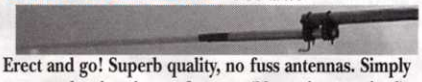

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ACCESSORIES *P&P £3.00 on the following*

TSA-6001N	Duplexer (+Coax) 2/70 (N/N259)	£24.95
TSA-6003	Duplexer (Coax) 2/70 (PL/259's)	£19.95
MX-2000	Triplexer (6/2/70) (Coax)	£56.95

MOBILE ANTENNAS *£6.50 delivery*

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

ACCESSORIES *P&P £3.50 on the following*

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

COPPER ANTENNA WIRE

(All 50mtr rolls)

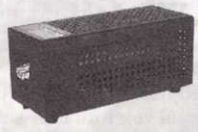
Enamelled	£12.95 P&P £5
Hard drawn	£13.95 P&P £5
Multi-Stranded (Grey PVC)	£9.95 P&P £4
Extra H/duty (Clear coated)	£30.00 P&P £5
Flexweave (H/duty 50 mtes)	£30.00 P&P £5
Flexweave H/duty (20 mtrs)	£15.95 P&P £5
Flexweave (PVC coated 20 mtrs)	£18.95 P&P £5
Flexweave (PVC coated 50 mtrs)	£40.00 P&P £5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

Q-TEK BALUNS & TRAPS

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

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

1kw Handling



Q-TEK DL-1000

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

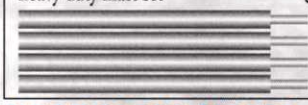
INTRO OFFER **£79.95** P&P £8

Q-TEK DL-60 DC-500MHz (PL-259) ..... £18.99 P&P £1

★ 20FT BARGAIN MAST SET ★

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

SSP ~~£60.00~~
LIMITED STOCK
£35.00
DEL £10



FIBRE GLASS MASTS

1½" Dia	£8.50 per metre	*Delivery £10*
1¾" Dia	£10.50 per metre	*Delivery £10*
2" Dia	£12.50 per metre	*Delivery £10*

Max length 3m delivered

NB. We can only deliver 3m lengths

TELESCOPIC MASTS

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

8 mtrs **£79.95** Weight approx 6kg 12 mtrs **£109.95** Weight approx 8kg *Carriage £10.00.*

FREE STANDING TRIPODS

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

£84.95 *Carriage £10.00*

GUY WIRE KITS ETC.

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

MAST HEAD PULLEY

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

£8.95 + P&P £2.00

WALL BRACKETS + MAST BASE PLATES

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

COAX BARGAINS

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

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

SP-350V

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

INTRO PRICE **£19.99** P&P £1

HAYDON COMMUNICATIONS

MasterCard SWITCH Access VISA

NEXT DAY DELIVERY TO MOST AREAS, £10.00.

MAIL ORDER: 01708 862524

AUTHORISED DEALER FOR:- YAESU ● ICOM ● KENWOOD ● ALINCO

ICOM IC-706IIG

Buy IC-706IIG this month and we'll give you a free IC-T81E worth £420.00

£939.00

Icom IC-746	+ free IC-2100H worth £269	£1295.00
Icom IC-756PRO	PHONE FOR UK's BEST PRICE	
Kenwood TS-870S	HF transceiver	£1449.00
Kenwood TS-570DG	HF transceiver	£829.00
Kenwood MC-80	Desk mic	£49.95
Kenwood SP-31	Extention speaker	£79.95
Kenwood MC-60	Deluxe mic & pre-amp	£75.00
Yaesu FT-847	HF, 6, 4, 2, 70cm trcvr	£1269.00
Yaesu FT-100	HF, 6, 2, + 70 trcvr	£849.00
Alinco DX-70TH	HF + 6m trcvr	£599.00

KENWOOD TM-V7E

True dual-band mobile transceiver. 2m, 70cm, FM operational dual receiver on same band ★ 50/35W output ★ CTCSS + DTMF H Optional extended Rx available. (108-950MHz).

ONLY **£349.95**

Kenwood TM-G707	2m, 70cm mobile trcv	£279.95
Kenwood DFK-3C	Remote front panel kit	£34.95
Kenwood DFK-4C	Remote front panel kit	£59.95
Kenwood HS-5	Deluxe headphones	£52.95
Kenwood HS-6	Lightweight headphones	£35.95
PG-5ME	Mic extension lead	£4.99
Yaesu FT-8100R	Dual-band mobile	£349.95
Yaesu FT-90R	Miniature dual-band mobile	£319.95
Alinco DR-430	70cm mobile	£199.95

YAESU VX-5R

The toughest full performance 5W tribander ever (6-2-70). The VX-5R's ruggedness and durability are assured thanks to the die-cast aluminum housing. Ultra-wide frequency coverage (0.5-1GHz).

ONLY **£279.95**

Yaesu SU-1	Barometric pressure sensor for VX-5R	£32.95
Yaesu MH-34	Speaker microphone	£27.95
Yaesu EDC-6	DC adaptor	£7.95
Yaesu EDC-5B	Cigarette lighter DC adaptor	£22.95
Kenwood TH-G71E	2m + 70cm hand-held	£199.95
Kenwood TH-D7	2m + 70cm h/h with packet modem	£279.95
Kenwood PB-39	High power nicad for D7/G71	£45.95
Kenwood SC-45	Soft case for G-71	£14.95
Kenwood SMC-34	Speaker microphone	£38.95
Alinco DJ-G5	Dual-band hand-held	£279.95

SANGEAN ATS-909

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

ONLY **£129.95**

Sony SW-55 SW portable £239.00

REALISTIC DX-394

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

S.S.P. ~~£249.95~~ SPECIAL OFFER: **£149.95**

FRG-100 Communications receiver £369.00

AR5000

The ultimate wide-band receiver. Covers 10kHz-2600MHz.

SPECIAL OFFER

With Spectrum Master Software worth £130.00 **£1269.00**

ICOM PCR-1000

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

Includes S.S.B

OUR PRICE **£249.00**

UT-106 DSP option for above £79.95

AR108

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

ONLY **£59.95**

Optional batteries + charger £13.99.

MVT-7100

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

ONLY **£195.00**

MVT-9000MkII Our price £319.95

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

AR8200

The latest all mode innovation in handies. Covers 0.5-2GHz all mode. Buy one this month and we'll give you a free case worth £20.

OUR PRICE **£339.95**

AR8000 Our price £279.00

Soft case for 8200/8000 (specify) £19.95

★★★★★★★★★★★★★★★★★★ STAR BUY ★★★★★★★★★★★★★★★★★★

SONY SW-100E

Award winning miniature portable all mode SW receiver. ★ Station presets for 50 frequencies (with station names) ★ Single side band system ★ Multi-function LCD display ★ FM stereo via headphones ★ Synchronous detector ★ Sleep function ★ Short wave tuning in 5Hz & 1KHz steps ★ Includes compact antenna/stero earphones/carrying case/comprehensiveshort wave handbook. Due to over stocing at Sony UK we are able to offer for a limited period the Sony SW-100E at £100 off retail price. RRP £229.95.

SPECIAL OFFER **£129.95** P&P £10

PMR-446 TAKES UK BY STORM

Haven't you ever wanted to play radio? Now you can! - No license required - Yes, anyone can buy and use this two way radio system with absolutely no running cost! Are you going on holiday and need some for the family - need communications for your work or leisure - then look no further. PMR-446 solves the problem. We've even seen families using them at fun parks to stay in touch and, don't forget, you can use them as much as you like - it will not cost you a penny.

MOTOROLA TA-200

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

ONLY **£69.95** *or 2 for £129.00*

NISSEI EP-300 TM

Over the ear earpiece with lapel mic & PTT Fits Motorola TA-200.

ONLY **£24.95**

MOTOROLA TA-288

Licence free PMR-446 radio with nicad and charger. ● No need for a walkie-talkie licence and there are no airtime charges. Just pick up your new Motorola Talkabout TA288 walkie-talkie and start using it. ● Your Motorola Talkabout TA288 is supplied with a rechargeable NiMH battery for up to 1 hour of continours talktime or 13 hours of standby time. ● With up to a 3km range out of sight does not mean out of touch. This dependable little walkie-talkie will help keep your group together.

ONLY **£109.95** *or 2 for £199.00*

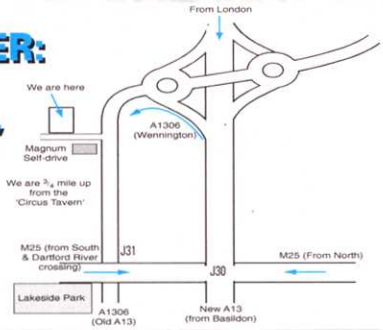
MOTOROLA HANDIE PRO

★ Up to a mile in range (depending on terrain)
★ 38 channels
★ Rapid one-hour drop in charger
★ Internal vox with user sensitivity
★ Large, easy to read LCD screen

ONLY **£179.95**

SHOWROOM & MAIL ORDER:

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



W. MIDLANDS SHOWROOM

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

RM-913
RADIO CONTROLLED CLOCK. ● 12/24hr function ● Auto clock from "Rugby" RF signal ● Alarm function ● Backlight & more ● Incl's batteries

£11.99 P&P £2

BA-928
WEATHER CLOCK. ● Weather forecast ● Atmospheric presure (+ 24 hour history) ● Moon phase ● Wireless outdoor temp sensor ● Time/date/alarm ● Table & wall mount ● Incl's batteries + 1 outdoor sensor

£78.95 P&P £2

YAESU G-650C
Extra heavy duty rotator for large HF beams, etc. Supplied with circular display control box and 25mtr of rotator cable. ~~£499.00~~.

ONLY **£349.00**

YAESU G-450C
Heavy duty rotator for HF beams etc. Supplied with circular display control box and 25m of rotator cable.

ONLY **£319.95**

G1000	Heavy duty rotator	£499.95
GC-038	Lower mast clamps	£25.00
GC-065	2" thrust bearing	£48.00
AR300XLT	Quality rotator for VHF/UHF	£49.95

NISSEI PWR/SWR METERS

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

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

COAX SWITCHES (P&P £3.00)

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

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

SALE PRICE **£329.95**

Garmin Street Pilot	GPS	£419.00
Garmin Street Pilot	Colour	£549.00
Garmin GPS-12	Navigator	£129.95
Active magmount antenna		£39.95
"CD map source"		£69.95

RECHARGEABLE ALKALINE CELLS

Starter kit includes charger & 4 x AA cells.

£13.99 + £2.50 P&P.

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

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

BA-312E
WEATHER CLOCK. ● 5 weather forecast ● Temp (Min/max) ● "Higlo" illumination ● Alarm/calender ● Much more ● Incl's batteries

£27.99 P&P £2

BAR-888U
WEATHER/RADIO CONTROLLED CLOCK. ● Supplied with one remote (wireless) sensor ● Weather forecast ● Barometer ● 24 hr "radio" clock ● Thermometer

£69.95 P&P £4

NISSEI PS-300
Superb 30 amp/12V power supply built to combat most needs. *Features:* ★ Over voltage protection ★ Short circuit current limited ★ Twin illuminated meters ★ Variable voltage (3-15V) latches 13.8V ★ Additional "push clip" DC power sockets at rear ★ Multiple front outlets ★ Detatchable IDC lead (supplied) for mains connection ★ Ultra quiet fan ★ Professional build (black finish). *Dims:* L308 x W268 x H135mm. *Wt:* 9kg. SSP £149.00.

INTRO PRICE **£99.95** Delivery £10

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

Every amateur using this mic (over 2000) has expressed extreme pleasure with it's performance.

£49.95 P&P £6.00

OPTIONAL LEADS (P&P £1.50)

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

TH-887 HEADSET

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

£24.95 P&P £3.50

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

TH-887K	Headset for Kenwood	£24.95

MFJ-259B MKII
HF digital SWR analyser + 1.8-170MHz counter/resistance meter.

ONLY **£189.00** P&P £5

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

UK VERSIONS

SGC-230 SMARTUNER
Auto ATU will tune any lengh of wire in the range 1.8-30MHz

ONLY **£289.00**

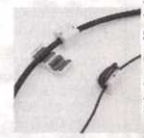
BA-888
ELECTRONIC BAROMETER/CLOCK. ● Temp/weather/forecast/pressure barometric trend ● 24hr bargraph ● 12/24hr clock & alarm ● Humidity ● Table/wall mount

£69.95 P&P £4

JM-838
JUMBO WALL/DESK CLOCK. ● Wide screen/2" digit time display ● Barometer ● Calender ● Temp ● Auto RF synch clock from Rugby

£59.95 P&P £4

INTERFERENCE – STOP IT!



