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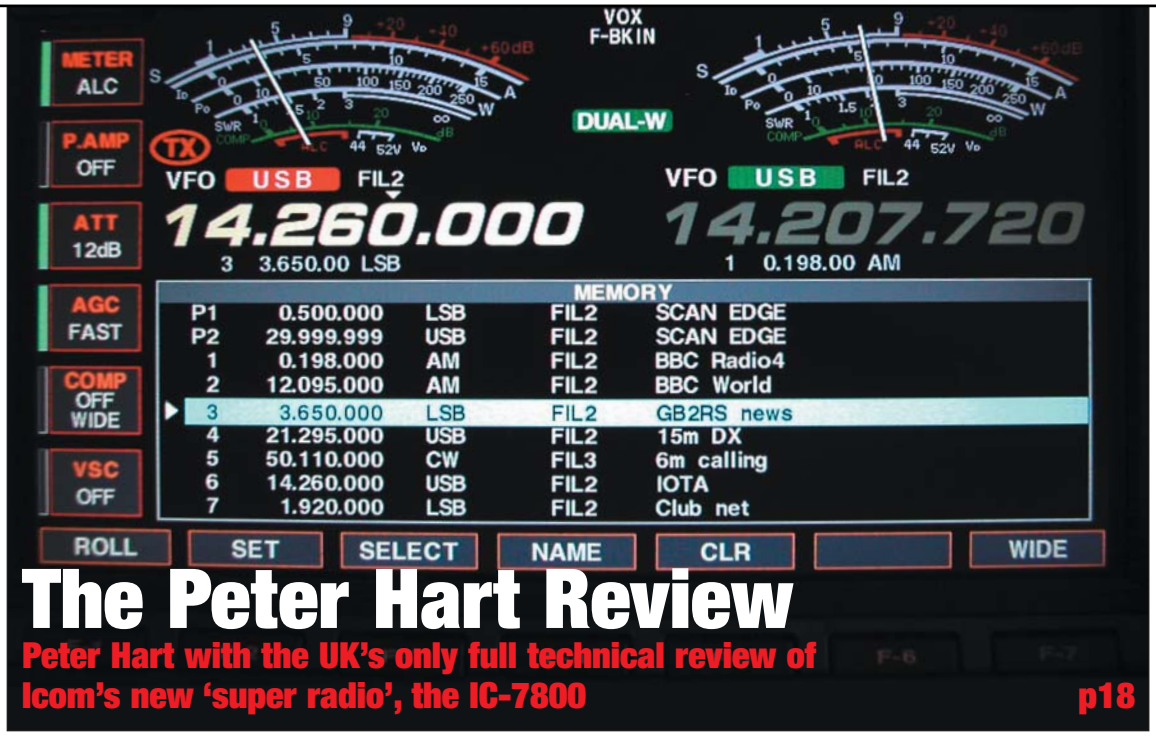
The Radio Society of Great Britain Members' Magazine

RadCom

£3.95 Vol 80 No. 8 August 2004

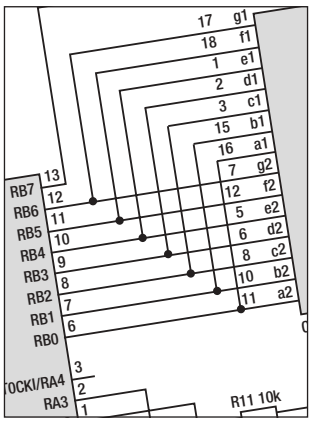


The Peter Hart Review

Peter Hart with the UK's only full technical review of Icom's new 'super radio', the IC-7800 p18

Antennas

Peter Dodd, G3LDO, goes bicycle mobile this month, and explains why some electrically short antennas are better than others p49



Code speed calibrator

Measure your Morse code sending speed in words per minute with this handy gadget p83

VHF / UHF

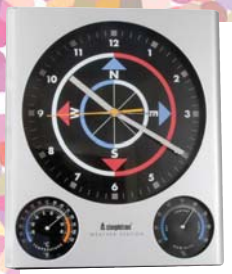
The VHF bands come out of the doldrums with some good Sporadic E and tropo openings, as Norman Fitch reports on p77

INSIDE

WATERS & STANTON

PAY SU

NO DEPOSIT NOTHING TO PAY



FREE!

Get this lovely Wall Clock (worth £24.95) with temperature & humidity readout absolutely free. Purchase any transceiver or receiver more than £100 and mention this offer to get your *free* wall clock. Subject to Availability

NEW IC-7800 In Stock!

FTDX-9000 NEW!

From Yaesu's largest dealer!

As Yaesu's top dealer we were the first to handle the sample of this radio. We will also have the first UK delivery of this radio. Call us for delivery schedule

BUY NOW PAY LATER AT ALL THREE STORES

You won't find a better deal!

Proof that at W&S you get the best possible deal. On selected items it is now possible to pay nothing for a whole year without incurring any interest charge. Amazing but true. And what's more, you get probably the best prices in the business. Give us a call today or visit one of our branches.

If you can find a better advertised deal we will match it!

0% APR TYPICAL EXAMPLE OF BUY NOW PAY LATER. CASH PRICE £600. PAY NO DEPOSIT AND PAY THE FULL AMOUNT 12 MONTH'S LATER. PAY NO INTEREST.

OR AFTER TWELVE MONTHS

29.8% APR REPAY £31.53 PER MONTH FOR 36 MONTHS. TOTAL AMOUNT DUE £1135.08. INTEREST IS CALULATED FROM THE DATE OF THE AGREEMENT.

ALL FINANCE SUBJECT TO STATUS WRITTEN QUOTATION ON REQUEST.

ICOM IC-756 PRO II £1899 C

Flagship of the Icom range of HF transceivers. HF & 50MHz, features large colour LCD with spectrum scope, auto ATU and 32-bit floating point DSP unit.

ICOM IC-7400 SPECIAL OFFER £1299 C

HF/VHF 100W transceiver covers 1.8 - 146MHz Features large LCD with spectrum scope, auto ATU and same DSP system as IC-756PRO II. A great base station!
Comes with *FREE* SP-21 Speaker & SM-20 Desk mic

ICOM IC-703 SPECIAL OFFER £589 C

HF/ 50MHz Transceiver 0.1-10W Portable, Mobile, Base-Station. Ideal for Foundation Licence/QRP. Auto ATU, DSP memory keyer. External batt **BP-228 £71.76.** B

FREE Icom IC-703 Logbook with every IC-703 - While Stocks Last!

ICOM IC-706 IIG DSP £769 C

HF/VHF/UHF mobile DSP transceiver. Its relative small size not only makes it a great mobile rig but also for fixed station use as well. HF general coverage and VHF & UHF .

Heil Traveler single ear "706" headset + PTT **£89.95 B** →

ICOM IC-718 £449 C

HF 100W transceiver. Covers all HF bands plus wideband receive. C/w auto notch, dual VFO, SWR meter etc. Options include extnl ATU DSP & filters.

KENWOOD TS-2000 £1599 C

Top-of-the-range Kenwood transceiver. HF/VHF/UHF or up to 23cm with the optional module. Built-in auto ATU, DSP and its unique TNC.

ARCP Control Software. **£44.95 B**

KENWOOD TS-870S DSP £1399 C

HFDSP 100W base station. 1.8 - 30MHz. Excellent all round rig great for DX working with its ability to winkle out weak stations using its true IF DSP. No filters to buy.

MC-60A base mic with pre-amp. Ideal match. **£117.95 B** →

KENWOOD TS-570DGE £849 C

HF100W base station with built-in auto ATU. Very popular rig, excellent performance on SSB and CW. Two fitted antenna sockets - very handy.

SP-23 Matching base station receiver **£68.95 B** →

ICOM IC-910X with 23cm £1249 C

Icom's all mode VHF/UHF transceiver with 23cm.
Large clear LCD with lots of facilities. 100W on VHF and 75W on UHF, 10W on 23cm.

UT-106 DSP unit **£84.99 B**

Basic Model IC-910H £1129 C

YAESU FT-1000 MKV £2349 C

200W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC PSU - Acknowledged as one of the finest DX rigs on the market. Superb tailored audio and the ability to select Class A bias for dramatic signal purity.

YAESU FT-1000 FIELD £1749 C

100W HF transceiver, EDSP, Collins filter, auto ATU, 220V AC / 13.8V DC - Building on the success of the FT-1000MkV, the Field has become a respected leader in its class.

KENWOOD TS-480SAT & TS-480HX

NEW

The **TS-480SAT** is the 100W version of this new HF+6m transceiver from Kenwood. Smaller than the TS-2000/ TS-B2000 it has many similar features.
TS-480SAT £999 C
The **TS-480HX** is the 200W version of this new HF+6m transceiver. **TS-480HX £1099 C**

YAESU FT-897D £899 C

100W HF rig plus 2m and 70cms (50W/20W) 13.8V external supply / internal optional FP-30V AC power supply / self powered portable using optional Ni-MH pack at 20W output. Compatible with FC-30 auto ATU and ATAS 120/100 antennas. The "must have" radio for 2003.

YAESU FT-847 £1199 C

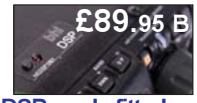
1.8 to 440MHz, this all-in-one transceiver offers unbeatable value. 100W on HF plus 6m, and 50W on 2m and 70cm. You get genuine RF clipping on SSB for up to 6dB gain and there are 4 separate antenna sockets.

YAESU FT-857D NEW £729 C

HF / 50 / 144 / 430MHz Mobile Transceiver. HF/6m 100W, 2m 50W, 70cm 20W. (13.8V DC)
Developed on the FT-897 and FT-817 transceivers. Built-in features 32 colour display, spectrum scope, AM airband aircraft reception, built-in memory keyer, detachable front panel.

YAESU FT-817ND £499 C

bhi NE-DSP1061 Module available!



160m - 70cms. Up to 5W output all modes. ***Ours includes*** **battery and charger.** **Add £90 for DSP ready fitted.**

NEW DSP Module

There is NO new FT-817 DSP! The fact is that the UK manufacturers, **bhi**, (of whom we are their largest distributor), have produced a lovely 4-stage DSP module that can be fitted inside the FT-817. The NE-DSP1061 module costs £89 plus a fitting charge of £25 for retro-fitting to existing models. This includes installing a mini switch and LED on top cover.

TOKYO HY-POWER HL-50B £269.95 C

FT-817 VERSION !

This Linear Amplifier has been specifically designed for use with the FT-817. Enjoy up to 50 Watts output

UMMER 2005!

FOR 12 MONTHS ON SELECTED ITEMS MARKED BY £

THE ONLY THING WE CUSTOMER SERVICE WON'T DISCOUNT

ICOM IC-E208 NEW £279 C

VHF/UHF FM Dual Band Mobile Transceiver *Freq range 144-146MHz, 430-440MHz Tx *55/50W (3 pwr steps each band) *Wideband Rx 118-173, 230-549 & 810-999MHz *512 memories *FM narrow capability *104x2 DTCS, 50 CTCSS tone squelch *16 DTMF channels *HM-133 remote control mic *Packet ready for 9600/1200bps-mini DIN or 1200bps-mic socket *Supply 13.8V

ICOM IC-2725E £269 C

The Icom IC-2725 dual band FM transceiver is proving very popular. Easy to install, the controller is separated from the main unit - great where space is limited.

ICOM IC-2100H £229 C

2m 55W FM mobile. Commercial grade, rugged construction. One piece die-cast aluminium chassis. Selectable green or amber display.

YAESU FT-8900R NEW £339 C

Want the best of all worlds then the FT-8900R is just the ticket! A rig with four of the most popular mobile bands - 10m/6m/2m & 70cm. Detachable head.

YAESU FT-2800M NEW £159 C

*144-146MHz *FM *137 - 174MHz expanded Rx *RF Pwr 65/25/10/5W *25/12.5kHz channel spacing. The NewFT-2800M from Yaesu with 65 Watts High Power, rugged construction, excellent receiver performance and direct keypad entry.

YAESU FT-8800E £289 B

Dual Band FM Mobile 50/35W
The FT-8800R series operates as two radios in one, with independant two channel operation.
Remote head mounting capability, wideband receive on VHF & UHF and over 1000 memories.

YAESU FT-7800E NEW £239 C

*2m/70cms Dual Band Mobile *High power 50W 2m /40W 70cms *Wide receive inc. civil & military airband *CTCSS & DCS with direct keypad mic. *Detachable front panel *1000 memories plus five one-touch

We Price Match!
Call 08000 73 73 88

KENWOOD TMD-700E £449 C

Certainly the best 2m/70cm dual band mobile transceiver with APRS. Does not need extra high cost boards to function. The only extra if required is a compatible GPS receiver.

KENWOOD TM-V7E £359 C

Dual-band 2m/70cm.
A lovely cool blue display, easy to read with 50/35W output. 50W/35W plus 280 memos and five storable operating profiles.

KENWOOD TM-G707E £289 C

Dual Band
If you are looking for simplicity and low cost, here's the answer. 2m &70cms with detachable front panel and "Easy operation mode." GREAT!

YAESU VX-7R £299 B

6m/2m/70cm

Available in Silver or Black

The VX-7R is the best outdoor handie ever. The case, keypad, speaker and connectors are all sealed against water damage. Wide Frequency coverage from 500kHz to 900MHz the VX-7R is ideal for monitoring a variety of broadcasts. The display is a dazzling 132x64 dot matrix providing easy-to-read frequencies and information plus pictorial graphics.

YAESU VX-150 £125 B

The VX-150 is a fully featured compact yet incredibly rugged 2m 5W Handheld. Features include direct keypad frequency entry, CTCSS, DTMF, 1750Hz tone calling, wide/narrow deviation selection. It has a die-cast case, large high output speaker, illuminated keypad and battery voltage meter.

YAESU VX-2E NEW £169 B

Dual Band handy, 1.5W (2m) and 1W (70cm). Full DTMF, CTSS and DCS. With 1300 memories and AM/FM coverage 500kHz-960MHz.

ICOM IC-E90 £269 B

The new E-90 offers triple band coverage of 6m, 2m and 70cms. Up to 5W output and rx coverage from 495kHz - 999MHz makes this a very attractive rig.

ICOM IC-T3H £129 B

The IC-T3H 2m handheld features tough quality but with slim looks. Its striking green polycarbonate case has been ergonomically designed. The rig is capable of providing a powerful 5.5W output with either Ni-Cad or Ni-MH battery packs. Supplied with charger and rechargeable battery.

KENWOOD TH-D7E £319 B

DATA COMMUNICATOR

One of the most successful handhelds over the past few years. It has a built-in TNC for Packet use. You can also use it for APRS operation in conjunction with an external GPS unit. Plus NMEA, 200 memos, and up to 5W output.