Rectangular snap-fixing ferrite cores suitable for :- Radio coax/TV/mains/telephone/PC & data cables.
Plastic teeth prevent it from sliding on cable. Simply snap close onto cable and job is done!

BULK PURCHASE hence **2 for £7.50**
(P&P £2.50). HURRY – LIMITED STOCK

FERRITE RINGS
10 for **£7.50** P&P £2.50
Superb quality.

NISSEI EP-320
Hanging type earphone with boom mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

£24.95 P&P1

NISSEI EP-300T
Over the ear earpiece with lapel mic & PTT. Fits Kenwood, Alinco, Yaesu or Icom.

(Please specify brand of radio when ordering)

OUR PRICE **£24.95** P&P £1

T h i s

REGULAR-GAINER RH-770

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

ONLY **£14.99** P&P £1

SUPER-GAINER RH-9000

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

ONLY **£19.95** P&P £1

QS-300
A fully adjustable desk top stand for use with all handhelds. Fitted coaxial fly (FAI) with BNC & SO239 connectors

ONLY **£14.99** P&P £3

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

EP-300
Deluxe over the ear earpiece.

ONLY **£9.99** + P&P £1

Members' Advertisements

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

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

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

FOR SALE

£325 ono the lot! Yaesu FT-757GX with Yaesu FP-757HD kW ATU. Alinco VHF/UHF FM mobile tcvr with duplex. Standard C-500E VHF/UHF h/held. CT-1600 VHF h/held. Cobbweb multiband ant 20/17/15/12/10m. Tri-Star vertical ant 10/15/20m. GP-144W 2-step colinear base ant. 20ft scaffold pole. Telescopic pole. Lots of mounting brackets. Lots of other quality bits. All must go as one lot. 01904 331 169 (York). E-mail: michael@cpas.org.uk

ALTRON telescopic tilt-over 60ft mast, c/w two rotators + control boxes by Yaesu, dipole (rotatable) 40/20/15/10m bands, brand new 4-ele Yagi by Cushcraft, with add-on kit for 40m. The lot, £1250 ono. Dismantle & collect. 01749 860 576 (nr Wells).

COLLINS KWT6-5 1.8-30MHz HF SSB tcvr, 500W. Modular rack comprising 786F1, SSB-gen, 429B1, LV-PSU, RRUP-ant, phone-patch, 180U2, ant network, 786E1, freq-gen, RF1K, DL-PWR M, 367-A3, power amp, A28B1, PA-PSU, 159-B1, audio c, 172-J1, 1kW-DL, fan M, interconnect m. Complete with some spares, mans, serviced & operational. Offers? Harris RF-601A & RF-601A control, auto or manual 1kW+ ATU, as new with mans & connectors, would suit KST6-5. Peter 01642 289 093 after 6pm. (Middlesborough). E-mail: g4hsb@grecobrothers.co.uk

DRAE 3-way aerial switch, 'N' cons. Two heavy 10in standoff wall brackets. 6A power unit. Tonna 19-ele crossed Yagi 70cm beam. Sandpiper 4/6m beam. 6 pieces RG-213 coax. 12m 6-core new rotor cable. 6m 5-core ditto. Selection of books. *RadCom*s Jan 95 - Dec 99. Various UR-67 cons for unit. Plenty 'N' and 239 plugs, etc. Offers for anything please. Peter, G1MVV. 01703 863 709 (Southampton).

EDDYSTONE EA-12, mint, with original carton & man, + plinth speaker, £300. HP-141T spectrum analyser with 8554B 0.01-1.3GHz RF section, 8552B IF section, 197B scope camera, 0.01-1.3GHz tracking generator (h/brew clone of HP-8444A), gwo, £750 ono, no splits. Boonton 91H sensitive RF voltmeter & probe, good, £40 ono. Bremi BRI-8007 inductance meter, bench type, LED readout 1.0µH-2H, exc, £35. Awesome QRO tubes: 5J-180E, ITT RF pentodes, 3.5kW plate diss, air cooled, as new, unused, two off, £150 each. (original Ministry cost £2000). Peter, 01642 289 093 after 6.30pm. (Middlesborough). E-mail: g4hsb@grecobrothers.co.uk

FT-902DM, FC-902, FL-2100B, FDK multi-700EX 2m FM, 40ft Strumech telescopic post-mounted tower, 4-ele HF beam and Yaesu rotator, 6-ele 2m quad beam, 2m colinear, numerous power supplies, several CBs, approx 100m high quality antenna cable on reel, brand new Bird RF watt meter unused. Brian, G0MBE. 01706 222 999 eves only. (Rawtenstall). E-mail: bh999999@aol.com

ICOM 207H dual-band mobile, 2/70 50W/35W, test-used only. Bought different car. Complete with remote head, lead and bracket, and unused Linear Amp Ltd remote mic and control box. Cost new £440. For quick sale will take £245. 01235 868 498 (Wantage). E-mail: shapwick@aol.com

ICOM 746 HF-6m-2m with IC-PS30 PSU and IC-SP3 speaker, £850. Diamond GSV-3000 PSU, £75. Buyer collects or pays carriage. 01986 798 524 (Woodbridge).

KENWOOD TS-430S tcvr, 12V PSU, SP-430 speaker, MC-60 mic, Ten-Tec rollercoaster ATU, Drake low pass filter, Welz SP-300 SWR meter, Hy-Gain heavy duty rotor, Kenwood HC-10 world clock, Realistic PRO-2006 scanner. Offers? 01797 364 319 or 01303 872 506 (Dymchurch). E-mail: somerset@aol.com

KENWOOD TS-790A 144MHz/440MHz/1.2GHz, as new, boxed, with man, £845 ono. MF-J931 artificial ground, £40. Kenwood AT-250 tuner, £150. Steve, G0LII. 01754 811 592 (nr Skegness).

KENWOOD TS-940S, auto ATU, exc cond, £650 inc carr. G4NPS. 01472 316 094 (Grimsby). E-mail: jim@g4nps.freeserve.co.uk

50ft triangular 3-section tower, built-in ladder, total weight approx 1 tonne. Offers? Buyer collects. G4AZH. 01778 832 985 (Rugby). E-mail: martin.bushnell@whkh.net

6 METRE tvtr, RN Electronics, 2m to 6m, 25W output, gc. Roy, G0SLR. 01925 725 402 (Warrington). E-mail: roy@rlisle.freeserve.co.uk

70cm 19-ele Tonna antennas crossed, in a kit, £25 ono. 934MHz 12-ele loop Yagi beam, 4 off, £40 ono. 01245 356 394 (Chelmsford).

ALINCO DJ-V5 VHF/UHF h/held tcvr, receive range 76-999MHz, with speaker mic, as new, boxed, £140. 01636 686 835 (Newark). E-mail: malcolm@innotts.co.uk

ALINCO DX-70TH, never used mobile, with unused EDS-6 remote head kit, £425. MFJ-906 6m ATU/power/SWR, £25. Heil HC-4 Micropro headset/mic, £45. Could deliver locally. Mick, M5AED. 01536 763 637 (Desborough).

ALINCO EDX-2 auto ATU, £190. Variac 240V 10A, £15. Welz SP-425 SWR meter, £20. Western PM-2001 power meter, 50-150MHz, £25. 023 9241 2187 (Rowlands Castle). E-mail: pecox@clara.co.uk

ALL Datong items (1 - 4). 1. Audio RF clipper (original). 2. PC-1 converter HF to 2m tuning. 3. Multimode AF filter FL-2. 4. Automatic speech processor. 5. TV tuner to analogue monitor. 6. Pace Hayes compatible modem. (1-6, £20 each ono) 7. ?icrowave 2m amplifier 100W, £80 ono, as new. Buyers collect or pay postage. 0161 437 3045 (Stockport).

AMATEUR paradise - three-bedroomed bungalow, double garage, very large garden, three antennas ready wired, shack. Ludlow area. 01568 780 296 (Ludlow/Orleton).

AMERITRON AL-811 HF linear, 600W, 160-10m, c/w two spare 811 tubes, man, boxed, as new, £475. G-whip mobile antennas (four) 10, 15, 20, 80m bands, £45. Nevada masthead remote coax switch, 400W rated, c/w fixing bracket, control box, £30. Nigel, G0BNR. 01487 832 147 (Peterborough). E-mail: druzhba100@aol.com

AR-88LF unmodified, exceptional cond, with mans speaker and spare valves, £75 ono. GW4DYY. 01938 580 280 (Welshpool). E-mail: roymander@aol.com

CLOSING down HF station, no reasonable offer refused for all items as one lot to be seen and collected. Yaesu FT-101Z (WARC), two spare unused output valves, Yaesu FV-101 external VFO, Heathkit SB-200 linear, spare HV capacitors, Yaesu desk mic, Weston peak reading RF power meter, 1kW dummy load, KW easy match RF tuner, original mans, Morse keys, aerial feeder, etc. 01752 841 685 (Saltash).

DATONG FL-3 multifilter (boxed/man), £300. Vectronics VC-300DLP ATU, £35. SEM TransMatch ATU, £20. Microset 10A PSU, £35. Diamond SX-2003R SWR meter, £25. All above boxed, vgc. G5RV full size, includes Watson 80m loading coils plus insulators (boxed), £45. Kent Morse key, £10. Netset SWR meter (3-range), £10. Buyer collects or postage at cost. Cash or cheque (cleared). David, G0NEZ, QTHR. 01442 245 832 (Hemel Hempstead).

DRAKE TR-7. PSU PS-7, RV-7 and MN-7 ATU, Datong RF speech proc, ASP complete with h/books and mic, £550. G3GMY. 0208449 7203 (Barnet).

DUE to ill health, brilliant hilltop QTH, Icom 821H, Yaesu 270RH, 12AVQ vertical, new 70cm vertical, 203BA beam. 29 Trenance Avenue, Newquay, Cornwall TR7 2HH.

EDDYSTONE 'digital lock' rcvr, 100kHz - 31MHz high stability, SSB CW & AM, mint cond, in desktop cabinet, any trial, £400. 01354 741 168 (March, Cambs).

FAULTY FT-one fitted with optional extras and crystal filters. Operating and technical mans, £145. Kenwood TS-140S, PS-430, MC-43S, gwo, £325. FT-290R (Mk1) with mic, £135. Meade Starfinder 6in reflecting telescope, motorised drive, little used, £350. Yaesu MH-1 mic, unused, £35. Bradley 234 counter timer, £15. Wireless set No 19 MkII, no offers, £150. Regret buyers collect, as no transport. 01793 331 585 (Swindon).

FL-2100Z Yaesu HF PA, vgwo, £350. Redifon roller-coaster ATU, £45. Kenpro KR-400C rotator, £45. HQ1 quad aerial, £45. VHF colinear aerial, £35. 01403 269 835 (Horsham). E-mail rwilmot@screaming.net

FOR sale. QTH – 3 bed room semi-detached house in village 10 miles from sea, large gardens, 2 towers and radio shack, with mono-band beams for 10m 20m 15m, c/w TS-440S and KW-1000 linear. Also garage, 2 store sheds and double carport, oil fired CH, double glazing, open views over meadows by river Bure, £70,000. G0EVQ. 01263 733 905 (Burgh Next Aylsham, Norfolk).

FRDX-400 160-10m rcvr, KAM, TR2200, Motorola MC-80 70cm, 6m converter, G0BSX TNC, dataswitch. Best offer secures, you pay carriage. GM4ENK. 01950 460 472 (Shetland). E-mail: paulkelly@cwcom.net

FRG-8800 HF rcvr, FRT-7700 tuner, FRC-7700 VHF converter, superb rcvr, £275. Tiny-2 packet TNC, £60. Yaesu KR-400 elevation rotator with 2 x 17-ele 70cm crossed Yagi and 2 x 6-ele 2m crossed Yagi with cables, £150. G4CCN, QTHR. 01394 386 529 (Woodbridge). E-mail: tim.keats@btinternet.com

FT-1000MP, 250Hz & 500Hz filters, DVS-2 digital voice recorder, £1150. SSB Electronics 70cm 100W linear, £100. Eagle 6M5 5-ele 50MHz Yagi, £60. 01403 864 222 (Horsham). E-mail: jrm@redifon.com

FT-107 tcvr with mic, good order, used daily. Lafayette HE-30rcvr, minor fault. Matched pair 6JB6A valves. Offers. G4XQQ. 0123 474 3175 (Bedford).

FT-290 Mk2, clip-on linear and nicads, all boxed, with mobile mount, £200. Grundig YB-500 portable, £50. 01908 504 140 (Milton Keynes).

FT-707 with FP-707 PSU, gc, boxed, G4HZU Silent key sale, £250 ono. G4OAC, QTHR. 01706 650 174 (Rochdale). E-mail: bobhayter@go.com

FT-726R 2m/70cm HF board, satellite, man, £350. FT-102, spare valves, man, £300. FC-102 matching antenna tuner for FT-102, man, £60. FT-790R all-mode, £200. FT-480R all-mode, £225. Buyer collects. 01273 870 039 (Shoreham-by-Sea). E-mail: ella-tugwell@com-sound-sys.freeserve.co.uk

FT-767GX 2m 6m 70cm, with MD1 desk mic, box, man, £600, buyer collects. 0114 221 7644 (Sheffield).

HEATHERLITE Explorer amplifier, had very little use, external soft start, HF. Purchaser must arrange transport, heavy, £650. G4ODG, QTHR. 01529 307 844 (Sleaford). E-mail: vince.c@tesco.net

HEATHKIT HW-100 tcvr, 100W 80-10m, no WARC, mic, man, home brew P/P, £70. Buyer arrange collection. G3MA, QTHR. 01452 539 519 (Gloucester).

HILOMAST WTM/24-section 56ft crank-up. Tubular alloy with electric winch, requires some work, £100 ono. G3HQG. 0114 247 0277 (Sheffield).

IC-207H VHF/UHF FM mobile tcvr, never used mobile, almost 2y warranty left, £200. 01977 558 706 after 6pm (Castleford). E-mail: david@g4rqi.demon.co.uk

IC-740 HF tcvr with 250Hz CW filter, IC-PS15 PSU, IC-SP3 speaker, vgc, £350. Heathkit SB-200 HF amplifier, £250 ono. G4XOL, QTHR. 01925 226 197 (Warrington).

ICOM 735 + SM-6 d/mic, Yaesu 4700RH + t/mount and duplexer, MFJ-748B DSP filter, PK-232MBX, all with mans, sensible offers please. G4OIZ. 0113 267 7054 (Leeds).

ICOM 820H VHF/UHF exc cond, boxed, mans, £550. Yaesu FT-480R Mk2, £150. Kenwood TR-751E, exc cond, boxed, mans, £250. Kenwood MC-50, £35. Datong FL-3, £40. Datong speech processor, £35. 01803 665 772 (Paignton).

ICOM IC-2KL, £775. Icom AT-500, £265. 01435 883 248 (Heathfield). E-mail: brian@g3gsi.freeserve.co.uk

ICOM IC-701 100W HF tcvr, 160-10m (not WARC) SSB/CW, inc h/book, £120. BC221T, all metal case, inc h/book, spare new xtal, £23. Brother M1009 printer + h/book, £10. BMC BX-1000 printer, new, unused, inc h/book, £20. Spectrum computers with many accessories inc micro drives. Offers? ZX81. Offers? Europa-B, new QQVO6-40, £30. G3JPE. QTHR. 01743 860 511 (Shrewsbury).

ICOM IC-706 boxed, original packing, like new, £425 ovno. NAG 2m valve amplifier, slight fault on change-over relay, £125. 0114 246 8463 (Sheffield). E-mail: gfiander@lineone.net

ICOM IC-706 Mk2G DSP 160m to 70cm, all-mode base/mobile tcvr. Purchased new 20/2/2000, never used mobile, mint cond, £845. 01202 460174 (Poole). E-mail: g0faj@freenet.co.uk

ICOM IC-730 100W HF with narrow CW filter, good order, £200 ono. Also KW E-zee match, £50 ono. 07977 444 835 (Bristol).

ICOM IC-736, built-in ASTU, PSU, 28V PA, complete, boxed, late model, inspection welcome, as new, £575, was £1,600. G3GYE, QTHR (Penzance).

ICOM IC-737 HF tcvr, auto ATU, exc cond, man, boxed, £495. 01379 643 644 (Diss).

ICOM IC-756, HF + 6m, £850. Yaesu FT-530, h/held 144/430, £90 ono. Realistic PRO-2042 scanner, £80 ono. SCR-522, PTR-175, A41, offers invited. G0JNT, QTHR. 01472 509 753 (Grimsby). E-mail: les@g0jnt.freeserve.co.uk

ICOM IC-820H VHF/UHF all mode tcvr, mic, mans, little used, pristine cond, checked by Icom, boxed, sales data available, £575 ono. 01279 731 070 (nr Harlow).

ICOM IC-R7000 rcvr, 25MHz to 2GHz, with man, £275 plus carriage. 01843 601 845 (Broadstairs).

ICOM lineup: IC-706Mk2G, £800; AT-180 auto ATU, £200; PS-85 20A PSU, £100; IC-T7E 2m/70cm, £100. All immac cond. David. 01778 440 079 (Lincs).

KENWOOD 930S HF tcvr, gc, £395. Icom 706 MkII DSP, £595. Trio 2300, comp, £55. QRO 2m linear. Offers? Martyn. 01422 251 520 (Halifax).

KENWOOD CW filter YG455-CN1 250Hz (for TS-930, 940, 950, etc), £65. AEP memory Morse keyer and trainer model MM-1, £50. Collins ATU type 18DL-3A, contains large variable inductor and vacuum capacitor, £35 + carriage. Swan 500C tcvr + ext VFO, boxed, offers. 01943 872 231 (Leeds).

KENWOOD TM-321E 2m 50W FM mobile, £140. Trio TS-700G 2m 10W multimode, £150. G7PPV. 01677 423 349 (N Yorks).

KENWOOD TS-520S, external VFO, DG-5 display unit, CW filter, original box, man, mic, immac, £200. Hoka Code 3 decoder, latest V5 software, full man, £250. MFJ-490 memory keyer, brand new, with box & man, £80. Wanted: Mutek 2m transverter. Adrian, G4JBH. 01288 331 113 (Bude). E-mail: 106471.620@compuserve.com

KENWOOD TS-530S (WARC) with external VFO, narrow CW filter and man, £275 ono. Collect or plus carriage. G3LCG. 01723 355 071 (Scarborough).

KENWOOD TS-820 HF/tcvr (no WARC bands), analogue readout, also comes with separate VFO-820 and MV-50 desk mic, works well, bargain, £150 lot, plus p&p. 01684 560 490 (Malvern). E-mail: beelee@talk21.com

KENWOOD TS-940S, gc, all h/books, mic, RS-232 interface, still vg performer, ideal HF starter rig, check dealer prices! Only £600. 0118 969 8274 (Reading). E-mail: g0opb@compuserve.com

KW-1000 linear amp with two new 572B valves and man, £275, buyer collects. Roland, G4NGW. 01702 710 000 (Leigh-On-Sea).

MANSON EP-925 20A PSU, as new, £60. Watson 5A PSU, £12. Kenwood fist mic, new, £6. H/phones, £5. Home-brew telescopic mast, 40ft+. Bag ferrite rods & rings, 1lb+, £10. 01446 413 379 (Cardiff).

MARCONI D-11/R-234 tcvr + accs and info, £625. Belcomm Liner 2 2m SSB tcvr + matching PSU, £40. 01427 611 160 or 07803 601 176 (Gainsborough).

MFJ-1792 80/40m vertical ant, brand new, never been used, good reason for sale. Cost £169 new, £90. Jim, G4WXZ. 0174 602 424 (St. Helens).

NEW QTH G7KKC. Reasonable offers for Strumech mast, two ex-DDR army guyed sectional aluminium masts, one UK military smaller ditto, buyer collects. 01384 877 336 (S Staffs). E-mail: newsham@envillevillage.freeserve.co.uk

OLD 1950/1970 amateur radio books, also some interesting vintage gear. Offers invited around £700 for Watkins-Johnson WJ-8700S-1 rcvr with full man. SAE please for lists of books and vintage gear. G3CWW. 01484 842 330 (Huddersfield).

ORIGINAL Eddystone mans: EC-958, £25; EC-958/7, £25; 990S, £18; 1837, £30; 1838, £30; 1990S, £25; 964/7, £18; 1964, £18; 1590, £27; 1061A, £30; 31A, £15; 40A operator's h/book, £25. Thumbwheel switches BCD and decimal, £0.75 for 4. Quality Painton 100 ohm audio attenuators, £3.50 each. RS-232 adaptors, £2.50 for 4. Right-angle 8in rubber helical antennas, TNC, scanner type? £1.50. 330µF 450V, £3.50 each. 0181 297 2440 (London). E-mail: nikki01@btinternet.com

PAIR PRC-6 American military walkie talkies operating on 51.00MHz, £60. Eddystone 990R service man, as new, £15. Various Pye PMR mans, 1960s, 1980s, £5 each. Icom UT-40 CTCSS enc/dec module, £27. Quantity of new RG-59 75ohm mil spec coax, POA. R107 rcvr, working, £70. 01354 741 168 (March).

RACAL 1792 backlit BITE option, ISB fitted, like new, £850. 1792 backlit BITE, first class cond, £750. Racal 1784, £450. 02088139193 (Middlesex).

RACAL RA-1792 rcvr, exc cond, service 1998, all mans (pre BITE), £600. Phil, G0OXB. 01278 451 954 (Bridgwater).

SHACK clearance. Many components - must be seen. Also Wayne Kerr bridge type CT37B, Advance signal generator AM/FM type 63A, digital voltmeter Advance DVM1 plus inst book. Offers? G3ASV, QTHR. 020 8455 2437 (Finchley).

SILENT key sale (G4ZDO). Trio TS-820S HF tcvr, £440. Alinco DR-112 2m mobile, £100. Alinco DJ-180 2m handie, £75. SP-820 speaker/filter, £40. Trio AT-200 tuner, £85. Kent electronic keyer, £40. Kent twin-paddles, £40. Welz 12V 10A PSU, £25. All ono, buyer collect or carriage extra. G4FAS, QTHR. 0161 437 7784 (Stockport). E-mail: geoff.royle@lineone.net

SILENT key sale, G0PWG. Alinco ALM-203E h/held with h/book, charger & batteries, £55. Standard C-8900 2m tcvr & h/book, £20. FDK Multi-11 UHF tcvr & h/book, £20. Toyo meter T-435 RF Thruline watt meter, 20-120W, 144-435MHz, £30. Gould time counter TC-314 with man, £25. Sagant BL-40x dipole centre, £15. All reasonable offers accepted. 01708 551 158 (Essex) eve.

SILENT key sale. FT-990AC, mint, all filter, AATU, £750. FL-2100Z, WARC, new PAs, £350. FT-101ZD MkIII, vgc, £225. FT-480R 2m multimode, £175. TS-700 2m multimode, Mutek F/E, £190. FT-890, all filters, mint, £575. FC-102 500W ATU, £150. SP-102, £30. YC-355 counter, £30. 50W dummy load, £10. Watson 20A PSU, £60. Hirschmann rotator, new, £60. All with mans and boxed, gwo. 01633 880 146 (Newport). E-mail: gw3nws@aol.co,

SILENT key sale. Racal RA-17 rcvr, £140. Hallicrafters FPM-300 HF tcvr, £90. Yaesu FT-290 Mk2, £150. Hameg 203 oscilloscope, £90. Altai TE-20D signal generator, £50. Micronta 13.8V 12A regulated PSU, £30. Meteor 600 counter, 5Hz - 600MHz, £40. All equipment gwo. 01283 544 677 (Burton-on-Trent).