KENWOOD TH-F7E £249 B

WITH EXTRA WIDE RX COVERAGE
144-146MHz Tx/Rx: FM
430-440MHz Tx/Rx: FM
Up to 6W out with Li-ion battery and "scanner" style coverage from 100kHz to 1300MHz including SSB on receive! This is a great radio to have at all times when you are on your travels.

KENWOOD TH-G71E 199 B

If you want an excellent 2m/70cm dual-bander then you can't go wrong with the TH-G71. Fully functional with three power levels, 200 memories, CTCSS tone encoder/decoder, illuminated keypad and backlit LED.

YAESU VX-110 £119 B

Combining the ruggedness of the VX-150 with the simplicity of 8-key operation, the VX-110 is a fully featured 2m hand held ideal for the most demanding of applications. With its die-cast case, large speaker, and illuminated keypad, it is particularly well suited for most conditions. The VX-110 is a very affordable, rugged and reliable handheld.

Price Match Competitor's goods must be: new, UK sourced via official UK distributors and be in stock. Some competitors items offered may be non-UK compatible, ex demonstration or have no CE or E approval. All our new products come through official sources.

carriage charges:
A=£2.75, B=£6, C=£10

LOWE ELECTRONICS OPEN DAY MATLOCK 10am SATURDAY SEPTEMBER 4TH

Stalls from Icom, Kenwood & Yaesu as well as the spacious Lowe showroom.

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WATERS & STANTON

PRICE MATCH

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VERTICAL ANTENNAS

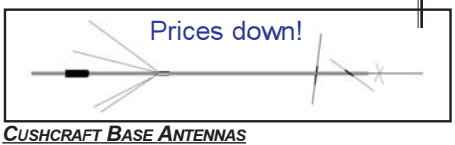
Hustler Mobiles

Get top performance when on the move. Purchase the **MO-3 base** (137cm) for **£24.95** or the **MO-4 base** (68cm) for **£22.95**. Then add the resonator of your choice. **RM-10, RM-12, RM-15**, all **£19.95** ea. **RM-17, RM-20 £24.95** ea. **RM-40 £26.95, RM-80 £29.95**
Carriage £6

Resonator

MA5V Base vertical
No radials needed

Base section
MO-3 or MO-4



CUSHCRAFT BASE ANTENNAS

MA6V *NEW*	20-17-15-12-10-6m 250W PEP	**£269.95**	C
MA5V	20-17-14-12-10m 250W PEP	**£239.95**	C
R8	40-30-20-17-15-12-10-6m 1.5kW	**£469.95**	C
R6000	20-17-15-12-10-6m 1.5kW PEP	**£329.95**	C

DIAMOND CP6 £239.95 C

**Bands: 3.5 -50MHz *Power: 200W *VSWR: Better than 1.5:1*
**Socket: SO-239 *Height: 4.6m *Radials: 1.8m adjustable*

Covers five popular HF bands and the 6m band. Low angle radiation makes it ideal for DX work. Outperforms dipoles for long distance contacts and compares favourably with beams located 10m+ above ground. It doesn't need long wire radials. Adjustable rigid radials, DC return helps the antenna get rid of static noise. Antenna is adjustable for each band.

HARI High quality German traps. (Pairs)
200W 20m £44.95 40m £49.95 80m £53.95
1kW 20m £59.95 40m £64.95 80m £73.95
Carriage £2.75

HARI High quality German Baluns
SO-239200W 1:1, 4:1 or 6:1 £25.95 ea.
1kw 1:1 £34.95 4:1 or 6:1 £41.95 ea
Carriage £2.75

HORIZONTAL BEAMS & DIPOLES

CUSHCRAFT Prices down!

Premier HF beam used around the world by serious DX'ers.

X-7	20/15/10m 7 el. Yagi 2kW	**£669.95**	D

Not got the space for a full sized HF beam antenna, then the mini beam MA-5B should be considered.

MA-5B	10-12-15-17-20m 4 el. Yagi 2kW	**£369.95**	C
A4-S	10-15 & 20m 4 el. Yagi 2kW	**£569.95**	D
A3-WS	12 & 17m 3 el. Yagi 2kW	**£379.95**	D
D-3	10-15-20m dipole element 2kW	**£249.95**	C

Don't want a wire antenna but can't fit a Yagi, then consider a rotatable dipole.

D-3W	12-17-30m dipole element 2kW	**£249.95**	C
D-4	10-40m dipole element 2kW	**£349.95**	C
D-40	40m dipole element 2kW	**£319.95**	C
TEN-3	10m 3 el. Yagi 2kW	**£229.95**	C
ASL-2010	13.5-32MHz 8 el. log periodic	**£749.95**	C

RADIO WORKS

A choice of quality wire antennas available to fit almost any circumstances. Prices down!

CW-160	160-10m 76.8m long	**£129.95**	C
CWS-160	160-10m 40.5m long	**£119.95**	C
CW-80	80-10m 40.5m long	**£89.95**	C
CWS-80	80-10m 20.1m long	**£109.95**	C
CW-40	40-10m 20.1m long	**£84.95**	C
CW-20	20-10m 10.36m long	**£89.95**	C
CW-620	20-6m 9.7m (32ft) long	**£89.95**	C
G5RV PLUS	80-10m with balun 31m (102ft) long	**£59.95**	B

SGC's Unique Portable Auto Tuner

Self Powered 160m - 10m

SG-211 Smart Tuner

This is a revolutionary Auto ATU. Not only does it match virtually any antenna, it is self powered from 4 x AA cells that last for ages - well over a year. Zero state relays mean no current drawn unless actually tuning. And coming from an established pedigree, you can be assured of top performance. With its 256 memories it tunes like lightning and can handle impedances from 03 - 5000 Ohms and VSRs as high as 10:1. If you are a portable enthusiast, then this is for you. Just a single coax line back to your radio and no external DC needed. Now that really is a Smart Tuner!

Can run on 4 x AA cells for up to Five Years!

1W to 60W PEP
Zero State Relays
Dipoles, wires and whips
Open Line feeder
LED Status Indicators

£189.95 C

No other model comes near it

First shipment sold out before we advertised it!

Zero Space - - DX Antennas

From Hustler USA

Run full legal power - 80m to 10m - with no masts or guys to worry about. 50 Ohm feed.

Small garden, planning problems or similar restrictions? Then the Hustler range is the answer. These HF verticals will take 1kW of power, work at ground level, and are self-supporting. A single earth rod will get you going. Add buried radials for even better results. Many hams have got on the HF bands with just this simple system. So why not join in the fun. These are rugged, well-built antennas that American hams have been using for years. Now they are available in the UK from our three stores.

4BTV
40-20-15-10m. 6.52m high. Full band coverage.
£149.95 C

5BTV
80-40-20-15-10m. 7.64m high. Full band coverage (100kHz on 80m).
£179.95 C

6BTV
80-40-30-20-15-10m. 7.3m high. Full band coverage (100KHz on 80m).
£209.95 C

WATSON FC-130 FREQUENCY COUNTER £59.95 B

**1MHz-3GHz *Impedance 50 Ohms*
**LCD readout *10-digit display*
**16 segment bargraph*
**BNC Whip Antenna*
**Black anodised case *Internal Ni-Cads*
**600mAH *6 hours operation*
**AC charger *9V DC 300mA*
**68 x 80 x 31mm*240g*

WATSON HUNTER FREQ. COUNTER £49.95 B

**10MHz-3GHz *Impedance 50 Ohms*
**LCD readout *8- digit display*
**BNC Whip Antenna*
**Black anodised case *Internal Ni-Cads*
**AC charger *9V DC 300mA*
**68 x 80 x 31mm *210g*

PORTABLE ANTENNAS

MIZUHO (FOR FT-817)

ATX-WBN	Walkabout 80-6m Whip 1.5mBNC	**£44.95**	B
ATX-WPL	Walkabout 80-6m Whip1.5mSO-239	**£44.95**	B
ATX-W38	Walkabout 80-6m Whip 1.5m 3/8in	**£44.95**	B

New Low price on Walkabout whips, three to choose from with three different connectors.

AT-80	Single band 80m whip with BNC	**£19.95**	A
AT-40	Single band 40m whip with BNC	**£19.95**	A
AT-30	Single band 30m whip with BNC	**£14.95**	A
AT-20	Single band 20m whip with BNC	**£14.95**	A

Range of single band HF antennas with BNC connection. Ideal for FT-817.

AT-17	Single band 17m whip with BNC	**£14.95**	A
AT-15	Single band 15m whip with BNC	**£14.95**	A
AT-12	Single band 12m whip with BNC	**£14.95**	A
AT-10	Single band 10m whip with BNC	**£14.95**	A

Check our website for more info - www.wsplc.com

RSGB matters

RADIO SOCIETY OF GREAT BRITAIN

THE NATIONAL SOCIETY WHICH REPRESENTS UK RADIO AMATEURS

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

Patron: HRH Prince Philip, Duke of Edinburgh, KG, KT

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

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Details of the Society's volunteer officers can be found in the RSGB Yearbook 2004

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Board and National Council elections for 2005 - first call

In the elections for the Board and Regional Council members later this year there will be the following vacancies:

The Board (3 vacancies)

Gordon Adams, G3LEQ, retires after a period of six years on the Council and Board and is ineligible to stand for re-election. There are two further vacancies outstanding from 2004.

Regional Elections

Elections will be held in the following regions:
Region 3 - North West, Regional Manager has completed 3 year term of office
Region 4 - North East, Regional Manager has completed 3 year term of office
Region 6 - North Wales, Regional Manager has completed 3 year term of office
Region 10 - South and South East - Vacant
Region 12 - East and East Anglia, Regional Manager has completed 3 year term of office
Region 13 - East Midlands - Vacant.

At the present time there are co-opted Regional Managers serving in the following regions:
Region 10 - South and South East
Region 13 - East Midlands.
These appointments cease on 31 December 2004. The Regional Council therefore has six vacancies.

Members of the Society who wish to stand for election need to obtain the nominations and supporting signatures from at least 10 corporate members of the Society. Forms for this purpose are available from the General Manager. For the Regional vacancies, candidates are reminded that they must reside in the relevant region. The formal notification of the vacancies will be included in the September edition of *RadCom* and voting papers will be enclosed in the November 2004 edition.

7MHz EXTENSION

Following further talks with Ofcom it is anticipated that the 100kHz extension to the 40m band as agreed at WRC03 will come on stream at the end of October. This will extend the current frequency allocation in the band from 7000 - 7100kHz to 7000 -7200kHz.

RSGB HF & IOTA CONVENTION

This year's event takes place over the weekend of Friday 22 to Sunday 24 October at the Europa Hotel, Gatwick. If you haven't been before you need to know that it is *the* major event of the year for radio amateurs, newcomers and 'old hands' alike, who are interested in meeting others to share their experiences about operating on the LF and HF bands, constructing equipment or to discuss matters concerning the technical aspects of the hobby. Three lecture streams are planned along with an exhibition area that will include stands by Yaesu UK, Martin Lynch & Sons, RSGB (the event's principle sponsors), and an HF station. The latter will feature Yaesu's current range of state-of-the-art equipment. Newcomers to amateur radio and / or HF are also very central to the event - this year, in addition to a range of lectures aimed at the newcomer, planning is well underway to conduct assessments / exams for all three grades of amateur licence. There will also be an opportunity for all to have their Morse proficiency assessed!

It's always difficult to pick programme highlights but in addition to presentations on the 3B9C, 7Q7MM, TJ3G and T33C DXpeditions, and Logbook of the World, the event has some special features to mark IOTA's 40th anniversary year. This includes a presentation on major new developments to the IOTA programme, talks on the Maniitsoq Island, Greenland, operation, and a chance to see the videos of the recent visits to

At last year's HF Convention.

three islands off Australia: VI3JPI, VI5WCP and VI5BR. It is rumoured that some secrets from the IOTA database will also be revealed!

A small selection from the other streams includes a range of topics concerning 136kHz, talks by *RadCom* columnists Peter Dodd, G3LDO, and Steve Hartley, G0FUW, as well as a further chance to participate in an Internet videoconference about the Elecraft K2, with Eric, WA6HHQ, from his shack in California. Plans are also under way to deliver a major BBC-style 'Question Time' session on PLT.

For further information check the website at www.rsgb.org/hfc or e-mail hfc@rsgb.org.uk

FRIEDRICHSHAFEN 2004

The RSGB manned a large stand at the 'Ham Radio' show at Friedrichshafen, Germany, which took place from 25 to 27 June. For many European amateurs, 'Ham Radio' - which is the largest amateur radio exhibition in Europe - provides a unique opportunity for them to look at (and buy) RSGB books and other merchandise. The following RSGB members signed-in at the stand:

Wim Louwentahl, DJ0PM; Gunter Pesch, DJ2XB; Wolfgang Gellerich, DJ3TZ; Hans-Georg Goebel, DK1RV; Brian Fitzsimmons, G0GGM; J Barlow, G0LBW; Colin Smith, G0LIN; J Worsnop, G0SNV; W Daly, G0SXA; Paul Steed, G0VEP; Doug Roberts, G0WMW; Ann Webber, G1PRM; Andy Chadwick, G3AB; John Ickringill, G3HHU; Roger Brown, G3LQP; RAE Fronius, G3MCW; Jim Leviston, G3NFB; John Pethard, G3PNJ / DJ0MBK; Keith Khan, G3RTU; David, G3UNA; Dave Aldridge, G3VGR; John Kelly, G3YGG; Barry Hitchins, G4CTU; Phil Hart, G4JSM; Gerry Birkhead, G4KOQ / EI9DZ; Gordon Carter, G4SCI; Justin Snow, G4TSH; Rupert Bullock, G4XRV; G Reid, G4YRU; Graham Reid, G4YRU / 9G1YR; Lionel Parker, G5LP; Brain Cooper, G8DLM; John Ray, G8DZH; Phil Webber, G8KLC; Reg Woolley, G8VHI; Brian McMahon, GI4KEQ; Norman Hughs, GI4SZP; P G Mercer, GI4VIV; M J Eccles, GM3PPE; Rob Ferguson, GM3YTS; Tom Wylie, GM4FDM / T33TW; Koos Scheffer, GU0GUX; David Henry, GU0HRY; B Ayres, GU1HTY; Glyn Jones, GW0ANA; John P G Jones, GW3IGG; Philip A Jones, GW4HAT; Simon Brown, HB9DRV / GD4ELI; M Codebo, I1CMA; C Messina, I5XWW; W Smith, K1QS; Dave Smith, K1ZZ; Paul Whitely, M0PDW; Paul Whiteley, M0PDW; Peter Clifford, M0PTR; Frank Priborsky, M1FEM; D Sumner, M1SUM; S A Reid, M5AAS; Alan Thompson, MM1EQE; Nathan Thomas, MU3NTH; J Palmquist, SM5FUG; Chris Slomczynski, SP5HS; Andy Kaleta, SP6GVU; Tim Ellam, VE6SH / G4HUA; Bill Hempel, VK4LC / G4BAW; Graham Whiteside, VK5GW.