SILENT key sale. Yaesu FL-2100Z with spare tubes, £400 ono. Yaesu FT-767 HF/VHF tcvr with general coverage receive, £500 ono. Yaesu FT-101E, narrow filter fitted, outboard digital display YC-601, £200 ono. Kenwood TS-830S + spare tubes + VFO-230 + SM-220 monitor scope, £425 ono. Will separate. KW-500 linear amplifier + spare 813 tube, £150 ono. Bencher key, chromium base, boxed, as new, £70 ono. Ten-

Tec Argonaut SSB/CW tcvr, £125 ono. Heathkit HW7-A QRP/CW tcvr with matching power supply 230V AC, £75 ono. Trio TR-2500 h/held with speaker mic and charger, £80 ono. Hammarlund HX-50 transmitter with man. Offers? Drake 2B rcvr with man. Offers? 01707 261 648 (Hatfield).

SILENT key. Yaesu FT-847 with FC-20, £1075. IC-207H, £225. W-20AM 20A PSU, £40. DJ-580, £95. KPC-3 TNC, £30. MX-2000 triplexer, £25. MX-72 duplexer, £15. DX-ion duplexer, £10. WM-308 mic, £25. Watson Hunter h/held frequency counter, £35. Davis weather monitor (Perception 2), £60. Oregon weather monitor, £35. SSTV module, £15. Digital meter, £20, Mobile antennas. All items unboxed, buyer inspects and collects. 01689 826 891 (Orpington). E-mail: david@98kpy.freeserve.co.uk

SMARTUNER SG-230 automatic antenna coupler, exc cond, used little, indoors only, £240. Jim, G4LWY, QTHR. 01925 762 485 (Warrington).

SPECTRUM analyser Marconi TF-2370, £200. Wayne Kerr frequency response analyser and display RA-200/AD-51, £50. JJ-G35 tunable detector, £20. G3NYX. 01273 832 910 after 6pm (Brighton). E-mail: jwh@cts-minns.demon.co.uk

STANDARD C510 dual band FM hand portable tcvr, FM/AM wideband receive, with soft case, rechargeable batteries and charger, plus man, £85. 01202 460 174 (Poole). E-mail: g0faj@freenet.co.uk

SUPERB 10m 4-ele monoband Yagi, only 9 months old, only £110 plus carriage. This is not a flimsy antenna!! 01902 569 419 (Wolverhampton). E-mail: neil@radio3.freeserve.co.uk

TEKTRONIX oscilloscope model 465B, 100MHz, dual-trace, delay trigger, 5mV, 20ns/div, gc, £295. 01224 588 604 (Aberdeen) or 01934 812 543 (Weston-Super-Mare).

TELESCOPIC tilt-over mast with galvanised post for mounting in concrete, height 30ft, includes rotator and controller, £315. G0ASP, QTHR. 01952 223 831 (Telford).

THREE section standard Western winch-up tower, frame base mounting, new winch ropes, Ham M rotator and control unit. Buyer inspects, dismantles and collects, £300. 01344 421 783 (Bracknell).

TOPWARD (Mapline) type 7046 40MHz double-beam oscilloscope, brand new with full man, boxed, FB item, £500. HF linear Yaesu FL-2100Z, the big one, new set 572B valves, complete overhaul by ML&S in November last year, £450 with full tech mans. Ron, G3AAJ, QTHR. 020 8989 6741 (Wanstead). E-mail: ronbg3aaj@cs.com

TRIO TS-180 solid state SSB/CW (WARC) rig, man, Kenwood PS-30, AT-180. Good matching set for beginner, £250 ono. G0DUY. 01725 552 439 (Salisbury). E-mail: christineemm@ukonline.co.uk

TS-140S inc PSU, vgc, boxed, h/book, tx unused, £400. 01925 269 655 (Warrington).

TS-940SAT with MC-80 base station mic and internal ATU, boxed with man and circuit diagram, mint cond and full working order, £800 ono. G0VDE. 01728 724 087 (Suffolk). E-mail: bill.rothwell@btinternet.com

TWO magnetic loop with control box, £179.99. Ten-Tec OMNI IV with power supply, £1,450. Hameg oscilloscope HM203.5, £174.99. TR-9130 2m all-mode tcvr, box, £249.99. FRG-7700 communications rcvr x5, converter and memory unit, £399.99, all in gwo. MFJ-1278B multimode data controller with 10 digital modes, new, £184.99. Kubota generator, heavy duty, 240V/110V, new, £474.99. Reason for sale. G0LLK. 01869 244 1266 (Bicester). Mobile: 0403 893 433.

VERSATOWER 30ft 3-section tilt-over wall-mounted, can be converted to post, 2 winches, £100. 01371 872 240 (Gt Dunmow).

YAESU FT-101E HF tcvr, £150. 01179 640 809 (Bristol). E-mail: peter@cableinet.co.uk

YAESU FT-101E, YC-601 and spkr, boxed with all mans, spare new valves, £180. Also original American Seeburg jukebox, 50-play, gc with records circa 1970, £475. Graham, G4IJO. 01609 883 007 (Northallerton).

YAESU FT-101Z Mk3 HF tcvr, all bands 160m-10m, SSB/FM/CW, base mic, man, orig box, mint cond, £195. Welz 80m-10m 200W ATU, £15. Kenwood TH-48E 70cm h/held tcvr with 2m receive, carrying case, charger, man, mint cond, £95. 01945 589 707 (Wisbech).

YAESU FT-290R Mk1 multimode, vgc with new 12.5kHz channel spacings, new lithium battery carried out by Castle Electronics, checked and tested; with Daiwa linear amplifier, 3W in 30W out, vgc, £185 and post. Tokyo hy-power labs HF all-band antenna coupler, model HC200A, 200W PEP at 50ohms unbalanced, built-in power/SWR meter, boxed, as new, £65 plus post. 01443 437 345 (Tonypandy).

YAESU FT-480R 2m multimode, man, £260. Standard C-828 12ch 1-10W FM, man, £50. G8IXP. 01625 531 803 (Wilmslow). E-mail: bob.lister@btinternet.com

YAESU FT-51R dual-band 2m/70cm h/held tcvr plus spare FNB-31 ni-cad battery and diamond RH6 antenna, exc cond, original packing, £215. Icom IC-PCR1000 inc DSP, computer-driven wide-band rcvr, exc cond, original packing, £210. Rob, GW0DFY, QTHR. 01745 590 257 (Rhyl). E-mail: robert@ranthony.freeserve.co.uk

YAESU FT-707 HF tcvr, 80-10m, c/w FP-707 PSU, ideal base station or mobile, £275 ono. 1000W dummy load, £45. HD rotator, new gears, desktop control, £75. TR dip meter, 1.5-250MHz, unused, £45. All vgc. G4TNG. 0116 271 8809 (Leicester).

YAESU FT-840 HF tcvr with CW filter and FM board, inc Diawa PS-304 MkII PSU, vgc, boxed, £425, no offers. 01424 732 058 (Bexhill on Sea). E-mail: g4woe@yahoo.com

YAESU FT-900AT, Collins filter, auto ATU, mint, £525. Yaesu VX-5R, softcase, mint, £195. 486DX/250MHz PC, Win95, offers. 01900 821 192 (Cumbria).

YAESU FT-990, mint, boxed, desk & hand mics, £690. FT-26 h/held, £50. MFJ ant switch, £10. 01524 381 381 (Lancaster).

CONGRATULATIONS

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

50 years		*60 years*	
Mr K Clark	G2DOT	Mr J D Kay	G3AAE
J E Lacey	G3GLB		
Mr AM Smith	G3IAS		
Mr G P Lovelock	G3III		
Mr N Miller	G3MVV		
Mr E J Gregory	G3ORW		
Mr K W Dews	G3PMW		
C D Colbeck	G4IER		
Mr A G Bounds	G3KDP		

WANTED

ALL early wireless equipment wanted. Rcvrs, crystal sets, early transmitters, horn speakers, valves, Morse keys, spy sets, pre-war television. Any cond considered. Jim Taylor, G4ERU, 5 Luther Road, Winton, Bournemouth, BH9 1LH. Tel/fax 01202 510 400 (Bournemouth).

ALPHA 87A HF linear amplifier, will collect if possible. Cash paid. Bob McHenry, G3NSM. 01865 556 321 (Oxford). E-mail: mchenrymsn@msn.com

SPY/Clandestine radio sets from any period or origin wanted by private collector. Your price paid for special items. Bill. 020 8505 0838 (E London).

VALVE/tube tester required by OAP returning to ham radio. Must be fully working and in good cond. Phone/Fax 020 8946 2028 (London).

CIRCUIT diagram etc for Kenpro rotator controller model KR-400RC. All costs met in full. 01333 424 776 (Methil). E-mail: alexgm4hbq@aol.com

COLLINS AC power supply type 516F-2, 110V or 110/230V. Any age or cond considered, as long as transformer and chokes are serviceable, and lead with 11-way power socket is intact. G3GGK, QTHR. 01954 210 374 (Caldecote, Cambs).

CUSHCRAFT R5 HF vertical antenna. Other type considered, would consider minibeam, also medium/heavy-duty rotator, fair price paid. G0ADL, QTHR. 0161 280 3064 (Radcliffe).

DISABLED enthusiast offers good home to unwanted QSL cards, expenses paid. Also seeks recent US and International callbooks, state price. Mike, 8 Windsor Road, Reydon, Southwold, Suffolk IP18 6PQ.

DISABLED fan of pre-1970 radio would like to correspond, by letter or tape, with old timers. Interested also WW2 RAF and aircraft. Also looking for QSTs from same era. Mike MacArdle, 8 Windsor Rd, Reydon, Southwold, Suffolk IP18 6PQ.

EDDYSTONE 880 rcvr required. 01484 654 650 (Huddersfield).

EDDYSTONE models 850, 960, 910, (Marconi HR-101) and EM-34 (Marconi 3873A Elettra). 01686 630 255 (Montgomery). E-mail: forwyn@aol.com

FL-2100Z in gc. Do you have one that you are hardly using and want to sell? John, G0CHQ. 01815613837 (Hayes). E-mail: john@pepps.demon.co.uk

FLUKE scope meter 105B, Rohde & Schwarz Polyskop IV or V. GW0ALR, 01267 237 078 (day), 01267 222 445 (eve) (Carmarthen). E-mail: adrian@amgenerators.com

HEATHKIT CI-1096 timing light in gc. Brian, G3SZH, QTHR. 01454 316 723 (Bristol).

HEATHKIT SB-101 accessories required to complete line-up. SB-600, SB-610, SB-620, SB-630, SB-640, SB-650, SB-200, original mic, etc, preferably with mans. 01223 343 444 day (Cambridge). E-mail: m0blp@m0blp.ampr.org

IC-271H service man wanted. Beg, buy or borrow for photocopy, all expenses refunded. Peter, G3SMT. 0161 439 6746 (Manchester). E-mail: peter.torry@barclays.net

KENWOOD SP-230 speaker, AT-230 ATU, also TS-830 h/book and service man. G3GBB. 01379 783 657 (nr Diss).

LABGEAR LG-300. Still searching, for 'on-air' use, not shack ornament! Also Yaesu FTV-107 or FTV-707 transverter, FT-102 FM and RF boards, Eagle RF40/FL-20HA field strength meter, RSGB Bulletin August 1947, RSGB pamphlets 'Valve Technique', 'Service Valve Equivalents', 1948. Ken, G3XSJ. 07867 926101 or 01453 845 013 (Wotton Under Edge). E-mail: mail@ken-brooks.fsnet.co.uk

MIMCO Marconi International Marine Company

valve rcvrs wanted. Types 2232A, 3823A, 3873A, IMR54, HR101, etc, or any other marine models made or badged by Marconi. G0OGN, QTHR. 01789 293 375 (Stratford-on-Avon). E-mail: g0ogn@aol.com

MORSE keys wanted by private collector. Also telegraphic sounders, relays, galvanometers. Anything considered. Silent key sales, etc. Gerald. 0118 983 4307

REEL to reel tape recorder/player, ¼ track stereo, must have 7½in reels. G3JPE. 01743 860 511 (Shrewsbury).

SEM Castletown IoM Europa or Europa B for 70MHz or 144MHz for Newquay DARS 70MHz transverter project. 01637 875 848 (Newquay). E-mail: brian@henver.freeserve.co.uk

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

STILL wanted: Eddystone four-pin coils, LF end. Also un-drilled Raymart plain former. Bernard Litherland, G4IMT. 01225 891 254 (Chippenham).

WANTED man for Hewlett Packard wave analyser model 310A, photocopy or original. 01950 460 508 (Shetland).