All set up and ready to go: the RSGB stand at Friedrichshafen - before the hordes descended!

IOTA 40th BIRTHDAY CELEBRATIONS AT FRIEDRICHSHAFEN

Saturday 26 June saw the IOTA 40th anniversary boat trip on Lake Constance in Germany. Organised by the RSGB IOTA Committee, the *Königin Katharina* left Friedrichshafen harbour at 7.30pm with 130 party-goers on board. The array of international island hunters was welcomed with speeches by Martin Atherton, G3ZAY, and Roger Balister, G3KMA. After a spectacular buffet dinner including a cake celebrating the 40th anniversary, live music was struck up for the remainder of the trip. G3ZAY laid on various 'island' party games for the return trip, including a fiendish anagram of island names quiz, particularly difficult for those whose first language is not English. The boat finally docked at 11.00pm and discharged the very happy (merry) and well-satisfied trippers into the warm German night.

Just part of the spread awaiting IOTA 40th birthday party-goers on board the *Königin Katharina*.

MORE ON PLT

The ARRL has announced that a PLT Broadband trial at Cedar Rapids, Iowa, has been shut down by the utility company operator following complaints of interference by Jim Spence, W0SR, and other amateurs. The ARRL took up the complaints with the FCC and as a result the trial was shut down.

In recent months, we have tried to alert the membership to the potential threat of PLT to amateur radio and the HF spectrum. It may be that in doing this we may have caused a few of our members immediately to suspect PLT every time they have an apparent EMC problem. In fact, as things stand at the moment, the chances of any member hearing PLT noise on reception are almost negligible. Tests on PLT are only taking place in a few small isolated areas and, as far as we know, there are currently only a handful of radio amateurs who could be affected. In the meantime Broadband will soon be available at over 90% of locations in the UK through the BT network, so the case for investment in PLT in most areas must appear less attractive.

As set out in the article 'The RSGB and Power Line Telecomunications (PLT)' (see page 40), the RSGB EMC Committee and others are working extremely hard on the PLT issue, and it is clear that these efforts have had an impact on the thinking of the standards organisations and the other parties involved. Members can be assured that these efforts will continue to defend the amateur bands and the HF spectrum against any threat, whatever the source.

Angus Annan, MM1CCR,
Chair EMC Committee,
Board Member:
Environmental Portfolio

COMPETITION WINNERS

The lucky winner of the West Mountain Radio RIGblaster competition run in the May *RadCom* is Mr S Edwards, G4GPY, of Beverley, E Yorks, who wins a RIGblaster Pro donated by West Mountain Radio and Waters & Stanton plc. The runner-up is Mr T Lambert, G8EZL, of North Shields, Tyne & Wear, who wins a RIGrunner. Apologies for omitting news of the prize winners in last month's *RadCom*.

NEW DRRM IN WEST MIDLANDS

Mike King, G8XDX, has been appointed as Deputy Regional Manager for District 53, Hereford and Worcester. He will be a valued addition to the regional team, supporting members and clubs in Herefordshire and Worcestershire. His details are: Mike King, G8XDX, 52 Falkland Road, Evesham, Worcs WR11 1XF; tel: 01386 40874; Mobile: 07733 331 663; e-mail: michael.king@btinternet.com

WANTED: DEPUTY REGIONAL MANAGER

If you are passionate about the future of amateur radio and are an RSGB member with some spare time, there is a vacancy for the voluntary post of Deputy Regional Manager in District 54, Gloucestershire & Warwickshire. If you are interested in joining the regional team please telephone the RSGB Regional Manager, Roy Clarke, G8AYD, on 01952 820 838 or e-mail:g8ayd@rsgb.org.uk

CONGRATULATIONS!

Congratulations go to the following RSGB members who successfully upgraded from **Foundation to Intermediate** licence following the exam on **21 June**:

David Hamby, M3EIV; John Mallinson, M3BGH; David White, M3RGO; Kevin Newton, M3KWN; Anthony Al-Naqib, M3FVD; Christopher Pomfrett, M3FUH; Roy Bonney, M3FUO; Brian Gutteridge, M3MZB; Robert Killington, M3NZU; Caroline Drummond, M3LUV; Raymond Heming, M3VJH; Kent Royce, M3KNT; John Egleton; Peter Crewe, M3EWD; Ronald Cunliffe, M3ERC; Terry Winyard, M3FYB; Stephen Henson, M3KNC; Darrall Allcote, MD3ACB; David Ali, MD3NOT; Anthony Roberts, M3GNP.

And following the Intermediate exam on **29 June**: John Hann, M3EBO; Barbara Ramsdale, M3FYI; Clive Ramsdale, M3FZM; Richard Townley, M3HAX; Patricia Holland, M3BIH; Andreas Macrides, M3FXB; Roy Wilkes, M3DIO; John Greenway-Brown, M3JGB; Malcolm Frame, M3MCF; Geoffrey Taylor, M3DZB; Richard Lacey, MW3FEF; Michael Ronan, M3KNB; Elwyn Edwards, MW3FHJ; Simon Smith, MW3CUR; Anthony Pegg, M3BHA; Bryan Moore, M3FNV; Simon Warren, M3FPR; Jens Hougaard, M3YEN; Simon Jenner, M3DSU; Mark Isaacs, M3EQK; Louis Wellington, M3LSW.

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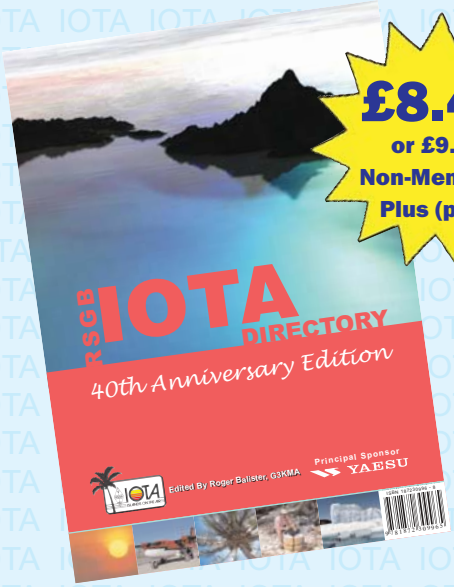

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IOTA DIRECTORY

This 40th Anniversary Edition builds on the extensive data revision seen in recent years. Fully updated, it provides the only complete, official listing of IOTA islands available, with the many recent changes. The Directory lists all islands that qualify for IOTA, grouped by continent, and indexed by prefix. It also details the award rules, and includes application forms and masses of information and advice for island hunters and intending award applicants and DXpeditioners alike. This edition also contains for the first time for several years some "Yearbook material" and is a must-have book for every island chaser.

IOTA MERCHANDISE

To celebrate the 40 years of IOTA the RSGB has produced some high quality limited edition items. These goods are only on offer for a short time and will only be available until stocks are exhausted. We recommend that you purchase early to avoid disappointment.

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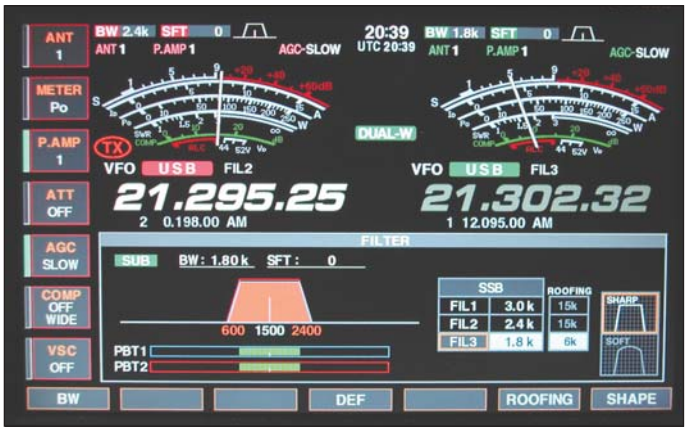
Special arrangements exist for blind and disabled persons. Details and membership application forms are available from RSGB HQ.



p18 – Peter Hart reviews the Icom IC-7800 'super radio'

p83 – A Morse code speed calibrator

New amateur radio satellite to allow communications using handhelds

Oscar 51 launched successfully

At 0630UTC on 28 June the AMSAT *Echo* amateur radio satellite was successfully launched from the Baikonur Cosmodrome in Kazakhstan. It has now been given the name AMSAT Oscar-51 (AO-51). Telemetry from AO-51 can be received on 435.150MHz FM. The 10in-square microsat, equipped with a transmitter capable of up to 7W output, will allow voice communications using handheld FM transceivers.

There will be a presentation on AO-51 at the AMSAT-UK Space Symposium (www.uk.amsat.org) which is being held from 30 July to 1 August at the University of Surrey, Guildford. This event is open to all radio amateurs and SWLs and for further information contact the AMSAT-UK secretary, Jim Heck, G3WGM, tel: 01258 453959; e-mail: g3wgm@amsat.org

♦ For the first time an astronaut and a cosmonaut have been on the air simultaneously from both of the ARISS operating positions on the Space Station. Astronaut Mike Fincke, KE5AIT, operating as NA1SS, made about 60 contacts on 2m during the ARRL Field Day on 26 / 27 June, while Expedition 9 Commander Gennady Padalka, RN3DT, operated on 70cm as RS0ISS. (*ARRL*)

♦ Entries are invited for the AMSAT-UK 'Notable Event' Competition, the aim of which is to get ideas from the international amateur radio satellite community for a series of special-issue stamps to be released by the Royal Mail. Full rules for the competition are available from AMSAT-UK secretary Jim Heck, G3WGM. Entries must include a graphic which should be an original design, a picture or a photograph, and should either be in the public domain, or one that the copyright owner is likely to give permission for publication. The closing date for entries is midnight on 31 July.

AMSAT-NA president Robin Haighton, VE3FRH, with Oscar-51 just before launch.

BWBF launches new radio

The British Wireless for the Blind Fund (BWBF) launched a new radio to be supplied to the blind and visually impaired at a reception in London on 22 June. The 'Symphony' radio, which incorporates CD and cassette players, was designed by Roberts Radio to a brief from the BWBF over a period of two years and at a cost of £1m. The set, which is charcoal coloured with bright yellow controls for ease of use by the visually impaired, incorporates a CD 'bookmark' facility. Margaret Grainger, ex-G7SXD, the BWBF Chief Executive, explained that this unique feature allows users to stop the recording, go to the radio, and later continue the CD at the same point they left off. "Blind people will now be able to put their 'book' down and pick it up whenever they wish, without having to start at the beginning of the CD each time", she said. The LW, MW and VHF radio also incorporates an audible tuner using a variable frequency tone - the higher the frequency the higher the tone - making frequency finding easier for blind listeners. It is hoped that the radio will also be made available to the general public at a cost of about £140. Roberts Radio has been adapting radios for the blind for over 40 years.

BWBF is a registered charity (No. 1078287) and depends on donations to carry out its work. Radio amateurs can help by participating in the 'Transmission 2004' event which will take place on 25 / 26 September. Full details appear in the BWBF advertisement on page 76.

The new BWBF / Roberts Radio 'Symphony' set.

Raynet fire evacuation standby in North Lancs

Chas Warr, G0AWM, Lancashire County Raynet Controller reports that North Lancs Raynet and Central Lancs Raynet were put on stand-by on 11 June, by Lancashire County Emergency Planning because of a fire at a scrap yard in Morecambe. The Groups were on stand-by from 1015 to 1524. The fire started in the early hours of the morning and during the day local residents were advised to stay indoors because of the fumes, which could be smelt two to three miles away. There was a possibility that local residents would be evacuated to a rest centre if the fire became worse, but in the event, this proved not to be necessary.

Marlon Brando, KE6PZH / FO5GJ, Silent Key

World-famous Hollywood star Marlon Brando died on 1 July at the age of 80. What was perhaps less well known was that Marlon Brando was a licensed radio amateur, listed in the FCC (US licensing authority) database under the name of Martin Brandeaux. He held a General class licence with the callsign KE6PZH at his Beverly Hills home, but had been more active in the past as FO5GJ from his own private island in French Polynesia. In the week following his death CNN rebroadcast an edition of 'Larry King Live' in which Brando had given a rare interview to King in 1994. Answering a telephone caller he confirmed that he was still interested in amateur radio, adding that it gave him the chance to "just be myself".

Marlon Brando, KE6PZH / FO5GJ, Silent Key.

NEWS BRIEFS

- The International Lighthouse and Lightship Weekend (http://illw.net) takes place this year on 21 / 22 August. There's still time for you or your club to take part in this event which, last year, saw 369 stations participating from lighthouses and lightships in 48 countries around the world. If you plan to take part from a lighthouse or lightship you are asked to register on-line with the organisers at http://illw.net/2004_list.htm
- Ian White, G3SEK, of 'In practice', has pointed out that the Gigavac company in the USA, makers of vacuum relays, are offering selected lines at reduced prices to radio amateurs, in recognition of amateurs' public service and contributions to emergency preparedness. Details are on their website at www.gigavac.com This is a good opportunity to thank also Maxim and Analog Devices, who have decided to make their semiconductor products available to amateurs through their samples programmes.
- Paul Berkeley, M0CJX (RSGB Regional Manager for Region 9, London and the South-East), reports that several members have received requests from an individual representing a radio club in Bangladesh that he be sent copies of their licences, supposedly for the purpose of modelling the Bangladesh licence on the UK format. Paul suspects that the person has made many such requests and believes this to be a scam.
- We are aware of the following countries that have dropped the Morse code test as a requirement to obtain an HF amateur radio licence: UK, Switzerland, Belgium, Germany, Norway, the Netherlands, Ireland, Singapore, Luxembourg, Papua New Guinea, Denmark, Hong Kong, Australia, Finland, France, Sweden, Kenya, New Zealand. Austria has also announced its intention to drop Morse code tests, but when the change will be implemented is not yet known.

SOTA news

Two more amateurs have achieved SOTA (Summits On The Air) 'Mountain Goat' status in recent weeks. The second 'MG' was John Earnshaw, G4YSS (usually active with the Scarborough club callsign GX0OOO/P), who reached the landmark on England's highest peak, Scafell Pike G/LD-001, on 9 May. He was followed by Shirley Smith, MW0YLS, who sprinted to MG status with high-scoring activations in Scotland and the Lake District. However, it was on her local one-point summit, Hope Mountain (GW/NW-062) that Shirley became a 'Mountain Goat' on 13 June. John and Shirley follow Alan Poxon, M1EYO, who became SOTA's first MG back in January.