WANTED transformer for Yaesu FL-2100Z amplifier, part no L3030012. Ean. 01651 806 805 (Aberdeenshire). E-mail: emitc75113@aol.com

EXCHANGE

KENWOOD TH-28E 2m h/held as new, £100, or exchange HF equipment, QRP equipment, anything considered, antennas, meters, WHY? 01239 654 880 (Cardigan).

CLUB NEWS

DEADLINE – Items for club news should be sent to the *RadCom* Office at HQ to arrive by the 26th of the month, ie approximately a month before publication. For example, 26 January for the March Issue. News items should be sent in writing (fax or letter) and be signed by the club secretary or the person responsible for publicity. Postcards for this purpose are available from RSGB HQ. Note: This is a service for clubs affiliated to the RSGB. The announcements are intended to notify non-members and potential members of your club of specific events. Therefore, 'committee meeting', 'natter night' and 'ragchew evening' etc will not be included. Basic, unchanged details about RSGB-affiliated clubs are published annually in the *RSGB Yearbook*.

ABERDEEN ARS – 5, JS. Robert, 01224 896142.

BANGOR & DARS – 3, T 'Kite Antennas', by Adrian Hanna, GI0SMU. Mike, GI4XSF, 028 42772383.

BARRY ARS – 2, Final planning of NFD entry. OTA, MP; 9, OTA, MP; 13/14, Club Contest entry in the VOLTA RTTY WW; 16, OTA, MP; 23, OTA, MP; 27/28, Club Contest Call GW8K in CQ WW WPX CW; 30, OTA, MP. Rich, GW4BVJ, 01656 658830.

BRACKNELL ARC – 10, T 'Repairing Modern Electronics', by G3YMC. Baugh @compuserve.com

BRAINTREE & DARS – 1, Millennium camp planning meeting; 15, AGM. Keith, M0CLO, 01376 347736.

BRISTOL RSGB GROUP – 22, T 'Propagation on 6m', by Geoff Grayer, G3NAQ. Martyn, G3RFX, 0117 9736419.

BROMSGROVE ARS – 9, 17th AGM; 23, DF Hunt - on foot. B Taylor, G0TPG, 01527 542266.

CAMBRIDGE & DARC – 5, T '10GHz TX did yours', testing and debugging, CON, by Mike, M0BLP & Mike, G8VCN; 12, 2m DF 'Fox Hunt'; 19, QRP C C evening, open to all Members. Bob, G0GVZ, 01223 413401.

CHELMSFORD ARS – 2, T 'A small Street Organ - its Construction and Remarkable Similarity to a CW Transmitter', by Arthur Butcher, G3KPJ. Charles, G0GJS, 01245 256654.

CHELTENHAM ARA – 5, T 'Across the Pacific with Ham Radio', by John Layton, G4AAL. John, G4PDQ, 01242 242336.

CHESHAM & DARS – 3, General Meeting; 10, OTA; 17, Technical Talk; 24, OTA. P Blakeney, G8BLB, 01494 784811.

CHESHUNT & DARC – 3, Members' Forum; 10, Audio Editing on your PC - Roger, G4OAA; 17, OTA; 24, Portable on Baas Hill Common. David, M1DGS, 01920 463746.

COCKENZIE & PORT SETON ARC – 19, 144MHz DF Hunt. Meet in the Old Ship Inn car park (East). Bob, GM4UYZ, 01875 811723.

COLCHESTER RA – 11, T 'Amateur Radio Awards', by Frank, G3FIJ; 25, Constructors' Award Night. Bring along and show us any radio related construction project you've completed recently. Awards for those the meeting likes the most. Frank, G3FIJ, 01206 851189.

CONWY VALLEY ARC – 3, T 'Air Support Unit of the North Wales Police'. Wynne, GW6PMC, 01745 855068.

CRAWLEY ARC – 3, T 'Internet over Radio (History & Possibilities)', by Paul Overton; 10, ES; 24, T 'Small Loop Antennas', by Mike Underhill, G3LHZ. Stewart, G3YSX, 07720068493.

CRAY VALLEY RS – 4, ES; 18, T 'M2000A - The Most Successful Special Event Station Ever', by Bob Treacher, BRS32525 and Dave Lawley, G4BUO. Tony, G4WIF, 020 7739 5057 (OH).

CROWBOROUGH & DARS – 25, T 'Fast-Scan ATV', by Keith, G8HGM. Margeret, G6UIF, 01892 663666.

CRYSTAL PALACE & DRC – 3, CON (6m transverter), MP, Rigs, CAD, Internet etc. Vic, G1PKS, 0208 653 2946.

DENBY DALE RS – 13/14, The National Mills Weekend, phone for details. Tony, G4LLZ, 01484 664360.

DERBY & DARS – 3, JS; 17, Visit to Phil Rosen's radio collection; 24, T 'California - an illustrated talk', by Martin, G3SZJ. Martin, G3SZJ, 01332 556875.

DUDLEY ARS – 15, VID - large rotary beams 20m & 80m in California & Oregon. Bill, G3CAQ, 01902 843873.

DUNDEE ARC – 2, T 'My Trip to Tristan Da Cuna', by Colin Topping, GM6HGW (lecture & slides); 9, Morse Enthusiasts Group Scotland Night, by George Allan, GM4HYF; 16, Annual Club Awards Night. Melrose Terrace Lecture Theatre; 23, NFD Prep Night, by Tom Harrison, GM3NHQ; 30, Lecture. M Black, GM0PIV, 01382 455771.

ECHELFORD ARS – 11, ES by Auction; 25, T 'The R1155 Rx', by Wilf Cole & Dick Shannahon. Robin, G3TDR, 01784 456513.

EXMOUTH ARC – 3, T 'Silent Tuning for Transmitters', by Theo, G3EQM; 17, Introduction to Computers III. Alec, G8GON. 01395 264872.

FAREHAM & DARS – 3, Club Project - QRP Dummy Load & Power Meter, by G7HEP; 10, CON (Club Project); 17, Club Project post mortem; 24, Circuit Diagrams & Components - Part 5; 31, T 'The Oscilloscope', by G7HEP. G0AMS, 01329 235397 or G7HEP, 01329 663673.

FARNBOROUGH & DARS – 11, T 'Antenna Clinic', by Bob, G4HZV; 25, t 'Contesting Rules', by Derek, G3HEJ. Norman, G0VYR, 01483 835320.

FELIXSTOWE & DARS – 8, RAE Exam; 14, (Sunday) National Mills Day Special Event Station; 15, ESWR Preparation; 28, (Sunday) ESWR - The Ipswich Rally. Paul, G4YQC, 01394 273507.

GLOUCESTER AR & ES – 1, VHF/P from escarpment site; 8, Tuning high to low - talk/slides/demo; 15, OTA; 22, MP 5WPM; 29, VHF/P from escarpment site. Tony, 01452 618930, OH.

GRIMSBY ARS – 4, HF OTA; 18, ES, JS. Jim, G4NPS, will again be the auctioneer. Brian, G4DXB.

GUILDFORD & DRS – 12, Discussion on NFD and meet the committee; 26, Don Beattie, RSGB President to give an illustrated talk and forum. Tim, G7JYQ, 0208 3995125.

HALIFAX & DARS – 16, T 'Cybernetics', by Dr JEF Baruch. Ray, 01274 600297.

HARWICH ARIG – 10, Lecture 'APRS - What, why and how?', by Jonathan, G0DVJ. Eugene, G4FTP, 01206 826633.

HASTINGS ELECTRONICS & RC – 17, T 'History of the Link Trainer', by Keith Ellis. Doug, G4ERA, 01424 812350.

HEREFORD ARS – 19, Three Counties Preparation. Tim, G0JWJ, 01432 279435.

HORNDEAN & DARC – 2, Club Social Evening; 6/7, Special Millennium Event Station, GB2HRC, at Fort Nelson; 23, 10-minute talks by club members. Stuart, G0FYX, 01705 472846.

HORNSEA ARS – 3, Foxhunt. Early start. Short range; 10, T 'I Hate decibels', by G0TPS; 24, Activity, logging; 31, NFD Prep. John, G0TPS, 01964 562258.

HORSHAM ARC – 4, T 'Practical Wireless' by Rob Mannion, G3XFD, Editor. David, G4JHI, 01403 750228.

HULL & DARS – 5, Phasors on stun, G0TPS; 5, Q, G0VVP; 26, Codes & Cyphers, G6VWP. John, G0TPS, 01964 562258.

IPSWICH RC - 3, Presentation on UI-View by Suffolk Data Group; 17, ESWR Planning Evening; 31, MP. Keith, G7CIY, 01394 420226.

ITCHEN VALLEY ARC – 12, ZL9CI Campbell Island DXpedition; 26, The latest from Yaesu; 13/14, Mills On The Air – Burseldon. D C Symonds, G0PRZ, 023 80261877.

KIDDERMINSTER & DARS – 2, The Weather. Geoff, G0RJP, 01299 888826.

LEICESTER RS – 1, Bank Holiday OTA; 8, Lecture by Vic, G3MXV; 22, Club Birthday. The club will be 87 years old, all welcome; 29, Bank Holiday OTA. A T Wann, G0TNI, 0116 2630947.

LINCOLN SHORT WAVE CLUB – 3, Games Night; 24, T 'Flying by Radio', by Ken Jones, G3RRN; 31, ES. John, G1TSL, 01522 793751.

LIVERPOOL & DARS – 2, CON; 9, OTA; 30, ES. Ian, G4WWX, 0151 7221178.

LOTHIAN RS – 10, T 'Forensic Electronics', by Burt Whittington; 24, DF Hunt; 27, Lothians Challenge 2000. Brian, GM4DIJ, 0131 3342247.

LOUGHBOROUGH & DARC – 2, Computers and Things; 9, JS; 14, Sunday - Bletchley Park visit, leave 0900; 16, Updating and Building Your Own Computer Open Forum, G8SNF; 23, Hangar Visit EM Airport. Numbers Limited; 3, 2nd DF of the year - Bands TBA. Chris, G1ETZ, 01509 504319.

LOUGHTON & EPPING FOREST ARS – 5, HF/6m OTA; 19, Preparation for Club Field Weekend; 20/21, Club Field Weekend, Aylmers Farm, Old Harlow. Marc, G0TOC, 07803 023501.

MAIDSTONE YMCA ARS – 6, (Sat) RSGB official scheduled MT; 8, (Mon) RAE Examination. John, G0RHO, 01622 832259.

MAXPAK – 8, T 'Introduction to the MaxPak web site'. Ron Taylor, G6LRD, 01922 684496.

MID-CHESHIRE ARS – 3, Post Rally and HF OTA; 10, VHF Field Day Preparations; 24, Contests Chairman. Peter, G8HAV, 01606 553401.

MID-WARWICKSHIRE ARS – 9, APRS and UI-View by Rod, G0FBY; 23, T 'Antenna Computer Modelling', by Alex, G3ZBE. Bernard, M1AUK, 01926 420913.

NEWBURY & DARS – 24, AGM. Ian, G3RVM, 01635 826019.

NORTH BRISTOL ARC – 19, Scratch and Kit Built Display; 26, T '50 Years of Ham Radio', by John, G3IZM. Dick, G0XAY, 01454 218362.

NUNSFIELD HOUSE ARG – 5, ES; 7, Antenna Maintenance 9.30am - 4.00pm. Food provided; 12, Great Egg Race, by Ken Clarke, G0JKC. Prize for the winner; 19, T 'DXpedition to Abokwa Island', by Ken Frankcom, G3OCA. Talk & slides; 26, T 'Derby Mountain Rescue Tea', by Charles Chesters. Talk & slides. Ann, 2E1GMP, 01332 752997.

OXFORD & DARS – 11, T 'History of the Oxford Society', by Paul Goodhall, BRS176562. Dave, G3BLS, 01865 247311.

PAISLEY (YMCA) ARC – 3, Speech Processing; 17, QRP is Fun; 31, AGM. Jim, GM3UWX, 01505 862817.

POOLE ARS – 12, CON. Colin Redwood, G6MXL.

QRZ AR GROUP OF SUSSEX – 19, T 'Coherent Ramblings of a Past President of the RSGB', by Ian Kyle, GI8AYZ/MI0AYZ. Stuart, M0CHW, 01435 863020.

RADIO SOCIETY OF HARROW – 14, GB2DHH on the air, with Aerojumble & memorabilia fair. Mosquito Museum Salisbury Hall, London Colney; 26, T 'Radio 4 & Medium Wave Crystal Sets', by John Brown, G4UBB. Jim Ballard, G0AOT, 01895 476933/02072786421.

READING & DARC – 11, CON, Desert Island Radio. Pete, G8FRC, 0118 969 5697.

SALOP ARS – 11, JS; 25, First 144MHz Foxhunt. Fred, G3NSY, 01743 790457.

SHEFFORD & DARS – 4, Electrical & Electronic Bygones, bring your own treasure; 11, T 'Radio Communications Agency', by Trevor Collymore; 18, CW NFD Planning; 25, T 'Has My Receiver Gone Dead', by Barry, G8FFM. Mike, G8BEG, 01462 816738.

SILVERTHORN RC – 12, JS; 19, Robot Wars Briefing; 26, OTA. David, G0KHC, 02085051871.

SOUTH BRISTOL ARC – 3, Bob's Computer Clinic, Bob, M1BOB; 10, HF Workshop for newcomers, Doug, G3KUL; 17, Annual Maintenance of Club Aerials, Peter, G0DRX; 24, Amateur Radio Software Demonstration, Len, G4RZY; 31, 40m OTA. Len, G4RZY, 01275 834282.

SOUTHDOWN ARS – 8, T 'Forests and Their Inhabitants', by Stuart Sutton. Glynn, M0CHO, 01323 765731.

SOUTH NORMANTON & DARC – 8, High Ordish; 15, JS (Hall); 22, Shack Activity Night. Dave, M1DBR, 01773 783670.

SOUTH NOTTS ARC – 3, OTA HF & VHF; 10, Q; 17, OTA HF & VHF; 24 T 'Safety and Communications', by Ron, G4NZU. 01509 672846.

STOCKPORT RADIO SOCIETY – 10, ES; 24, NFD Preparation & OTA. David, M1ANT, 01612850017.

STRATFORD-UPON-AVON & DRS – 8, Visit, C & W Earth Station; 22, Planning Permission & Amateur Radio with G4GJB. Ron, G0MRH, 01789 267430.

SWANSEA ARS – 4, Lecture 'The Titanic and the SOS'. Dave, GW4BNJ, 01792 519046.

TELFORD & DARS – 3, OTA; 10, Contest Planning; 17, Club Projects Part 2; 24, 1st DF Hunt; 31, JS. Mike, G3JKX, 01952 299677.

THORNTON CLEVELEYS ARS – 8, T 'America in the 70s', by Fred, G4FXG; 15, T 'Naval HF Communications in the 60s', by Ken, G3RFH; 22, Technical talk on Aerials. Jack, G4BFH, jack@duddingt.u-net.com

TROWBRIDGE & DARC – 3, T 'A Tale of Ten Metres-Trends in HF Propagation', by Steve Reed, G0AEV; 17, Social. Ian, G0GRI, 01225 864698. EW.

VERULAM ARC – 30, T 'Fire Hazards', by Stan Ames. Walter, G3PMF, 01923 262180.

WAKEFIELD & DARS – 2, T 'Back to Basics', by Ian, M0BFO; 9, Examination of the Roof Aerials. John, G7JTH, 01924 251822.

WARRINGTON ARC – 16, Visit of Don Beattie, G3OZF, President of the RSGB. John, G0RPG, 01925 762722.

WEST SOMERSET ARC – 2, Pre-Mills on the air. Alan, M0AOJ, 01643 707207.

WIDNES & RUNCORN ARC – 3, T 'Operating a packet station - the basics'. Martin, G4LUQ, 01928 714843.

WOLVERHAMPTON ARS – 21, Sunday Coronary Aftercare. J Smith, 01902 751936.

WORTHING & DARC – 10, Antennas with G3TNO; 17, Discussion Evening; 24, RSGB President to give a club talk; 31, Discussion Evening. Roy, G4GPX, 01903 753893.

YARMOUTHRC – 12, Preps for Millennium Weekend (19–21 May). Site to be advised; 26, Preparations for NFD. Tony, G3NHU, 01493 721173.

YORK RADIO CLUB (AMATEUR) – 4, Business meeting - Windmill SES with the committee; 11, T 'DF Hunting', by G1DRG; 18, MP by G4XIV & G0WUY; 25, DF Hunt (York area). Gareth, G1DRG, 01904 421392.

SILENT KEYS

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

G4IUT	Mr G Craig	17/02/00
G6FJF	Mr D R Parker	06/03/00
G4IME	Mr J Marrow	13/01/00
G0TLV	Mr H W Lambert	04/03/00
M0ATJ	Mr D J Dolland	03/03/00
GM3LYY	Mr JTA Johnstone	
G5XJ	Mr J W Moorhouse	02/01/00
G1NKS	Mrs P M Thom	26/01/00
G3VCQ	Mr D Wilson	31/01/00
G3VJZ	Mr RGN Soper	16/03/00
GM3BGB	Mr S B Jagger	03/03/00
RS178104	Mr J G Williams	03/01/00
G8GG	Mr H M Fenton	
G5JR	Mr RJC Buckstone	29/12/99
G0NRQ	Mr A W Dean	15/01/00
G7LWJ	Mr C R Forrester	16/02/00
G0WAO	Mr P Davies	/03/00
G3VYV	Mr D A Duff	23/01/00
GW4XYL	Mrs B Sweeting	
G0NHX	Mr E R Holloway	28/02/00
GW3VBP	Mr D H Adams	28/02/00
G6EUP	Mr T H Wray	21/03/00
VE7DW	Mr J Williams	05/03/00
G3GRB	Mr NHJ Cliff	10/03/00
G1ESO	Mr R A Gane	03/00
G0DDI	Mr P Matkin	
G4YMO	Mr R Cowgill	12/03/00
G3TAV	Mr G E Evans	
G8WV	Mr N H Sedgwick	04/03/00

RALLIES AND EVENTS

This is a list of all rallies, hamfests, exhibitions and conventions notified to HQ (as at press date). Items are given in detail for the next three months inclusive and in brief thereafter. Please send detailed information, including contact callsign and telephone numbers direct to HQ and marked 'Rally News - DIARY'.

1 MAY 2000

DARTMOOR RC Rally – Pannier Market, Tavistock, Devon. OT 10.30am, TI, CP, TS, B&B. Ron, G7LLG, 01822 852 586.

MID-CHESHIRE ARS Rally – Civic Hall, Winsford. OT 10.30am/11am, CP, C. David, G4XUV, 0160 677787.

7 MAY 2000

BRITISH AMATEUR TELEVISION CLUB Annual Convention and Rally – Bletchley Park. OT 10am, £1 (under 16 free), TS.

DRAYTON MANOR Radio & Computer Rally - Drayton Manor Park, Tamworth, Staffs, on the A4091. TS, FM, B&B, SIG. Peter, 0121 422 9787 or 0121 443 1189.

14 MAY 2000

DUNSTABLE DOWNS RC 17th Annual National Radio Car Boot Sale – Stockwood Country Park, Luton, Beds. Leave M1 jn 10a – follow signs for 'The Mossman Collection'. OT 9am, TI on S22. DDRC, PO Box 4053, Dunstable, Beds LU5 5ZJ with an SAE. Information www.ddrcbootsale.freeserve.co.uk Fax 01525 383 898, or e-mail DRC@magstripe.demon.co.uk

21 MAY 2000

MID-ULSTER ARC Rally – Silverwood Hotel, Lurgan, Co Armagh. OT 12 noon, TS, B&B, TI on S22. Jim, GI0OND, 028 3885 1179.

RIPON & DISTRICT ARS Northern Mobile Rally, Harrogate. Gerald, G0UFI, 01765 640 229, or g0ufi@email.com

THREE COUNTIES Radio & Computer Rally – Perdiswell Leisure Centre, Bilford Road, Worcester. OT 10am, £2, (OAP & disabled £1.50), TS, SIG, LB, C, CP. Eddie, 01905 773 181.

28 MAY 2000

BURY RS Rally – Mosses Centre, Cecil Street, Bury, Lancs. TI, CP, TS, B&B, LB, DF. 07946 090 773 or e-mail buryrally@hotmail.com

IPSWICH RC East Suffolk Radio Rally (Wireless Revival) – 'The Hollies', Straight Road, Foxhall, Ipswich. OT 9.30am (buyers), 8am (traders), TI S22, CBS, SIG, TS. G4DDK, 01394 448 495.

4 JUNE 2000

BENTLEY RC Mid-Hampshire Radio Rally – Medstead Hall, Medstead, Alton, Hants. OT 10.30am, £1.50, TI, CP, TS, FM, SIG, C, WIN. Chris, 07790 577 945 or e-mail chris@g0wyf.freeserve.co.uk

MANSFIELD ARS Annual Rally & Electronics Car Boot Sale – Debdale Lane Sports and Social Club, Debdale Lane, Mansfiled Woodhouse. OT 10am, LB, C CP. Angela, 01623 429218 or e-mail andange@netscapeonline.co.uk

KEY

Club News

AD - Annual Dinner; **AGM** - Annual General Meeting; **ARDF** - Amateur Radio Direction Finding; **B&B** - Bring and Buy; **CON** - CONstruction; **CC** - Construction Competition; **D** - Details; **ES** - Equipment Sale; **EW** - Evenings/Weekends; **JS** - Junk Sale; **MP** - Morse Practice; **OH** - Office Hours; **OTA** - On The Air; **Q** - Quiz; **RP** - Rally Preparations; **T** - Talk; **VID** - VIDeo;

Rallies & Events

TI - Talk-In; **CP** - Car Park; **£** - admission; **OT** - Opening Time - time for disabled visitors appears first, eg (10.30/11am); **TS** - Trade Stands; **FM** - Flea Market; **CBS** - Car Boot Sale; **B&B** - Bring and Buy; **A** - Auction; **SIG** - Special Interest Groups; **MT** - Morse Tests; **LB** - Licensed Bar; **C** - Catering; **DF** - Disabled Facilities; **WIN** - prize draw, raffle; **LEC** - LECtures / seminars; **FAM** - FAMily attractions; **CS** - Camp Site.

SPALDING & DARS Rally – Springfields Exhibition Centre, Spalding, Lincolnshire. OT 10am, CBS, CP, C, CS. Ray, G8ELV, 01775 711 953 or Mick, 07976 271 796.
WEST MANCHESTER RC 4th Red Rose QRP Festival – Formby Hall, Alder Street (off High Street), Atherton, Manchester. OT 11am, £1, TS, SIG, CP, DF, R, LB, B&B. Les, G4HZJ, 1 Belvedere Avenue, Atherton, M46 9LQ, 01942 870634.

11 JUNE 2000
NUNSFIELD HOUSE ARG Elvaston National Radio Rally – Elvaston Castle Country Park, Elvaston, Derby. Located on B5010, which runs between A6 and A52, 5 miles SW of Derby. TS, FM, B&B, C, MT, etc. Les, G4CWD 01332 559 965 or les@g4cwd.demon.co.uk

18 JUNE 2000
NEWBURY & DARS Boot Sale – Acland Hall and Recreation Field, Cold Ash. OT 9am, free but donation appreciated, CP, TI on S22. George, 01488 682 814.
NORFOLK ARC Barford Rally and Electronics Car Boot Sale – Barford Village, 9 miles W of Norwich off the B1108, signposted. OT 10am, free, CP, B&B, C, CBS, WIN. John, G0VZD, 01953 604 769.

22 / 24 JUNE 2000
HAMRADIO 2000 – Friedrichshafen, Germany

25 JUNE 2000
BANGOR & DARS Radio and Computer Rally – Clandeboye Lodge Hotel, Bangor. OT 12 noon, £2. Mark, MI1DRU, 028 9058 6515, or e-mail mi1dru@amrad.net
LONGLEAT RALLY – Longleat House, Warminster, Wilts. Ron, G4GTD, 01179 856 253.

2 JULY 2000
HARLOW & DARS Radio and Hobbies Rally – Mark Hall School, just off A414 Harlow ring road at jn with B183 First Avenue, jn 7 M11. OT 10am, TI, CP, TS, FM, CBS, MT, C, FAM. Len, G7UFF, 01279 832 700 or e-mail g6ut@qsl.net

8 JULY 2000
CORNISH RADIO Rally & Computer Fair – Penair School, Truro. OT 10.30am, B&B, TI, CP, MT. Robin, 01209 820 118.