In recent weeks, no fewer than 12 'Shack Sloths' have been awarded. 'Shack Sloth' is the title for those who achieve 1000 points in the Chaser section of the SOTA award. The first 'Shack Sloth' was Keith Mahood, G0OXV, who was followed by: Rob Hannon, G4RQJ; Graham Taylor, G4JZF; John Clifford, GW4BVE; Shirley Smith, MW0YLS; Don Bryant, G0NES; Tom Read, M1EYP; Steve Green, G1INK; Pete Wesley, M0COP; Ken Dons, GM0AXY; Alan Poxon, M1EYO, and - the youngest of the bunch - Sam Jones, M0SJJ. Shirley, MW0YLS, and Alan, M1EYO, have attained both the Shack Sloth and Mountain Goat status: many chaser points towards the Shack Sloth award have been gained while out on a mountain, making summit-to-summit contacts.

Shirley, MW0YLS, on Hope Mountain (GW/NW-062).

The popularity and rate of progress of the SOTA chasers section has been far higher than anything originally envisaged when the award was first launched. For more details about SOTA, see July 2004 *RadCom* page 47.

RAFARS mobile radio weekend at Windermere

The Royal Air Force Amateur Radio Society (RAFARS) is organising a radio-themed event at the Windermere Steamboat Museum over the weekend of 7 / 8 August. The theme is the use of mobile radio in the Lake District, in both professional and amateur hands. It is hoped that there will be participation from Radio Cumbria, with an outside broadcast on at least one of the days from the museum site. The police, fire, and ambulance services have also been asked to display their vehicles and equipment, together with mountain rescue teams and army and cadet forces from the area.

GB0RAF will be on the air using the facilities of the permanent special event station in the museum grounds. It is hoped that as many radio amateurs as possible will join in by bringing their mobile and portable stations along for the weekend, or by making contact with GB0RAF. A keen ear will be kept open for low-power stations operating from sites around the lakes under the 'Summits on the Air' scheme. Further details from Roy Walker, 2E1RAF, e-mail: 2e1raf@thersgb.net

Special prefixes for Athens Olympics

Radio amateurs visiting Greece this summer may use special callsigns in order to celebrate the Athens Olympics. From 1 August until 15 September amateurs from CEPT countries (including the UK) may use the special prefix J42004 before their callsign, for example J42004/M0XYZ. Alternatively, instead of your own callsign, you may use a combination of up to three letters after the special prefix, for example J42004W or J42004GGG, and supply the Ministry of Transport and Communications (Dept of Communications Control, 2 Anastaseos & Tsigante Str, 11510 Holargos, Athens, Greece, tel: +30 210 650 8555) with written notification of the callsign chosen. The Ministry will not verify the written notification unless there is a conflict with the special callsigns. The Radio Amateurs Association of Greece (www.raag.org/index_en.html) says that it will be pleased to help visitors while in Athens and that the club station at its headquarters is available for use.

UNESCO declares radio station World Heritage site

On 2 July SAQ, the Alexanderson alternator VLF transmitter at Grimeton in Sweden, was declared a World Heritage site by UNESCO. The decision was made by the World Heritage Committee of UNESCO at a meeting near Shanghai in China. The procedure turned out to be more dramatic than the Swedish representatives could have dreamt of: several delegates on the committee did not realise that Grimeton was a unique telegraphy station, but instead thought that it was an 'ordinary' broadcast station. However, once Grimeton's precise nature was explained the decision to name Grimeton a World Heritage site was made unanimously.

SAQ continues to make occasional CW transmissions using the Alexanderson alternator on 17.2kHz. The last such transmissions took place on 4 July, when news of the UNESCO decision was broadcast.

Albanian DX Convention

The first Albanian DX Convention took place in Tirana over the weekend of 19/20 June and was attended by over 60 amateurs from around 10 countries, including all 39 new Albanian licensees who gained their tickets during last winter's 'Project Goodwill Albania' (see *RadCom* March 2004).

Those attending the convention were able to operate the special callsign ZA1DX and Nigel Cawthorne, G3TXF, alone made around 2000 CW QSOs during his short stay in the country. Nigel gave a presentation on amateur radio contesting. Roger Brown, G3LQP, representing the RSGB, also gave a short talk at the convention. The weekend also saw the official opening of club station ZA1UT at the University of Tirana. Vertex Standard (Yaesu) donated 10 new transceivers, one for the new club and the others to selected students. Not so very long ago there were no radio amateurs in Albania at all. Roger, G3LQP, added, "I reckon we have sown enough seeds for progression now. I hope that they will grow quickly in the future."

Club and Regional News

1 Scotland West & Western Isles

KILMARNOCK & LOUDOUN ARC
1, 'Planning permission', Len GM0ONX. Len, GM0ONX, 01563 534383.

2 Scotland East & the Highlands

COCKENZIE & PORT SETON ARC
13, Junk night, money raised donated to British Heart Foundation.
21, 22, Lighthouse Weekend, Barnes Ness. Bob, GM4UYZ, 01875 811723.

3 North West

SOUTH MANCHESTER R & CC
6, VHF night on air.
13, Computer clinic.
20, The club CD, Dave, G0BJK.
27, 'Constructing the Caterham 7', Chris, G8APB. Ed, 0161 969 1964.
STOCKPORT RS
3, 'Oscillators, synthesis and all that stuff, Roland, G8LUL.
17, Practical skills, final preparation for SSB Field Day. David, M1ANT, 0161 456 7832.
THORNTON CLEVELEYS ARS
2, On air.
9, Video evening.
16, Logging programs.
23, Club quiz.
30, No meeting. Jack, G4BFH, jack.duddington@btinternet.com
WARRINGTON ARC
3, Mini talks by club members.
10, Quiz night.
31, 'Super-regenerative receivers', Jim, G3NFB. John, G0RPG, 01925 762722.

4 North East

GOOLE R & ES
11, Social evening at The Black Swan, Asselby.
18, Treasure hunt.
25, Social evening, planning. Richard, G0GLZ, 01405 769894.
HALIFAX & DARS
17, Video evening. Tom, M0TKA, 01484 715079.
KEIGHLEY ARS
5, Social evening.
12, 19, On air.
26, RSGB, Geoff Darby. Kath, G0OSA, 01535 656155.
SHEFFIELD ARC
7 - 15, Yorkshire Jamboree Scout event at Hesley Woods
7 to 15 August.
9, VHF radio.
23, HF radio.
30, No meeting, August Bank Holiday. Nick, G4FAL, 0114 255 2893.

5 West Midlands

CHELTENHAM ARA
6, Amateur Radio Observation Service, Barry Scarisbrick, G4ACK. Ron, G3SZS, 01452 713761.
COVENTRY ARS
6, 13, On air, beginners class, CW practice.
27, Preparation for Town and Country Festival.
28, 29, 30, Town and Country Festival special event. John, G8SEQ, 024 7627 3190, johng8seq@ntlworld.com
GLOUCESTER AR & ES
2, Visit to bookshop.
30, /P from escarpment site. Tony, 01452 618930 office hours.
KIDDERMINSTER & DARS
3, 'Radio in Emergency Planning', Bob, G8IYK, County Emergency Planning. Tony, G1OZB, 01299 400172.
SALOP ARS
5, 4th 2m 'foxhunt'.
26, Equipment calibration night. John, G0GTN, 01743 249943.
ST LEONARD'S ARS
12, Supper at Sanam's. Derek, G0EYX, 01785 604904.
TELFORD & DARS
4, Open evening, HF on air.
11, Oscilloscopes: how they work and are used, M1RKH.
18, Rally preparations.
25, Quiz, G3JKX. Mike, G3JKX, 01952 299677, mjstreetg3jkx@aol.com

6 North Wales

CONWY VALLEY ARC
4, 'Zeppelin Spies', Colin Lathem. Wynne, GW6PMC, 01745 855068.
WREXHAM & DARS
3, ZL9CI Campbell Island DXpedition video.
28, BBQ, members only. Mark, MW3MDH.

7 South Wales

ABERYSTWYTH ARC
1, 'Party on the Hill' celebrating the 108th Anniversary of the Cliff Railway. Ray, mwmg01@aber.ac.uk

8 Northern Ireland

No club details received.

9 London & Thames Valley

AYLESBURY VALE RS
11, Discussion evening, on air. Roger, G3MEH, 01442 826651, roger@g3meh.fsnet.co.uk
COULSDON ATS
9, BBQ at home of Prue, G4RWW. Steve, G7SYO, 01737 354271.
CRYSTAL PALACE R & EC
6, Wavemeters and practical workshop. Bob, G3OOU, 01737 552170 or Victor, G1PKS, 020 8653 2946.
NEWBURY & DARS
25, Distant Early Warning System, G4JAL. Kevin, G6FOP, 01635 826397, g5xv@ntlworld.com
READING & DARC
12, Natter night at Woodford Park. Pete, G8FRC, 01189 695 697, www.radarc.org
SOUTHGATE ARC
12, Club BBQ. Mike, M0ASA, 020 8366 0698.
SURREY RCC
2, Construction contest (note new date). Ray, G4FFY, 020 8644 7589.
SUTTON & CHEAM RS
19, 'Oscilloscopes', Martin, M1MRB. John, G0BWV, 020 8644 9945, info@scrs.org.uk

10 South & South East

BASINGSTOKE ARC
29, ADRF 'foxhunt'. Frank, M0AEU, barc@2lo.info
FAREHAM & DARS
4, On air.
11, 'How does it work? The rechargeable battery', Pete G8TXK.
18, 'The old class B on HF; a year on'.
25, Another quiz evening, Pete, G8TXK. Steve, G7HEP, 01329 663673.
FARNBOROUGH & DRS
11, Microwaves, Colin, G8BCO. Norman, G0VYR, 01483 835320.
HASTINGS E & RC
18, World Satellite. Peter Firman, G0FUU, 01424 432418, Peter.Firmin@virgin.net
HORNDEAN & DARC
1, Coach trip to Bletchley Park.
3, Social evening.
24, 'Operating on the microwave bands', Brian, G4NNS. Stuart, G0FYX, 023 9247 2846.
HORSHAM ARC
5, 'Computing', Gavin, G7DFV. David, G4JHI, 01403 252221.
WORTHING & DARC
4, Quiz.
11, Planning for lighthouse weekend.
18, Signals from Newhaven Fort.
21, 22, GB8SL special event at Shoreham Lighthouse.
25, Operating your station. Roy, G4GPX, 01903 753893.

11 South West & Channel Islands

APPLEDORE & DARC
16, Quiz, radio related subjects, Mike, G4NCU, John G4NUB. Brian, M0BRB, brian.jewell@ic24.net
CORNISH RAC
5, Antenna night.
9, Computer section. John, G4LJY, 01872 863849.
EXMOUTH ARC
4, 'SETI', Tony, M0THJ.
18, The 31 Set, Steve, G0ETZ. Mike, G1GZG, 01395 274172.

SOUTH BRISTOL ARC
4, Computer & Software Clinic.
11, BBQ, Fred, G7LPP.
18, Summer darts match.
25, On air. Len, G4RZY, 01275 834282.

SOUTH DORSET RS
8, Wimborne Hamfest.
21, 22, North Fort lighthouse event. Carol, 2E1RBH, 01305 820400, carolonfraggle@tiscali.co.uk

WEST SOMERSET ARC
3, Field day (possibly a site visit to Wessex Water, Porlock. Jean, G0SZO, 01984 633060.

WESTON-SUPER-MARE ARS
2, Show & tell evening. D Welch, G0ATD.

12 East & East Anglia

CAMBRIDGE & DARC
13, Network Analysers, Mike, M0BLP.
27, Visit Milton Microbrewery. Ian, G4AKD, 01954 782974.

CHELMSFORD ARS
3, G0TRM's Table Top Sale. Colin, G0TRM, 01245 223835, colinpage@ukgateway.net

FELIXSTOWE & DARS
8, HF activity day, in fields behind Orwell Park School.
23, New RSGB promotional video & talk. Paul, G4YQC, paul.whiting@bt.com

HARWICH ARIG
11, Video evening. Tony, G4EYE, 01255 886065.

NORFOLK ARC
4, SSB + Gala Day: what an opportunity!
11, Restoration of vintage radios, Brian, M1JLM.
18, SSB contest / Gala Day briefing.
25, Members' car boot & tabletop radio sale. Reg, G0VDO, 01603 429269.

13 East Midlands

EAGLE RADIO GROUP
10, Survival at sea in an emergency situation, Colin Higgins Jnr. Terry, G0SWS, 07979 733640.

LEICESTER RS & CC
2, Tidy up / painting.
9, Video, night on air.
16, RSGB & IOTA, Ken Frankcom, G3OCA, RSGB Regional Manager.
23, Video, construction, on air.
30, Bank holiday social (bring a friend). Tom, G1IUT, 0116 286 3949, tomchristmas@ukonline.co.uk

LOWESTOFT & DISTRICT & PYE ARC
14, 15, Establishment of station in Kessingland Lighthouse, GB2KLH. David, G3OEP, 01493 662323.

RAF WADDINGTON ARC
12, Cold war & gadgets, Mike, M1MSF. Martin Farmer, M3MDF, martin@farmer4.freeserve.co.uk

SOUTH NORMANTON, ALFRETON & DARC
2, Talk at village hall.
9, Family night at Hardwick Hall & Inn, details TBA.
16, Junk sale at village hall, all donations welcome.
19, ARCON simple equipment 'foxhunt', SNADARC members invited.
23, On air.
30, Bank holiday, on air. Mike, M0RMJ, 01949 876523, mike.jeffs@ntlworld.com, www.qsl.net/snadarc

Items for club news should be sent to the *RadCom* Office at HQ to arrive by the 26th of the month, ie approximately a month before publication (eg 26 January for the March Issue). News items should be sent in writing (fax, letter or e-mail: gb2rs@rsgb.org.uk) by the club secretary or the person responsible for publicity. Post cards for this purpose are available from RSGB HQ. A database of all meetings is shared between *RadCom* and GB2RS, so information only needs to be sent once.

FIRST INTERMEDIATE COURSE AT STEVENAGE

RadCom editor Steve Telenius-Lowe, G4JVG, recently had the pleasure of presenting course completion certificates to six members of the Stevenage and District Amateur Radio Society (SADARS - www.sadars.org) who had taken the club's first Intermediate licence course. Over the last two years, no fewer than 66 members of the general public have become M3 licensees through the Foundation courses held at SADARS. The recent Intermediate course was for existing members only and was taken up by six of the club's Foundation licensees, all of whom passed the exam and are now awaiting their 2E0 call-signs. Ken Blanshard, M0KPB, of SADARS said: "Our thanks go to the Chelmsford club for assistance by providing a very good *PowerPoint* CD; Steve Hartley, G0FUW, for the mock exam discs; Catherine and Kelly at RSGB HQ for answering endless questions and providing clarifications on certain matters; not forgetting those members of the club who gave up their valuable time for instructing and, finally, Steve, G4JVG, for agreeing to present course completion certificates to the successful candidates. We now look forward to the contest season, planning a possible rally for spring 2005, and the Foundation course on 4 / 5 September: there are still one or two vacancies left."

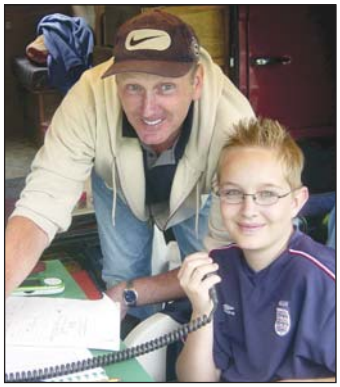
The six successful Stevenage M3s who have upgraded to Intermediate level; plus one more new Foundation licensee at the club. Back row: Maurice Tittcombe, Richard Paris, Philip Mortiboy (new Foundation licensee), Martin Juhe. Front row: Ian Ross, Nigel Holderness, Noel Bradford.

SADARC WEBSITE WELCOMES 2000th VISITOR

In a little over two years, the Southport & District Amateur Radio Club's (SADARC) website has attracted more than 2000 visitors. The 2000th web surfer visited the site on 27 June, which is quite an achievement for a small club website. When established, the SADARC website's goals were defined as raising the awareness of the Southport & District Amateur Radio Club and becoming a respected source of news and information for the amateur radio community.

The site's designer and webmaster, Derek Hughes, G7LFC, said: "I am pleased that the website is meeting its first goal. Over the last year, several radio amateurs and would-be amateurs have attended our club meetings as a result of visiting the website. In addition to this, the site's weekly visit figures have been going steadily up during the last year, so we are on the way to fulfilling our second goal. We hope to achieved our 3000th visitor by Easter 2005." The SADARC website was awarded a Golden Web Award last year and has been nominated for a Maestro Award of Excellence during June.

Having gone through a lean period, the Southport & District Amateur Radio Club has emerged over the last three years to become a strong club with 25 members regularly attending its monthly meetings. It is now well established as an active club, running several special event stations each year and taking amateur radio in to local schools and Scout groups. More details about the club and its activities can be found on the club's website at www.southportarc.org.uk



Richard, M0RJP, the present holder of G5RP Trophy (known locally as the 'the DX shark'), with newly-licensed stickleback, Mark, M3CNG, at the Eagle Radio Group's annual radio 'Campout'. Mark is already well on his way to his first 100 DX contacts.

LOTHIANS RADIO SOCIETY

Members of the Lothians Radio Society held a dinner dance cruise on board the *MV Maid of The Forth* on 11 June. The club was rewarded with excellent weather for the three-hour trip along the River Forth. The event proved to be a double celebration as registered blind member Tommy Mains, GM4DCL, heard that he had obtained a degree from the Open University after many years of hard study. On board the *MV Maid of The Forth* the ship's band played celebratory tunes for Tommy.

The Lothians Radio Society holds its first meeting of the 2004/05 season on Monday 13 September at the Royal Ettrick Hotel, Ettrick Road, Edinburgh. The club is actively looking for new members and further information can be obtained from Toby Sigouin, MM0TSS, club secretary on 07739 742367 or e-mail: tobysigouin@onetel.net.uk

HARROW'S COURSES

The Radio Society of Harrow (www.g3efx.org.uk), a registered examination centre, runs Foundation and Intermediate training courses throughout the year. Classes are usually one evening a week 7.00pm - 9.30 pm. Further information from registered volunteer instructor Don. G0ACL, tel: 0208 845 9575 (social hours please) or e-mail: g0ack@nasuwt.net

BOLSOVER'S SES

The Bolsover Amateur Radio Society will again be running special event station GB2PF to celebrate the birthday of Peter Fiddler, who surveyed and mapped much of Canada, over the weekend of 14/15 August. Activity will be on various bands from 80 to 10m plus VHF/UHF from the Coalite Sports and Social Club grounds in Bolsover. For more details please contact Dave, G0DJA, tel: 0797 957 5026 or e-maildave@g0dja.co.uk

THE HOARDS DESCEND ON ELVASTON

On 13 June more than 8000 radio enthusiasts and their families descended on the Elvaston Castle Country Park near Derby for the 35th Elvaston Castle National Radio Rally, organised by the Nunsfield House Amateur Radio Group. The crowds were treated to three huge trader marquees, a crafts marquee and a large bring & buy marquee. Arranged around the reception marquee were the many outside traders selling everything from mobile phone covers to leatherwear. Added to this were the RSGB in the main reception area, the manufacturers (Kenwood, Yaesu and Icom) in their own marquee, CDXC, IOTA and the ARRL DXCC QSL card checking service, Joe Bell's R161A communications vehicle in operation with GB2ECR, a massive flea market, plus a host of other attractions. The special interest groups were also out in force, including ISWL, RAOTA, RAFARS, RNARS etc. The weather was good, the crowds were big and the atmosphere was superb: a great time was had by all.

PHOTO: CHRIS CARRINGTON, NHARG CHAIRMAN

The Elvaston Castle rally in full swing, looking toward the manufacturers' marquee.

STOCKPORT RADIO SOCIETY

Members of the Stockport Radio Society recently visited the Greater Manchester Police Air Support Unit at Barton Aerodrome. The group was treated to a two-and-a-half hour tour of the facility, which included the resident helicopter, hangar and control room. The very enjoyable trip was organised by society and Lancashire Aero Club member Stewart Revell, G3PMJ.

Stockport Radio Society members in front of the Twin Squirrel helicopter G-GMPA which was substituting for GMP's own aircraft, a Boeing MD902 Explorer (away on a regular maintenance session).

A FLYING VISIT

In what is thought to be the first event of its kind in the area, Kidderminster and District Amateur Radio Society (www.communigate.co.uk/worcs/kdars) recently played hosts to members of the West Midlands Microlight Club. At the Society's June meeting, the pilots of five microlight aircraft ranging from small weight-shift models to large three-axis machines staged a 'fly-in' and landed in the field adjoining the radio society's venue. Kevin Mallin, G0TPZ, a qualified microlight pilot, initiated the contact between the two clubs. "The aircraft generated huge interest among our members and the public," said KDARS committee member Phil Harris, G4SPZ. "The management and stewards at the social club where we meet were kind enough to give their permission for the sports field to be used as a runway, provided the planes avoided the cricket pitches." Some KDARS members monitored the pilots' air band traffic as they took off for the return flight to their home airfield at nearby Pound Green.

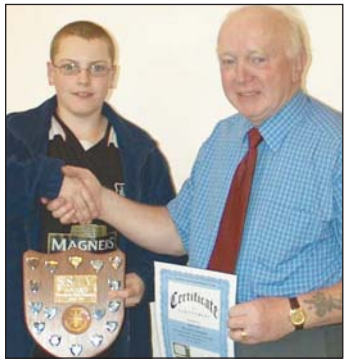
Kidderminster & DARS meets on the first Tuesday of each month at 8.00pm at the Chainwire Club, Zortech Avenue, Kidderminster and runs a full programme including lectures, demonstrations, special events and contests. The Society participates in SSB Field Day and International Museums Weekend, and offers new members their first year's membership free. For details, contact secretary Tony Saunders, G1OZB, on 01299 400172 or e-mail: kidder@thersgb.net

PHOTO: ROB FERGUSON, GM3YTS

Denzil, GW3CDP (centre), receiving a Yaesu FT-857 from Christine, GM4YMM, and Ken, GM0AXY. The FT-857 was the star prize donated by Yaesu at the GMDX Convention raffle.

DUNDEE's SSTV COMPETITION

The Dundee Amateur Radio Club has held an SSTV competition biannually since 1999 when the then President Peter Deans donated a trophy to encourage competition in the receiving of Slow Scan Tele-vision pictures. Participating members submit three pictures and the highest aggregate mileage from the transmitting stations determines the winner. This year's victor was Stuart Higgins, MM3GTR, who amassed 7031km with pictures from Ostra in Italy, Fishamend in Austria and Sofia in Bulgaria.



Stuart Higgins, MM3GTR, receives the Peter Deans SSTV Award Shield and certificate from Peter himself.

By Carlos Eavis, G0AKI

GB4FUN project manager,
c/o RSGB HQ.

E-mail: gb4fun@rsgb.org.uk

GB4FUN continues its mission

GB4FUN continues its mission to 'spread the word' about amateur radio and RF communications. Carlos Eavis reports on the 'fun bus' visits during the spring and early summer.

In the spring, GB4FUN visited the 'Bath Taps into Science' festival, followed by a return visit to Abbeyfield School. A visit to the Hinckley district Scout camp resulted in 40 new students for the Foundation licence. The first exposure to our hobby often has the most remarkable affect on young people: even in a world full of technology the basics of radio theory are not lost on them and their perceived applications for RF are limitless.

On 17 May a return visit was made to the Hewitt School in Norwich. This year, GB4FUN stayed at the school for six days, which allowed pupils greater access to amateur radio outside the structured teaching sessions, but also gave an opportunity for three other schools to send students to the Hewitt to participate in communication studies. On the sixth day the Norfolk Amateur Radio Club and the school organised an open day for students and parents, which resulted the club and school discussing holding regular club meetings at the school on Saturday mornings to facilitate students in taking the Foundation licence.

During the trip to Norfolk a request for the following week to attend a school science week at St Mary's Prittlewell in Southend-on-Sea was received from a teacher that had seen the advertising in the National Union of Teachers' magazine [see *RadCom* July 2004 page 15 - *Ed*]. The visit was well received by teachers and students alike, they showed a tremendous interest in Morse code and fast scan TV, with the 2.4GHz Hat Camera going on extended tours of the school.

One of GB4FUN's sponsors, Waters & Stanton, had a visit on their open day at Hockley, which gave a chance for amateurs in the Essex area to visit the vehicle and gain a better understanding of the work that it carries out.

Thomas Mills High School in Framlingham, Suffolk, was visited during their science week. The plan was to show how communications fitted in the modern world and to discuss how involvement in amateur radio can assist in future careers in telecommunications. The five 100-minute sessions rapidly disappeared as the overeager students didn't waste the opportunity to try their hands at operating different modes and showed a real understanding of ionospheric propagation and tropospheric refraction. It's not that often that radio theory can be classed as FUN, but the students were enjoying every minute.

Children and adults alike enjoy learning about Morse code at the 'Bath Taps into Science' festival.

COLLEGE'S 'INDUSTRY DAY'

Greensward College in Hockley held an industry day which allowed local companies to bring the work place to the students. Waters & Stanton engineers attended with GB4FUN, which allowed the students hands-on experience at constructing small projects in the classroom while being supervised, followed by a trip to GB4FUN for the radio operating experience. Judging from the faces of all involved we will be back there next year!

A trip to Lincolnshire for the Scunthorpe Steel Gala was next on the agenda as GB4FUN became a guest of the Scunthorpe Steel Amateur Radio Club. The gala was very well attended by the general public which gave the club the chance to increase their membership and to highlight the profile of amateur radio in the community.

Balliol Lower School in Kempston, Bedford, was GB4FUN's next visit. The school had already seen the RSGB's promotional video and the students were geared up for a day of communicating with as many parts of the world as possible, as well as using the local VHF repeater and talking to old pupils from the school, some of whom had not been back there since the 1960s.

Hazlemere C of E School near High Wycombe has just started a radio club for its pupils, so GB4FUN attended the school fete to allow the new club members a chance to use the radio equipment - and give their parents an idea of what they will be asked to donate funds to the school for!

An article appeared in the *Physics Education Magazine* (May 2004) highlighting the visit to St Johns School and Community College in Marlborough, which shows that the interest in amateur radio is spreading into many of the educational publications.

GB4FUN has a busy summer planned, and the autumn school term is already starting to fill with bookings.

A recent addition of a Signalink data interface for datamodes to the equipment on board, now allows PSK31 to be transmitted as well as received. PSK31 is mainly used as a demonstration of spectrum efficiency. Also SSTV and other datamodes will now be easier to operate. GB4FUN, like amateur radio itself, keeps moving and evolving, so watch this space for the continuation of this exciting project! ♦

Supporters of the Radio Communications Foundation

We asked members when renewing their membership to include a donation to help to continue to support the work of the Radio Communications Foundation. The following is the list of those members who have kindly sent in a donation by the deadline date for this issue. Contributions continue to be wanted: if you would like to help, please send your donation to RCF, c/o RSGB HQ.

RCF 'Big Hitters'
The estate of the late Cyrill Collins, G8SC
Itchen Valley ARC, G0IVR

G Gauci, 9H4H
G M Russell, G0CAK
R Knighton, G0GER
E L Newman, G0GZS
D Talbot, G0JHT
Peterlee Radio Club, G0KVJ
G A Lamb, G0LAM
N R Steadman, G0SMI
K C Li, G0TOY
M B Austin, G1GDA
J G Beecham, JP, BA, G1LAP
R J Pennington, G1NVS
R Davis, G1UNQ
A W Knight, G1UOZ
J Willy, G3CLL
A M Smith, G3IAS
B Vaughan, G3MCV
J H G Allsop, G3OGX
G Gallagher, G3SNV
R J Kearney, G3XOK
R Sterry, G4BLT
A Bagley, G4EKE
R T Dobson, G4OBX
R C Keefe, G4SIS
C E White, G4TXF
L Whitehead, G7GYP
S J Taylor, G7VGM
Dr A J Seeds, G8DOH
R Staveley, G8JWK
N P Mosedale, G8TBL
N R Doe, G8TBU
R T Sherrard, GI3VAW
J Crowden, GM1VGZ
D G Varney, GM3OAV
R Hale, GW0SKO
A I Grant, GW4KPD
K D Weaver, GW4TTU
C Nedland, LA9CQ
P Bergin, M0AAC
M W Coles, M0CIE
I M Douglas, M0IMD
L Smith, M0LRS
S Vaudrey, M1BEZ
P V Craven, M1PVC
T Denby, M1TAD
T M Humphries, M3BIC
D Drew, M5ABH
L Norman, MM1FHO
A C Lees, RS10128
J W Shere, RS190071
G Burkitt, RS190681
Mr MacKay, RS190715
G Halliwell, RS191028
L Olsson, SM3AVQ

The RSGB is also grateful to those many generous members who have sent donations anonymously, or who have asked us not to publish their names.

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Reviewed by Peter Hart, G3SJX

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

E-mail: peter@g3sjx.freeserve.co.uk

Icom IC-7800 HF/50MHz

The recently released IC-7800 transceiver from Icom is the new HF flagship, boasting a level of performance and built-in features superior to any other radio on the market. Based in concept on their earlier flagship in the late 1980s, the IC-781, and their more recent top-end transceiver, the IC-756PROII, Icom's new radio adopts some significant new innovations for the RF design and a degree of user convenience that sets it apart from other radios currently available.