9 JULY 2000
SUSSEX Amateur Radio & Computer Fair – Brighton Racecourse, East Sussex. OT 10.30am. Ron, G8VEH, 01903 763 978 or 01273 417 756.
YORK RC (Amateur) Radio Rally – Knavesmire Building, York Racecourse. OT 10.30am, £2, accompanied children free, CP, TI S22, SIG, MT, LB, C. Pat Trask, G0DRF, 01904 628 036.

16 JULY 2000
Humber Bridge Rally – Bob, G0VVP, 01482 834 240 or John, G0TPS, 01964 562 258.

23 JULY 2000
COLCHESTER Radio Rally & Computer Fair – Frank, G3FIJ, 01206 851 189.
RUGBY ATS Radio & Computer Fair – BP Truckstop, near Rugby. £2 per car, C, CP, TS, TI on S22. Arthur, M0ASD, 01788 550 778 or m0asd@tesco.net

30 JULY 2000
RSGB HAMFEST – RSGB, 01707 659 015.

6 AUGUST 2000
DERBY & DARS Mobile Rally & Computer Fair – Martin, G3SZJ, 01332 556 875 or e-mail martin@martinshardlow.demon.co.uk

11 AUGUST 2000
COCKENZIE & PORT SETON ARC 7th Annual Radio Junk Night – Bob, GM4UYZ, 01875 811 723, e-mail bob.gm4uyz@btinternet.com or GM4UYZ @ GB7EDN.

13 AUGUST 2000
FLIGHT REFUELLING ARS Hamfest 2000 – Keith, G1VHG, 01202 577 937.
KING'S LYNN ARC 11th Great Eastern Rally – Derek, G0MQL, 01553 841 189, Fred, 01760 440 570 or www.qsl.net/g3xyz

27 AUGUST 2000
MILTON KEYNES ARS 14th Fayre and Car Boot Sale – Dave, G3ZPA, 01908 501 310 or e-mail m0bzk@bletchley.madasafish.com

3 SEPTEMBER 2000
SOUTH BRISTOL ARC Bristol Computer & Radio Rally – Muriel, 01275 834 282.

10 SEPTEMBER 2000
LINCOLN SHORT WAVE CLUB Hamfest – John, G8VGF, 01522 525 760.
TELFORD & DARS Telford Radio Rally – www.telford-rally.co.uk or Bob, 01952 770 922 or bob@somrob.u-net.com or Jim, 01952 684 173.
VINTAGE Technology 2000 – Blackpool. Brian 01253 508 232.
22 / 23 SEPTEMBER 2000
LEICESTER Amateur Radio Show – Geoff, 01455 823 344, fax 01455 828 273, or e-mail g4afj@argonet.co.uk

1 OCTOBER 2000
GREAT LUMLEY AR & ES Rally – 0191 384 2803 or 0308 937 2772.

8 OCTOBER 2000
NORTH WAKEFIELD RC 17th Radio Rally – http:/www.nwrc.mcmail.com or 01924 824 451.

13-15 OCTOBER
RSGB International HF and IOTA Convention - 01707 659 015.

15 OCTOBER 2000
BLACKWOOD & DARS Radio, Computer & Electronics Rally – Stuart, 01495 243 824 or 07970 777 756, fax 01495 240 260 or e-mail fireham@aol.com

29 OCTOBER 2000
GALASHIELS & DARS Annual Radio and Computer Rally – Jim, 01896 850 245 or e-mail jimk@gm7lun.freeserve.co.uk

12 NOVEMBER 2000
GREAT NORTHERN HAMFEST – Ernie, G4LUE, 01226 716 339. Mobile 07787 546 515.
MIDLAND ARS 12th Radio & Computer Rally – Peter, 0121 443 1189.

25/26 NOVEMBER 2000
LONDON Amateur Radio & Computer Show - 01923 893 929.

26 NOVEMBER 2000
BISHOP AUCKLAND RAC Rally – Mark, G0GFG, 01388 745 353 or Brian, G7OCK, 01388 762 678.

21 JANUARY 2001
OLDHAM ARC Rally – Geoff, 01706 846 143.

28 JANUARY 2001
LANCASTRIAN Rally - G0GVA, 01772 621 954.

GB CALLS

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

1 May GB2AG: W2AG Bob Ehrler. West Sussex. LH2 (G0BXV)

6 May GB2HLM: Himley Lifeboat Museum. Dudley, West Midlands. LHV27 (G0TMF)
GB2JIG: Jack In The Green. Templecote, Somerset. LH (G0ENW)

7 May GB2HRC: Variation of Club Callsign. Cosham, Hants. TLH27 (G4PRG)
GB50IPA: 50 years of IPA. Bournemouth. LHV27P (G0JOH)

8 May GB2AG: W2AG Bob Ehrler. Northern Ireland. LH (GI4SNC)
GB2BYL: British Young Ladies. Jersey. LH2 (MJ0BJU)

12 May GB0CMW: Cattell's Mill Willingham. Willingham, Cambridge. LH (G0GKP)
GB0KLM: Killhope Lead Mine. Co. Durham. (G4TTF)
GB2AMM: Armley Mills Museum. Armley, Leeds. LH2P (M0BGS)
GB2MMW: Marsh Mill in Wyre. Lancs. L (G4BFH)
GB2NW: Nutley Windmill. Nutley, East Sussex. LH27 (G3TXZ)
GB2SMW: Stelling Minnins Windmill. Canterbury. (G0LGX)

13 May GB0ARM: Co. Armagh MTS Team. Co. Armagh. L (GI4SRQ)
GB0ATM: Co. Antrim MTS Team. Carrickfergus. LH2 (GI3YRL)
GB0BFD: Bedford MTS Team. Bedford. (G0WAS)
GB0BLY: Burnley - Lancs MTS Team. Accrington, Lancs. LH (G0JWB)
GB0CW: Chief Morse Examiner. Reading, Berks. (G4HNF)
GB0CWM: Cossington Water Mill. Leics. LH2 (G0TNI)
GB0DFD: Dyfed MTS Team. Carmarthen. LH (GW0CVY)
GB0DHM: Durham Team. County Durham. LH (G4RXR)
GB0DVN: Devon MTS Team. Plymouth, Devon. (G3VNG)
GB0ESX: Essex MTS Team. Maldon, Essex. LH (G0IBN)
GB0FMH: Co. Fermanagh MTS Team. Co. Fermanagh. TLH (GI4PCY)
GB0GDD: Gwynedd. Llanbedr, Gwynedd. LH (GW0OPY)
GB0GRN: Grampian. Aberdeen. TLH (GM3WIJ)
GB0HLD: Highland MTS Team. Ross-Shire. TLH (GM3WED)
GB0HSF: Hemel School Fair. Herts. L2P (G4BIP)
GB0JAJ: Jack and Jill. Clayton, West Sussex. LH2 (M0BKX)
GB0LCN: Lincolnshire MTS Team. Lincoln. LH (G4OSB)
GB0LDN: London Area. Ealing, London. LH (G3NOH)
GB0LEC: Leicester MTS Team. Loughborough, Leics. (G4KGG)
GB0MTS: Morse Test Service. Thatcham, Berks. (G3RVM)
GB0NLW: North Leverton Windmill. Redford, Notts. TLHV27 (G4YRZ)
GB0NOR: Norfolk. Kings Lynn, Norfolk. LH (G3DKO)
GB0PEM: Pembrokeshire MTS Team. Neyland, Pembs. LHV27 (GW4XQK)
GB0SPE: Shropshire. Priorslee, Shropshire. L (G3JKX)
GB0TAU: Taunton. Wellington, Somerset. L (G3TRU)
GB0WLT: Wiltshire. Bradford on Avon, Wiltshire. LH2 (G3GKC)
GB0YSE: Yorkshire East MTS Team. Hull. H2 (G4VHM)
GB0YSN: Yorkshire North MTS Team. Scarborough. LH27 (G4ZGP)
GB2CCM: Crabble Corn Mill. River Dover, Kent. (G4NPM)
GB2CWS: Cogglesford Watermill Sleaford. Sleaford, Lincs. LH (G3ZUC)
GB2EDM: Eskdale Mill. Cumbria. H2 (G4LLZ)
GB2FSM: Finzean Sawmill. Finzean, Aberdeenshire. LH (G4ZVD)
GB2LDG: Longtown District Guides. Newcastleton, Scottish Borders. LH (G4TAS)
GB2PSW: Patterson Spade Watermill. Templepatrick, Co. Antrim. (GI4HCN)
GB2PW: Polegate Windmill. Polegate, East Sussex. LH2 (G3DQY)
GB2ROA: Radio Officers' Association. Liverpool. LH (G0CMM)
GB2SPM: Stanton Post Mill. Suffolk. L (G3WRT)
GB2SWM: Stotfold Water Mill. Stotfold, Bedfordshire. LH2 (G0LYN)
GB2TMI: Thwaite Mills Island. Stourton, Leeds. (G0BFJ)
GB2UW: Upminster Windmill. Essex. LH (G4KIH)
GB2WW: Wilton Windmill. Wiltshire. LH2 (G4AJA)
GB4CFW: Cat & Fiddle Windmill. Derby. LH27 (G0IYZ)

14 May GB0BRK: Berkshire. Berks. LH (G0ORH)
GB0DFD: Dyfed MTS Team. Carmarthen. L (GW4ZXL)
GB0LCN: Lincolnshire MTS Team. Grantham, Lincs. L (G4HVC)
GB2WBM: West Blatchington Mill. East Sussex. LH2 (G4BWJ)
GB2WTM: Woodbridge Tide Mill. Woodbridge, Suffolk. LH2 (G4YQC)

15 May GB2AG: W2AG Bob Ehrler. Aberdeenshire. LH (GM3PIP)
GB2MIL: Millennium. Tenby, Pembs. TLHV27 (GW0JRF)

19 May GB0BMW: Bradwell Millennium Weekend. Great Yarmouth, Norfolk. TLH (G3NHU)
GB0RAF: Royal Air Force. Doncaster. TLHV27 (G0DAM)

20 May GB0WSF: Worcester & Sherwood Foresters. Bolsover, Derbyshire. LHV2 (G0OKD)
GB2RNI: Royal Navy Inspection. Warwickshire. LH2 (G3MXH)
GB6SS: Small Ships - Dunkirk. North Yorks. LH2 (G4SSH)

21 May GB2CR: Chiltern Rally. Aylesbury, Bucks. LH (G4BFV)

22 May GB2AG: W2AG Bob Ehrler. Leics. LH2 (G3UAA)

24 May GB0BCR: Bucks County Rally. Wendover, Bucks. (G0RXJ)

25 May GB1CHW: Canterbury,Herne Bay,Whitstabl. Yorkletts, Kent. 27P (G8XAJ)

26 May GB0BMC: Bournemouth Millennium Camp. Bournemouth. L27 (G4BKE)
GB0CAS: County Armagh Scouts. Market Hill, Co. Armagh. LHV27P (GI0OND)
GB0HI: Hilbre Island. LH (G0VBD)
GB0SA: Swallows & Amazons. Lancs. LH (G0VGS)
GB0WS: Wrekin Scouts. Newport, Shropshire. TLH2 (G4JOW)
GB2GSL: Gillingham St Lukes. Kent. TLH2 (G4EVY)
GB2MMC: Margam Millennium Camp. Port Talbot, W. Glam. TL2 (GW0JZN)
GB2PWS: Parkwood Scouts. Huddersfield. TLHV27 (G4OTC)
GB2SMC: Scout Millennium Camp. Nr Warminster, Wilts. (G3BHK)
GB2WDS: Wrexham District Scouts. Wrexham. TLHV27 (MW0BNB)
GB4RFS: Rockingham Forest Scouts. Caldecott, Rutland. LH (G4MRA)
GB8GS: Glanford Scouts. Brigg, N. Lincolnshire. LH2 (M0AUS)

27 May GB0DMC: Deal Millennium Camp. Kent. (M0CIS)
GB1LE: Lands End. Lands End, Cornwall. 27P (G7AGZ)
GB2FSH: Fallowfield Sheltered Housing. East Sussex. (G3JPJ)
GB2KKS: Kingsbury & Kenton Scouts. Chalfont St. Peter, Bucks. TLH2 (G0PQB)
GB4CWS: Colchester West Dist Scouts. Holbrock, Suffolk. LH27 (G4JIE)

28 May GB0BP: Baden Powell. Newbridge, Gwent. TLH (GW0RQS)
GB2SVL: Sunderland Volunteer Life. Tyne & Wear. LH2 (G0GFG)
GB4SWR: Suffolk Wireless Revival. Bucklesham, Ipswich. 2 (G4YQC)
GB6VR: Valve Radio. Ipswich, Suffolk. LH (M0AWS)

29 May GB0CMC: Cumbria Millennium Camp. Windermere. TLHV2 (G0GPM)
GB0NTC: National Trust Charlecote. Warwick. LH (G0MRH)

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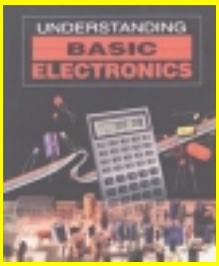

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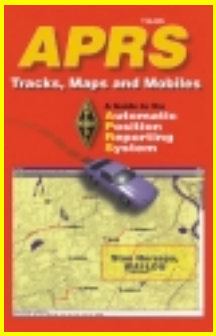

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the last Word

Licence Anomalies

I was very pleased when some licence changes were announced last year. The higher power level for Novices and the wider frequency coverage, now including the 2m band, should give them much more scope to join in with the rest of us.