BASIC FUNCTIONS

The IC-7800 is a mains powered base station covering LF, MF, HF and 6m. Measuring 424W x 149H x 435D mm and weighing a heavy 25kg, it is also supplied with attachable front facing handles for rack mounting operation aimed at professional installations. It incorporates two totally independent and identical receivers each tuning continuously from 30kHz to 60MHz. The transmitter is rated at 200W output and is enabled only within the amateur bands. The version sold in Europe also transmits in the 136kHz band but only at a level of -20dBm via the transverter socket on the rear panel, and the version sold in the USA transmits on five spot frequencies in the 5.4MHz band.

Individual buttons select the bands with a triple band stacking register employed which is useful if you operate frequently on three modes, eg SSB, CW and RTTY. One of three last used frequency / mode combinations is returned for each press of the band key. Buttons also select the modes LSB, USB, CW, FM, AM, RTTY and PSK with both sidebands (normal / reverse) available on CW, RTTY and PSK modes. There is extensive support for data modes, including dedicated modems and display for RTTY and PSK and three different selectable settings for data operation on SSB, AM and FM modes. This enables different audio lines to be switched between alternative accessory connectors on the rear panel.

The extensive functions provided in the radio are accessed in most cases by dedicated controls rather than multifunctional-layered menus. There are over 100 controls on the front panel which may seem rather daunting at first but it is really very fast and easy to use. User set-up rarely involves more than one long button push and the amount of information displayed on the large LCD panel is most impressive. This uses a 7in wide full-colour active matrix TFT display with a resolution of 800 x 400 pixels and may also be displayed on an external monitor via a VGA connector on the rear panel. Apart from the most informative set-up screens, the display gives a high-resolution spectrum plot, memory data lists of various types, incoming and outgoing RTTY / PSK data messages and two large meters. Three different meter formats are selectable - a very realistic analogue look-alike needle display with excellent resolution, an edgewise meter and a bar meter. In addition, a multifunction meter may be selected which displays seven items of transmit data simultaneously including heatsink temperature.

The rear panel carries an enormous number of connectors, many not normally found on the back of a radio. There are four antenna sockets which may be selected from the front panel or automatically assigned according to band. The receive path for both receivers is routed via the rear panel with jumper leads so that additional filters may be fitted (eg for co-sited multi-multi contest or DXpedition stations) or receive-only antennas connected. The usual accessory sockets are duplicated to allow more than one data terminal unit, linear or external auto ATU to be connected simultaneously. Extensive interfacing to computer equipment is provided with an RS-232 connector for PC control, USB keyboard connector for data transmission and message store entry, Icom CI-V remote control, VGA external display, S/P DIF fibre optic digital audio, and an RJ45 LAN network connection, use of which is as yet undocumented. The radio even has an IP address. There is a transverter drive capability giving about -20dBm on transmit and switching for linear amplifiers accommodates a wide range of switching voltages and currents although no particular features for QSK linears. Twin key jacks are fitted, one on the front panel and the other on the rear.

Each radio is provided with a comprehensive instruction manual which includes a full set of circuit schematic diagrams all contained within a ring binder.

RADIO DESIGN AND ARCHITECTURE

Most high performance radios adopt a triple or even quadruple conversion superhet approach. The receivers used in the IC-7800 adopt a double superhet architecture with a first IF of 64.455MHz and then converting straight down to a second IF of 36kHz to feed the DSP for all further processing. All channel filtering is performed at the 36kHz IF by DSP. This inherently simple and elegant architecture is difficult to engineer as it places stringent demands on the first IF filter, in particular suppressing the second IF image which occurs 72kHz away from the passband. Making a 64MHz bandpass filter which suppresses signals 72kHz away by some 80 to 100dB is a very difficult if not impossible task. Icom have addressed this by adopting an image rejection second mixer reducing the demands on the filter by the rejection ratio of the mixer which is perhaps 40dB for a well engineered design. Measurements showed a second image rejection in excess of 100dB which is a remarkably good figure.

Most radios adopt a first IF roofing filter bandwidth of 15 to 20kHz as this covers the bandwidth of the widest signal mode (FM) and is an achievable bandwidth for mass produced filters in the low VHF region without too much difficulty. However, the roofing filter bandwidth is invariably the limitation on the close-in dynamic range performance and a narrower bandwidth will ease design issues at the second IF. The IC-7800 has switchable roofing filters, one with a 15kHz bandwidth and the other with a 6kHz bandwidth. Only time will tell whether the 6kHz filter will remain sufficiently stable for the lifetime of the radio.

The front-end configuration of the

Icom has introduced the IC-7800, raising the bar for what might be a new generation of 'super radios' - with a super price tag! But, for those who really want the best, does the IC-7800 deliver? Peter Hart says it "performed impeccably" and "surpasses all other radios for the amateur market with its level of features, built-in modes and user friendliness".

transceiver

radio uses a D-MOS FET IC first mixer and two small ICs for the image rejection second mixer. A total of 12 switched bandpass filters provides the signal frequency filtering and a separate sharply tuned preselector may also be enabled. Mechanical relays are used entirely for signal switching in the front-end avoiding the use of switching diodes which can generate intermodulation products with very high level signals. A separate front-end is used for frequencies above 30MHz. The first local oscillator uses one of six VCOs restricting each to a relatively small tuning range to give reduced phase noise. The transmit path adopts triple conversion, interspersing a 455kHz IF between the 36kHz DSP generated transmit signal and the 64.455MHz final IF.

A total of four independent 200MHz 32-bit floating point DSP units are used with 24-bit AD/DA converters. One is used in each receiver, one for the transmit signal and the fourth is used for the Spectrum Scope. These DSPs are much more powerful than that fitted into the IC-756PROII. Each receiver DSP is used to perform all channel filtering functions, notch filters, demodulation, audio equalisation and AGC. AGC is applied mainly within the DSP but an auxiliary loop reduces the gain of the first IF amplifier on strong signals. The transmit DSP is used to generate the modulated signal, provide audio filtering and microphone equalisation, RF speech compression and for shaping the CW keying envelope. An ultra high stability oven controlled crystal oscillator is used for the synthesiser reference signal source. This is specified as stable to within ±0.05ppm over the operating temperature range of the radio, which is just 2.5Hz at 50MHz. This reference frequency output is also available on the back panel of the radio for other uses.

The radio is constructed on fully screened circuit boards housed in a substantial compartmentalised diecast chassis. A large internal finned heatsink cools the power amplifier blown by a fan. Two further fans are also fitted, one appears to be an afterthought, resulting in a bulge on the bottom cover. Considering the size of the radio, a very small speaker is fitted, just 55mm diameter. However, it is a hi-fi style unit fitted into an acoustic box which gives much better than average quality and no unwanted rattles and resonances which result from the usual open mounted unit.

RECEIVER FEATURES

The radio is fitted with two VFOs one controlling each receiver, and two tuning knobs one 55mm in diameter (main) and the other 35mm in diameter (sub). This is the only difference between the two receivers. The transmitter uses the main VFO for normal operation and the sub VFO for split frequency working. A quick split feature enables split frequency operation and equalises the VFOs. The usual A/B switching and swapping is not used. Tuning is in 1Hz steps at 500Hz per revolution or 10Hz steps at 5kHz per revolution. A faster rate of selectable kHz step sizes enables fast navigation and auto speed-up is selectable for fast sustained tuning. The frequency may also be entered directly from the band keypad and a quarter tuning rate function is selectable for fine tuning data signals. An auto-tune feature may be enabled for CW and AM modes.

101 memory channels are included with the usual access facilities and memories can be tagged with a 10 character alphanumeric label. The memory list screen is very convenient for scrolling through and searching memories and displays up to 15 memory contents at one time. A separate memo-pad feature allows frequencies to be quickly stored and recalled by a simple key press, on the basis of last-in, first-out. RIT and transmitter independent tuning operate over a range of ± 9.99kHz and various scan modes are implemented.

All controls for the two receivers are duplicated and independent. The receiver paths are kept separate right through to the audio output with left and right channels on stereo headphones or external speakers, or combined for the internal speaker. The usual receiver functions are provided. The receiver front-end configuration may be optimised to suit different requirements with two selectable preamplifiers, seven levels of signal attenuation, RF gain and squelch controls. Preamp 1 has a gain of about 10dB and preamp 2 about 16dB. This higher gain preamp is primarily intended for use on the higher frequency bands but can be useful on the lower frequencies when low output receive antennas are used such as small loops or Beverages.

To improve further the front-end signal handling with very strong out of band signals experienced for example in a multi-multi contest site, a sharply tuned preselector may be enabled at the receiver input covering frequencies from 1.5 to 30MHz. This is termed 'Digi-Sel' and is similar in function to the VRF feature provided in the Yaesu FT-1000MP Mk-V. Two units are fitted, one in each receiver path, using relay switched capacitors and inductors to track automatically the tuning of the receiver. A front panel control provides fine peaking if needed.

FILTERS

All IF filtering, demodulation and audio processing functions are implemented in DSP. The channel filtering is similar to that included in the IC-756PROII, providing 41 different passband widths on SSB, CW and PSK from 50Hz to 3600Hz, 32 passband widths on RTTY (50 - 2700Hz) and 50 passband widths on AM (200Hz - 10kHz). On FM three bandwidths are provided (7, 10, 15kHz). Three separate bandwidths are immediately available for each mode selectable by a simple push of a front panel key, from the available menu of bandwidths. In addition, two filter profiles are selectable on CW and SSB modes, a sharp profile with a flat passband and a soft profile with a more rounded passband. The DSP also provides the twin passband tuning function, which enables the filter sides to be both independently moved and narrowed. The filter set-up screen on the display shows all the filter adjustments in a friendly and graphical way.

The AGC is also implemented by the DSP with three separate time constants (Fast, Mid, Slow) plus constantly variable selectable from the front panel. These three values may be set from a menu of 13 different values (0.1 to 6s SSB / CW) and are set separately for all modes except FM. Two very effective notch functions are provided in this transceiver, both using the DSP. A manually tuned IF notch with a depth of 70dB and three selectable widths is included within the AGC loop and hence does not result in desensitising with strong carriers. An auto-notch is implemented at AF and will automatically attenuate several beat notes, even if they are moving. An

adjustable DSP noise reduction system is also included and there is a separate adjustable noise blanker for pulse type interference such as car ignition noise.

DSP also provides audio filtering and shaping functions. A narrow audio peak filter is available on CW, a twin peak filter sharply tuned to the 2125Hz and 2295Hz mark and space tones on RTTY, and treble and bass shaping for both receive and transmit voice modes separately adjustable for SSB, AM and FM.

TRANSMIT FEATURES

The IC-7800 contains a 200W power amplifier adjustable down to less than 5W operating from a 48V supply for good linearity. VOX, speech processor and a transmission monitor are provided on SSB and the transmission filter bandwidth can be set to wide, mid or narrow as preferred in addition to audio frequency response tailoring. On CW there is the usual provision for full and semi break-in with a front panel control for drop-back delay and the keying envelope rise and fall times are adjustable between 2 and 8ms to accommodate both fast CW and minimum radiated bandwidth.

A full message keyer is included with some useful features for contest operation on CW. The keyer operates over a wide range of speeds with adjustable weighting and a variety of keying paddle arrangements. Four memories will each store up to 70 characters with a provision to send automatically incrementing serial numbers and auto-repeat after a time delay. The message stores are programmed in text from front panel push buttons or directly from a PC USB keyboard if connected to the relevant rear panel socket.

An auto ATU is built-in matching up to 3:1 VSWR and which covers all bands including 50MHz. Tuning settings every 100kHz are stored to enable rapid and accurate reselection.

DATA MODES

The IC-7800 includes a full capability for receiving and sending RTTY and PSK-31 data modes as a stand-alone unit without the need to be connected to a PC running data mode software. A USB keyboard needs to be connect-

ICOM IC-7800 MEASURED PERFORMANCE

RECEIVER MEASUREMENTS

	SENSITIVITY SSB 10dBs+n:n		INPUT FOR S9	
FREQUENCY	PREAMP1 IN	PREAMP OUT	PREAMP1 IN	PREAMP OUT
136kHz	0.4µV (-115dBm)	0.9µV (-108dBm)	28µV	70µV
1.8MHz	0.14µV (-124dBm)	0.5µV (-113dBm)	20µV	56µV
3.5MHz	0.13µV (-125dBm)	0.45µV (-114dBm)	18µV	50µV
7MHz	0.13µV (-125dBm)	0.45µV (-114dBm)	18µV	56µV
10MHz	0.13µV (-125dBm)	0.45µV (-114dBm)	18µV	56µV
14MHz	0.13µV (-125dBm)	0.45µV (-114dBm)	18µV	63µV
18MHz	0.13µV (-125dBm)	0.45µV (-114dBm)	16µV	56µV
21MHz	0.13µV (-125dBm)	0.5µV (-113dBm)	16µV	63µV
24MHz	0.13µV (-125dBm)	0.5µV (-113dBm)	16µV	63µV
28MHz	0.14µV (-124dBm)	0.56µV (-112dBm)	16µV	70µV
50MHz	0.13µV (-125dBm)	0.4µV (-115dBm)	22µV	70µV

AM sensitivity (28MHz): 0.7µV for 10dBs+n:n at 30% mod depth
FM sensitivity (28MHz): 0.2µV for 12dB SINAD 3kHz pk deviation
AGC threshold: 1.3µV
100dB above AGC threshold for +1dB audio output
AGC attack time: 1-2ms
AGC decay time: as specified
Max audio before clipping: 1.9W into 8Ω, 2.4W at 10% distortion
Inband intermodulation products: better than -60dB.

S-READING INPUT LEVEL SSB		
(7MHz)	PREAMP1 IN	PREAMP OUT
S1	1.6µV	5µV
S3	2.8µV	8.9µV
S5	5µV	16µV
S7	8.9µV	28µV
S9	18µV	56µV
S9+20	180µV	560µV
S9+40	1.8mV	5.6mV
S9+60	22mV	70mV

	RECIPROCAL MIXING FOR 3dB NOISE	
FREQUENCY OFFSET	ROOFING FILTER 15kHz	ROOFING FILTER 6kHz
1kHz	65dB	65dB
2kHz	78dB	78dB
3kHz	87dB	87dB
5kHz	89dB	90dB
10kHz	91dB	100dB
15kHz	103dB	106dB
20kHz	108dB	108dB
30kHz	111dB	111dB
50kHz	116dB	116dB
100kHz	121dB	121dB
200kHz	124dB	124dB

	SHARP IF BANDWIDTH			SOFT IF BANDWIDTH		
FILTER	-6dB	-50dB	-60dB	-6dB	-50dB	-60dB
10kHz	10.9kHz	16.3kHz	17.5kHz	-	-	-
6kHz	6.3kHz	9.6kHz	10.6kHz	-	-	-
2.4kHz	2522Hz	3513Hz	4079Hz	2360Hz	3375Hz	3870Hz
500Hz	516Hz	704Hz	1909Hz	543Hz	842Hz	1982Hz
250Hz	255Hz	333Hz	1590Hz	264Hz	396Hz	1590Hz
100Hz	109Hz	177Hz	229Hz	113Hz	214Hz	271Hz
50Hz	64Hz	121Hz	163Hz	64Hz	144Hz	178Hz

CLOSE-IN INTERMODULATION ON 7MHz BAND

Preamp off 2400Hz bandwidth

	15kHz roofing filter		6kHz roofing filter	
Spacing	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
3kHz	noise limited	noise limited	noise limited	noise limited
5kHz	noise limited	noise limited	noise limited	noise limited
7kHz	noise limited	noise limited	+15dBm	91dB
10kHz	noise limited	noise limited	+18dBm	93dB
15kHz	+27dBm	101dB	+25.5dBm	98dB
20kHz	+31dBm	103dB	+30dBm	101dB
30kHz	+36dBm	107dB	+36dBm	105dB
40kHz	+41dBm	110dB	+40.5dBm	108dB
50kHz	+45dBm	113dB	+42dBm	109dB

INTERMODULATION

(50kHz Tone Spacing) 2400Hz bandwidth USB

	PREAMP1 IN		PREAMP OUT	
Frequency	3rd order intercept	2 tone dynamic range	3rd order intercept	2 tone dynamic range
1.8MHz	+21.5dBm	104dB	+32.5dBm	104dB
3.5MHz	+28dBm	109dB	+42dBm	111dB
7MHz	+29.5dBm	110dB	+45dBm	113dB
14MHz	+30dBm	110dB	+42dBm	111dB
21MHz	+26.5dBm	108dB	+41.5dBm	110dB
28MHz	+21.5dBm	104dB	+42dBm	109dB
50MHz	+14dBm	99dB	+32dBm	105dB

TRANSMITTER MEASUREMENTS

FREQUENCY	CW POWER OUTPUT	HARMONICS	INTERMODULATION PRODUCTS 3rd order	INTERMODULATION PRODUCTS 5th order
1.8MHz	218W	-65dB	-33dB	-46dB
3.5MHz	220W	-65dB	-35dB	-46dB
7MHz	215W	<-70dB	-32dB	-46dB
10MHz	216W	<-70dB	-31dB	-46dB
14MHz	212W	-66dB	-28dB	-49dB
18MHz	212W	<-70dB	-27dB	-49dB
21MHz	210W	<-70dB	-27dB	-47dB
24MHz	208W	<-70dB	-41dB	-46dB
28MHz	209W	<-70dB	-41dB	-47dB
50MHz	205W	<-70dB	-33dB	-47dB

Intermodulation product levels are quoted with respect to PEP.

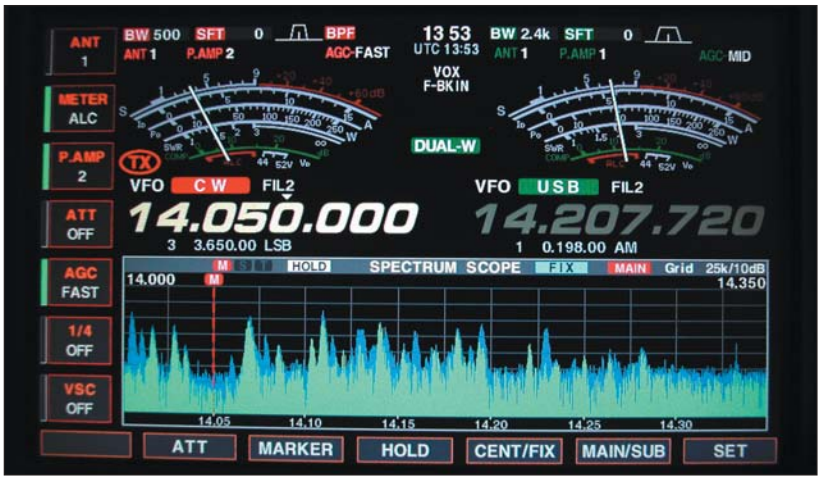
Carrier suppression: 75dB
Sideband suppression: >70dB @ 1kHz
Transmitter AF distortion: much less than 1%
Microphone input sensitivity: 2mV for full output
FM deviation: 2.3kHz
SSB T/R switch speed: mute-Tx 12ms, Tx-mute 1ms, mute-Rx 18ms, Rx-mute 1ms

NOTE: All signal input voltages given as PD across antenna terminal. Unless stated otherwise, all measurements made on USB with receiver preamp switched out, 2.4kHz bandwidth sharp filter selected and 15kHz roofing filter.

ed to the relevant rear panel socket for transmitting messages but is not needed if used only on receive.

When using the internal modem the display window is divided into two areas, the receive contents area and the transmit buffer area. These areas allow for 48 characters per line and depending on whether a wide or narrow display window has been selected, either 14 or eight lines in the receive area and three or two lines in the transmit buffer area. The wide setting is best for any serious data operation and with this setting the frequency readout size is reduced and metering displayed in bar or edge format. Two tuning indicators are provided for both RTTY and PSK modes, an FFT display which shows the amplitude of the received components against frequency and a waterfall display which shows this information colour coded also against time. The twin peaks of an RTTY signal or the narrower spread of a PSK-31 signal can be clearly seen. For the PSK decoder a vector tuning indicator is also provided to allow accurate fine tuning of the signal, as a line for a BPSK signal or as a cross for a QPSK signal. Both BPSK and QPSK modes are supported. Unlike most soundcard based decoder software, there is no auto-tuning facility built into the PSK decoder and accurate tuning with 1Hz step size is essential.

For both RTTY and PSK modes, eight message stores are provided each holding up to 70 characters. These can be programmed from the front panel controls or more conveniently from the USB keyboard. Various options for setting time stamps, unshift on space, display colours etc are provided. The contents of the message stores and receive memory can be saved to Compact Flash memory card and copied to a PC, but more on that topic in the next section.



PSK decoder screen in wide mode.

Spectrum scope display.

AUXILIARY FEATURES

All the settings of the radio and the contents of the various memories and message stores can be saved to a compact flash memory card which plugs into a slot on the front panel. The contents can then be used to reset the radio to the stored settings at any time in the future. This can be particularly useful in a multi-operator contest or DXpedition where each operator can store their own preferred settings or CQ calls in their own voice and instantly configure the radio for the duration of their operating period.

As well as the CW and RTTY message stores, the IC-7800 also includes a digital voice recorder. This has four channels to carry transmit messages with a total length of 99 seconds recording time available. This can be used for CQ calls and other contest exchange messages. The transmit stores can be tagged with labels up to 20 characters long for easy identification in the voice recorder display screen. Up to 20 channels of receive audio may be recorded with a total length of 209 seconds or 30 seconds maximum per channel. Not only is the audio recorded but also the frequency, mode and recording date and time for future reference. The contents are overwritten when the memory is full but can be protected if required. The CW and voice keyers can both be controlled from an external four key keypad connected via a rear panel socket. This is not available from Icom as an accessory but is simple to construct and is described in the manual.

A particularly comprehensive spectrum scope is included in the IC-7800 and unlike most other implementations of this feature it operates continuously and independently of either receiver. It has 80dB of display dynamic range and has two modes of operation. The centre mode will display the spectrum on either side of the on-tune frequency with spans selectable from ±2.5kHz to ±250kHz. The Fix mode will display the spectrum between two fixed points, these points being separately programmable for each band. In both modes there are a number of settings which select sweep speed, colours, VFO markers, peak hold etc. The spectrum scope can be used in conjunction with other display screens by using the mini-scope mode.

Other features include a built-in calendar and 24-hour clock, switch-on and switch-off timers, a voice synthesiser for audible readout of frequency, mode and S-meter level, a CTCSS tone encoder and decoder for repeater access and tone squelch operation, and quick access splits separately programmable for HF and 50MHz repeater operation.

The radio has been designed to allow the firmware to be upgraded by free downloads from the Icom website. Pioneered by Ten-Tec, this is likely to be a major feature of radios in the future providing new functions and performance upgrades. At the time of writing this review upgrades are planned for July / August but the precise details of how this is done had not yet been announced.

MEASUREMENTS

The full set of measurements is given in the table. Two preamplifiers are selectable across the whole tuning range of the radio although a different front-end with associated preamplifiers is selected above 30MHz. Sensitivity figures are excellent improving still further to 0.1µV with Preamplifier 2 selected. Sensitivity at LF holds well, still achieving 1µV at 30kHz. The figures in the table for AM and FM sensitivity and AGC threshold are quoted with Preamp 1 enabled. The S-meter calibration is the same on all modes and is very linear, holding closely to 2.5dB per S point from S1 to S9 and then within 1dB linearity up to 50dB over S9.

The rejection of images and IFs was

exceptionally good, in excess of 100dB in most cases. Rejection of the second image at 72kHz below the on-tune frequency which, as described earlier in this review, can be a potential problem with the IC-7800 architecture, measured an amazingly good 104dB with the 15kHz roofing filter and better than 110dB with the 6kHz filter. Some small fast tuning spurii were found mainly on the lower bands but a spurious response at ±12kHz from the on-tune frequency and at a level around -80 to -90dB might be a problem in some situations.

The AGC response was very clean. Attack times were fast and decay times roughly as specified although the longer times were a little short and the shorter times a little long.

The third order intercept measured with 50kHz generator spacings exceeded +40dBm over most of the HF range. This is outstanding and significantly better than any other radio I have measured. With the 6kHz roofing filter a slightly lower sensitivity and dynamic range was measured probably due to the extra filter loss. At closer generator spacings the performance degrades but within the roofing filter bandwidth reciprocal mixing noise predominates. The reciprocal mixing figures 10kHz or more away from the carrier are excellent but at closer spacings within the roofing filter bandwidth they degrade very rapidly. There is a noticeable difference in results between the two roofing filters particularly in the transition region. I surmise that the noise performance of the second local oscillator (also a PLL) is significantly worse than the first local oscillator which is the usual limitation (see **Fig 1**). As a result of the poor close-in noise, IF bandwidth measurements were compromised by noise at the -60dB level giving a wider skirt figure. In comparison it was relatively easy to measure the filters in the IC-756PROII at -70dB and more recently the Ten-Tec Orion at -80dB.

I was unable to measure the front-end blocking level, it exceeded my test capability. Second-order intermodulation also stretched my measurement capability but finally yielded a result better than any other radio measured. The Digi-Sel further improved results by a few dB. Overall in-band linearity was excellent and audio noise and distortion very low.

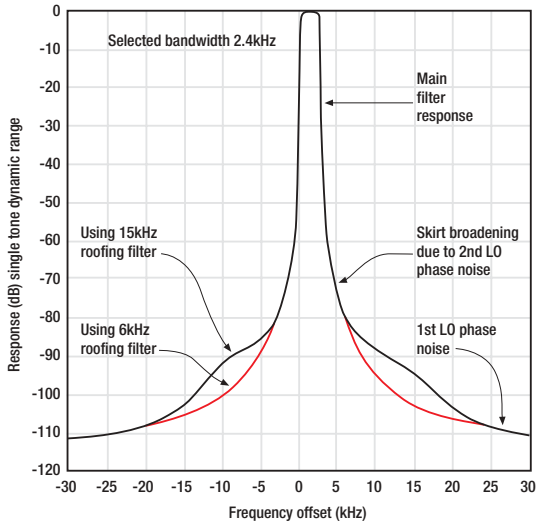
Multifunction meter display.

The transmit power output was well up to specification and the metered power level very accurate. The ATU introduced an additional loss of about 10%. Wideband distortion products on SSB fell away very rapidly, probably as a consequence of using power MOSFETs and a high supply rail (48V). Non-harmonic spurious outputs were very low at better than -70dB. The speech compressor made little difference to the distortion levels.

The CW rise and fall times are fairly optimal at the long settings and there was about 30% character shortening at 40WPM with full break-in. There was no character shortening on semi break-in. The results were identical to the IC-756PROII.

Fig 1
Effective selectivity curve on USB.

FIG 1 © RADCOM 224



ON-THE-AIR PERFORMANCE

I found the IC-7800 to be a very enjoyable radio to use. Although it has so many features and so many controls it is very easy to use. It is most intuitive in operation right from the start and rarely does the manual need to be consulted. The display is excellent and the various access and set-up screens most helpful and informative. Although the display is crisp and clear, I needed to keep the brightness and contrast controls at maximum particularly with high ambient lighting.

The radio performed impeccably, I experienced no trace of signal overload even with the high gain preamplifier on 40m, and sensitivity was excellent on 6m during recent Sporadic E openings. Audio quality was excellent on all modes and extended with good sensitivity to LF although there is a rough sounding spurious signal around 77kHz and its harmonics into the lower medium wave band. The IF filters, PBT and notches all performed extremely well.

The various features, memories and message stores were all easy to access and use. I could find little to fault on any of the features, they functioned very well. On data modes the decoder performance seemed as good as the popular PC soundcard based applications but the larger display area and much greater number of features of PC software with callsign capture and log book interfacing makes this preferable for contests and more intensive use. The lack of auto-tune on PSK makes tuning rather critical and in this mode PC software such as *Digipan* is more comprehensive particularly when it comes to split frequency working and dual channel monitoring. However, the built-in features are very creditable and available at the touch of a button whereas PCs need to be booted and applications loaded and run.

On transmit, the extra power can be a distinct advantage particularly to those without a linear and the radio runs quite cool. The CW transmission was narrow with clean QSK operation. Quality reports on SSB with the HM-36 hand microphone were good and with the low distortion audio and tailorable response, higher quality microphones will show off their true colours.

The sprectum scope was particularly useful in monitoring 6m band activity in the background on the sub-receiver whilst using the main tranceiver on HF.

CONCLUSIONS

The IC-7800 is a most impressive radio. It surpasses all other radios for the amateur market with its level of features, built-in modes and user friendliness. The measured performance in most areas is excellent, although the immediate close-in noise performance is not quite so good. The wideband dynamic range significantly exceeds all other amateur radios currently available.