My first reaction to the A/B licence was also favourable. It seemed a good compromise to allow those who, like me, find Morse code difficult, to get on the HF bands. It is well within reasonable interpretation of the international regulations.

I found this on the Internet as part of Article 32/S25.

2735/S25.5

§ 3. (1) Any person seeking a licence to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz.

This does not state in any way the speed at which the test should be carried out, so 5WPM seems to be as valid as 12WPM. I am not aware of any other international regulation that does specify the speed. Because of this I understand that Denmark and Sweden have already reduced their testing speed to 5WPM. In the USA, the FCC has said that the testing speed for all HF licences, even the Extra Class, is to be reduced to the same 5WPM. The national societies in Australia and Canada are asking for 5WPM to be the only test speed.

The new Class A/B licensee is allowed access to HF, but with reduced power compared with the full Class A. As the exam is the same, it seems strange that the power level should be restricted due to Morse speed rather than technical ability. As most people do not run more than 100W output anyway, it did not seem too bad a compromise at the time.

The second anomaly could be more serious. The A/B licensees were granted CEPT Class 2 status, which is the same as for a Class B licence. This means that they are restricted to VHF operation only when travelling abroad and operating under the CEPT privileges. This is in contrast to being able to use all the HF bands at home. Last year the USA joined the countries that have implemented CEPT Recommendation T/R 61-01. Both the ARRL and the FCC announced that the Technician Plus licence holders would have CEPT Class 1 privileges. This grade of USA licence is similar to the British A/B licence in that a 5WPM Morse test is required and allows full power on VHF. On the HF bands they have some CW sub-bands and the only HF SSB allocation is on 10m from 28.3 MHz to 28.5 MHz. They would apparently be able to use all the HF bands when travelling, but not at home; whereas our A/B licensees can use HF at home, but not while travelling.

In view of these anomalies, and the fact that more countries are making 5WPM their only testing speed, I am hoping that the A/B licensees are upgraded as soon as possible to full Class A status. I am sure that this is intended to happen when the Morse requirement is completely eliminated, but why wait? Too many other countries are reducing the test speed to justify these limitations being retained here.

Lawrence D Woolf, GJ3RAX

Does Anybody Care?

Over the past five months I have tried to get into contact with members of the local club, or someone who could help me with studies towards my licence. Those that I have telephoned have not been in and I have left my details for them to get back to me, but so far absolutely nothing. It is as if no one wants to be bothered with a disabled person, let alone make an effort to help.

All I am asking for is some help in studying for the RAE. I am disabled and cannot get around very well, nor do I own or drive a car, and the public transport around this area after 18.00hrs is non-existent. It is not easy by any means to get out. The nearest college for RAE studies is in Coventry, which is totally outside my ability to get to.

Is there anyone out there who cares enough to help me further my interests in radio and communications? It would enlarge my world considerably to be able to talk to others, without having to wait for visitors to come to see me (a very rare event indeed). Being at home all the time is just like serving a life sentence without any chance of parole. All I do at the moment is listen to the short-wave bands. I wish I was able to join in.

Richard Neale-Gardner

[Richard lives in Barwell, Leicestershire. If you would like to offer some assistance, please write to him via myself – *Ed*]

Car Boots Are Best

I write in support of G4CFH's letter ('The Last Word', March 2000). Without doubt the only genuine rallies are not those extensions to shops with expensive 'Black Boxes', but those with the true spirit of amateur radio selling items for building, converting or repairing. Where can you find these? Radio car boot sales, of course. No queuing, pre-trading, or rush for previously sold bargains.

Mike Neville, G4JUK

Planning Permission

I would like to thank the RSGB for their assistance and support during my recent planning application for the erection of a 60ft tower. I am pleased to advise that permission was granted without restrictions.

Tony Lord, G8DQZ

Watt Nonsense

The new millennium sees the abolition of some of our obsolete and unwieldy units. The pound is replaced by the functional SI kilogram, the ounce is no more! Some of us mourn the passing of the historical measurements, however we see the necessity of having a functional system of units. I'm old enough to remember that 63360 inches made one statute mile, but surely the fact that 1,000,000 mm equals one km is easier to manipulate.

Having set the scene for progress relating to our units, why oh why do we persist in using the ludicrous dBW? I am an electrical engineer and quite at home with the decibel, indeed I can see instances where it is quite efficacious. When having amplifiers and attenuators in series, or when dealing with widely ranging quantities on the same scale, the decibel is in a league of its own.

I suspect that 99% of UK amateurs have transmitter powers in the range of from 1 to 400 watts, and these values may be adequately measured with simple techniques to give output in watts. This being so, why do we start with a known (SI derived) unit and then perform a mathematical function on it to convert it to an ambiguous one?

I don't drive my car at 18.5dBmph along the motorway, nor do I weigh 19.8dBkg (23.2dBlb, if you prefer). There are not 25.6dBdays in a year and I am not 17dByears old!

No doubt some 'professional' radio amateur with lots of letters after his name will patiently instruct me as to the necessity of that foul unit, but until then I feel like the chap who dared tell the King that he had no clothes!

Ditch dBW and use watts – I do!

C J Osborn, G3XIZ

Doing The Splits

I am all for rare stations coming on the bands and working all and sundry, using split frequency working where they may be calling on one frequency and listening perhaps 2kHz higher or lower, however I do take exception to those rare stations demanding more frequencies than is necessary.

The worst I have come across recently was a station calling on 28.495MHz and announcing that he listening from 28.500 to 28.550MHz. This was at a time when the band was in superb condition and the busiest part of the band was rendered useless for normal communication.

I feel that some sort of guidance should be published to advise the rarer stations to occupy as little space as possible; after all, the bands are for us all to be shared equally.

Patrick Allely, GW3KJW

Morse Campaign

Having successfully completed the February Morse weekend, may I take this opportunity to thank all those concerned with the organising of the event? Bob Whelan and all the instructors made the weekend a very friendly and professional event. When I departed the pass rate stood at 80%, with still a few to go!

Special thanks must also go to those two fine young ladies, Fiorina and Catherine, who kept us supplied with welcome cuppas and biscuits throughout the weekend.

Thanks must also go to that band of amateurs who gave their time and patience in extra tuition (in my case Peter, G3JSR; Norman, G3GUL; Brock, G0WAR; and Bill, G0BOF). Well done, chaps, and thank you.

Finally, well done RSGB for a well organised weekend.

Jim McGowan M5AIP/M1CUC

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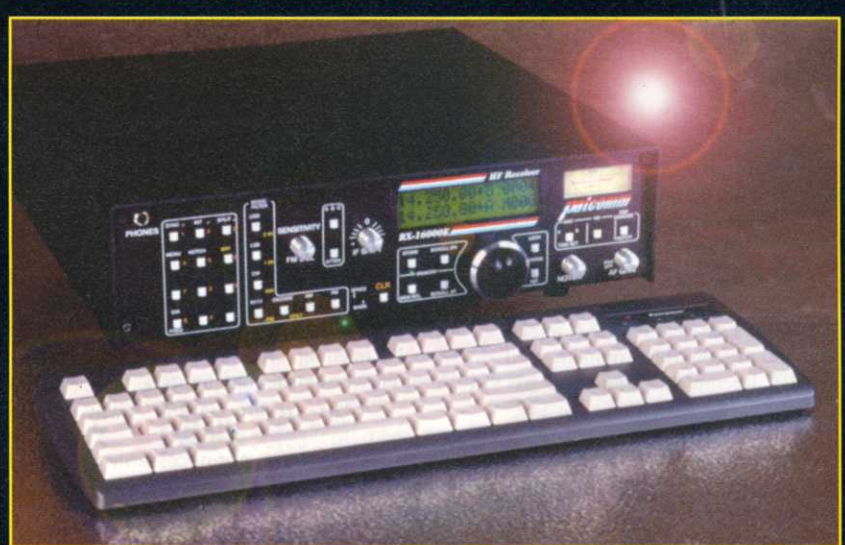

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BED & BREAKFAST/FOOD. Scotland, north coast GM0EXN, Cliff Top HF & Internet. Tel: 01847 851774
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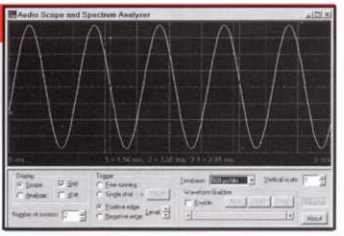

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- **WR3100e - £1169 INC VAT**

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

"Five stars for its mechanical design"
WRTH 1999 Review

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Model Name/Number	WR-1000i & WR-1000e	WR-1550i & WR-1550e	WR-3100i & WR-3100e
Construction of internals	WR-1000i/WR-1550i-3100iDSP- Internal full length ISA cards		
Construction of externals	WR-1000e/WR-1550e - 3100e - external RS232/PCMCIA (optional)		
Frequency range	0.5-1300 MHz	0.15-1500 MHz	0.15-1500 MHz
Modes	AM,SSB/CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W	AM,LSB,USB,CW,FM-N,FM-W
Tuning resolution	100 Hz (5 Hz BFO)	10 Hz (1Hz for SSB and CW)	10 Hz (1Hz for SSB and CW)
IF bandwidths	6 kHz (AM/SSB), 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)	2.5 kHz(SSB/CW), 6 kHz (AM) 17 kHz (FM-N), 230 kHz (W)
Receiver type	PLL-based triple-conv. superhet		
Scanning speed	10 ch/sec (AM), 50 ch/sec (FM)		
Audio output on card	200mW	200mW	200mW
Max on one motherboard	8 cards	8 cards	6-8 cards (please ask)
Dynamic range	65 dB	70 dB	85dB
IF shift (passband tuning)	no	±2 kHz	±2 kHz
DSP in hardware	no - use optional DS software		YES (ISA card ONLY)
IRQ required	no	no	yes (for ISA card)
Spectrum Scope	yes	yes	yes
Visitune	yes	yes	yes
Published software API	yes	yes	yes (also DSP)
Internal ISA cards	£299 inc vat	£369 inc vat	£1169.13 inc
External units	£359 inc vat	£429 inc vat	£1169.13 inc (hardware DSP only internal)

PCMCIA Adapter (external):	£69.00 inc vat when bought with 'e' series unit (otherwise: £99 inc vat)
PPS NiMH 12v Battery Pack & Chrgr:	£99 inc vat when purchased with 'e' series unit (otherwise: £139 inc vat)
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For your free (no obligation) info pack & WiNRADiO demo disk go to: http://www.broadercasting.com. If you don't have access to the internet then by all means feel free to phone/fax us. *Trunked radio transmissions should only be received & decoded with permission of the originator of the transmission.

Please send all your enquiries to: info@broadercasting.com or Telephone: 0800 0746 263 or +44 (0)1245 348000 - Fax: +44 (0)1245 287057
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