With a price tag of £6400 inc VAT it is not a radio which will suit everyone. It shows, however, what can be achieved if cost is not the key objective. Potential owners will certainly not be disappointed. I would like to thank Icom (UK) Ltd for the loan of the equipment. ♦

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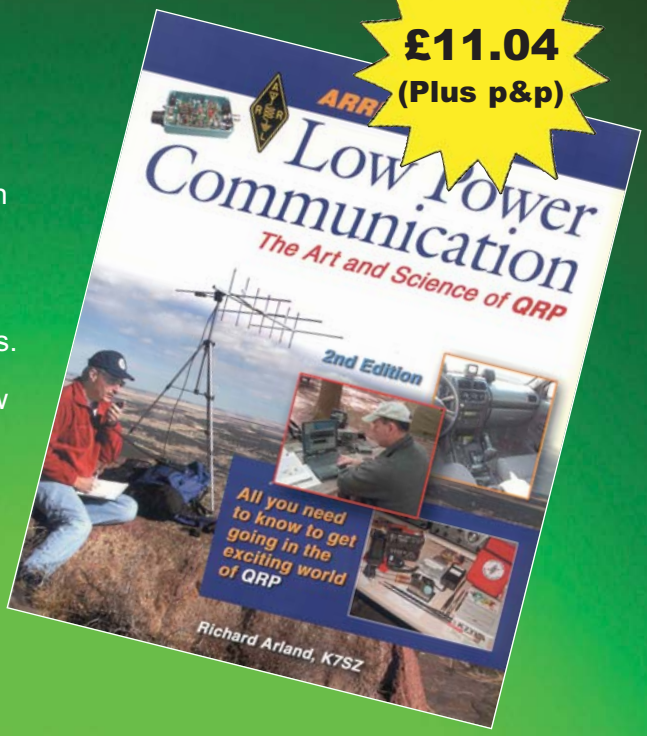

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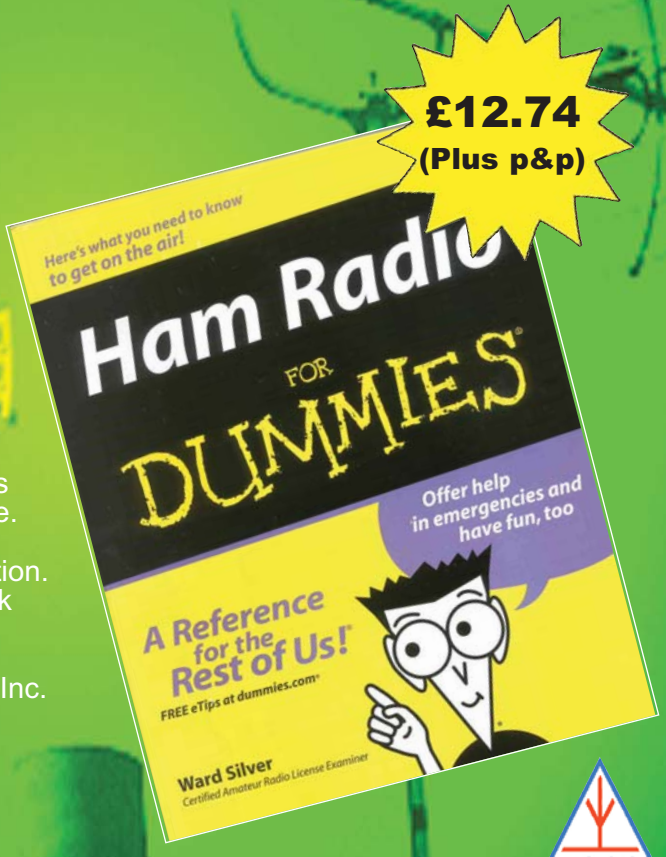

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By Steve Hartley, GOFUW

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

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

Steve Hartley says, "Lots of input from Newcomers and their tutors this month, please keep it coming!"

Newcomers' news

Clive Maby, G4NAQ, sends word that the instructors at the Shirehampton Radio club have just guided nine-year old Charlotte Imianowski through the Foundation course. Charlotte is now on air with the callsign M3ICJ, and having heard her myself I can confirm that she is doing a fine job.

The club meets every Friday from 7.30pm to approx 10.00pm at the Signal Station located within the Sea Cadet's *TS Enterprise* at the end of Station Road, Shirehampton. Further details can be had from their website (see Web search below).

Last year Ben Rawlings became the youngest-ever member of the Braintree and District Amateur Radio Society (see Web search below). He attended a Foundation course run by the Colchester club, passed the assessments and obtained the call M3EUO at the grand old age of eight.

In recognition of his achievement he was presented with a 7MHz receiver kit at the Braintree club's Christmas social evening. Then in April he entered this receiver into the club's construction contest and won first place.

Ben enjoys operating and in May he took part in the special event station that the club ran for the National Mills Weekend. It was a visit to this event last year that made Ben decide he wanted to obtain his own amateur licence. Hopefully, when schoolwork allows, he will be able to take the Intermediate course but for now he is enjoying his Foundation licence.

Above left Braintree's 2004 construction contest winner Ben, M3EUO, with his receiver kit and trophy.

Charlotte Imianowski, M3ICJ, with Lead Instructor John, G4DVV, at the Shirehampton Club.

A FEW BAD EGGS

As a newly-licensed amateur (something he is immensely proud of) Kev Howarth has come across a small number of what he describes as "small minded bigots and hecklers". One day, whilst using 7MHz, Kev was unfortunate to come across one such station when he came in under Kev's contact and started to make derogatory remarks about his operating procedure.

Kev is very lucky in that his club, the Morecambe Bay Amateur Radio Society, have a fine bunch of tutors. As well as lecturing and overseeing the progress of newcomers, they monitor their transmissions and advise them on correct radio protocol and etiquette. Unbeknown to Kev his tutor was listening and asked the 'rude' station to identify himself, to which the station went QRT (stopped transmitting).

The good news is that such ignorance has not stopped Kev's enjoyment and since he got his licence in November 2003 he has achieved over 400 QSOs (contacts) in over 60 countries, including Ascension Island, Brazil and the Turks and Caicos Islands. He says "I believe that the RSGB and Ofcom have made a brave and wonderful gesture allowing the Foundation licence to be available, Amateur radio needs new blood to keep it going, and this is the way forward".

I think we have all come across one or two 'bad eggs' but Kev's story shows that the majority of people in the hobby are more than happy to make contact with newcomers. Let us know when you make the DXCC (100 countries) Kev!

THE HOLY GRAIL?

Alastair Rosenschein, M3WMD, was one of the many readers who had copies of the practice papers for the Intermediate exam from me. Alastair was due to sit the exam in June having studied on his own at home with a little help from the Whitton Amateur Radio Club.

Alastair reports that obtaining a radio was easy but setting up his antennas is proving more of a challenge. "If only there was a small innocuous antenna which could be bolted to an existing TV antenna pole, with which one could work the world on HF and chat on VHF with no interference to one's neighbours and that would also satisfy the local planning authority", he muses. I have offered one or two suggestions but I guess if we could satisfy that design criteria we would all be very happy!

EMC REMINDER

In the May column I managed to get Dennis Carter's callsign, M1NED confused with Dennis Shields, M3JWJ: quite embarrassing as both are quite local to me - sorry guys! M1NED's story prompted a reminder about other sources of help from Angus Annan, MM1CCR, Chair of the RSGB EMC Committee. "Whilst it is good to note that the message of maintaining 'Good Neighbour Relations' seems to be getting home and that OfCom are being so helpful, members should be aware of the RSGB EMC Committee and the services they have in place to help members with similar problems.

"The EMC Committee has an excellent web page where members can read or download lots of information including especially designed EMC leaflets (see Web search below). Should this information not suffice, or if further help is required, their website shows a list of volunteer EMC Co-ordinators who would be pleased to help".

Thanks for that Angus. If readers do not have access to the Internet, a telephone call to headquarters should put you in contact with your local EMC Co-ordinator. ♦

WEB SEARCH

Shirehampton Radio Club	www.shirehampton-arc.org.uk
Braintree and District Radio Club	www.badars.org.uk
RSGB EMC Committee	www.qsl.net/rsgb_emc

By Ian Poole, G3YWX

5 Meadway, Staines, Middx TW18 2PW.

E-mail: ian_poole@lineone.net

Ian Poole describes the different types of capacitors available and explains which ones should be used for which jobs.

An introduction to capacitors

A capacitor is a component that stores electric charge. In its simplest form it consists of two parallel plates close to one another separated by an insulator, as shown in **Fig 1**. The insulating material between the plates is known as the *dielectric*, and its properties affect many of the properties of the capacitor as a whole.

Without any external electrical influence, these plates would be at the same potential and the number of free electrons on each plate available for carrying current would be the same. However, if a battery is connected across the plates a current flows for a short while. As the current consists of a movement of electrons, this results in one of the plates having an excess of electrons and the other being depleted of an equal number. One plate is said to be negatively charged (the one with the excess of electrons) and the other positively charged (the one depleted of electrons).

If the battery is disconnected and the plates are connected together, electrons from one plate will flow around the circuit to make up for the lack on the other plate and a current will again flow (see **Fig 2**.)

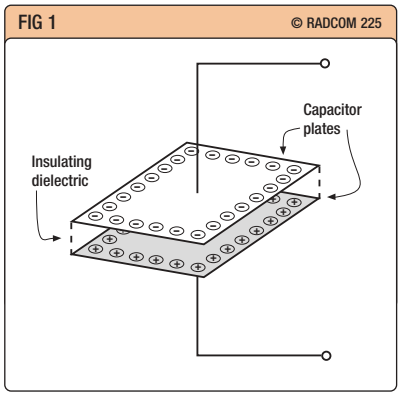
In any circuit there is some resistance and as a result sufficient charge cannot flow into the capacitor to charge it up instantly. When a capacitor is charging up, the current is initially high, and the voltage across the capacitor is small. As the charge builds up, so does the voltage across the plates, but so also the current decreases. Eventually a point is reached where the voltage across the capacitor is the same as that of the battery and no current flows. Similarly for discharging the capacitor, any resistance will prolong this.

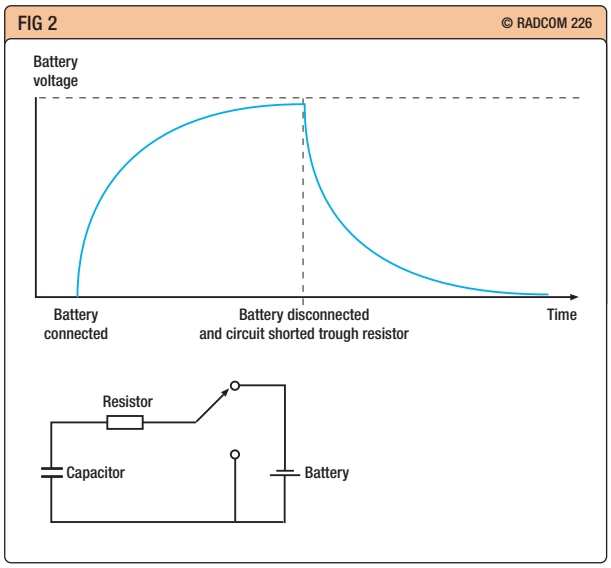
The size of the capacitor is important. The larger the plates, the greater the level of charge that can be stored. The level of charge that can be stored can also be increased by moving the plates closer together or changing the dielectric between them.

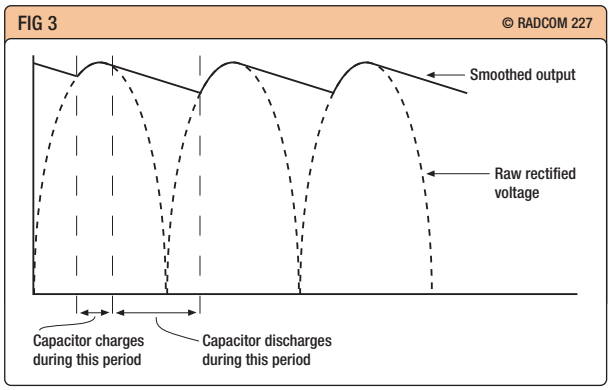
Fig 1
A basic capacitor.

Fig 2
Charging and discharging a capacitor.

Fig 3
Using a capacitor to smooth an AC waveform from a rectifier.







A DEFINITION

The definition of a one Farad capacitor is that it is able to store sufficient charge to enable one amp to flow for one second when the voltage across its plates is one volt. In reality a one Farad capacitor would be very large and for normal circuits capacitors that are much smaller are used. Typically they may be a few millionths of a Farad (microfarads, μF) or in the case of many radio frequency circuits they may be a few million millionths of a farad (picofarads, pF).

In just the same way that resistors impede the flow of a direct (and alternating current) so a capacitor impedes the current flow of an alternating waveform. This is because it does not have an infinite capacity (charge storing capability) and when the alternating waveform is applied only a certain amount of current can flow. This 'resistance' is known as the *reactance* of the capacitor, and it is also measured in ohms. However, it is dependent upon the frequency that is passing through the capacitor. It is quite simple to work out what the reactance of a capacitor is at any frequency from the formula:

$$Xc = \frac{1}{2 \pi f C}$$

where Xc is the capacitive reactance, π is 3.142, f is the frequency of operation in Hertz, and C is the capacitance expressed in Farads.

APPLICATIONS

A capacitor can be used in a number of applications. As it is essentially a component that stores charge, one of the most obvious applications is for *smoothing* in an alternating current (AC) power supply (see **Fig 3**). Once rectified, the resulting waveform is very rough. If applied to an electronic circuit in this form it would not operate correctly: some means of smoothing the supply is needed. A capacitor is able to charge during the peak periods of the waveform, giving out its charge when the incoming voltage falls away.

Capacitors may also be used to allow through an AC signal whilst blocking direct current (DC). Once the capacitor has been fully charged no current will flow in the circuit even if a large voltage is present. If an alternating waveform is applied to the capacitor circuit the capacitor will be continually charging and discharging. For this to happen a current must be continually flowing in the circuit. This means that the capacitor will only allow through changing waveforms. Anything that is steady, such as direct current, will not pass. In this way a capacitor is able to block DC whilst allowing an AC signal through, as shown in **Fig 4**.

This use of capacitors may also be

FIG 4 © RADCOM 228

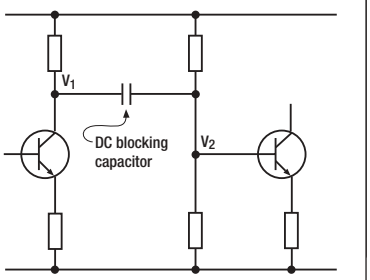
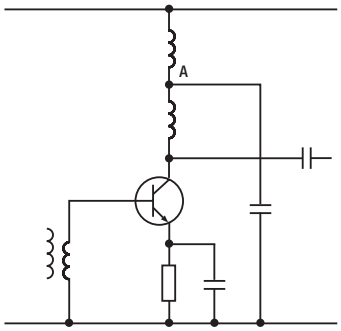


Fig 4
Using a capacitor to smooth an AC waveform from a rectifier.

FIG 5 © RADCOM 229



Capacitor smoothes varying voltages thereby removing any signal from point A

Fig 5
An example of using a capacitor to remove any AC signal from a supply or bias point.

utilised to remove a signal component from a supply line or DC bias point. Here the capacitor acts in exactly the same way as before, allowing through the varying components and smoothing out the voltage on the supply or bias point. However, the capacitor is connected from the point that needs the signal removed down to earth (see **Fig 5**).

Capacitors are also used in tuned circuits. Here it is the *rate* at which they charge and discharge that determines the parameters of the circuit. When they are used with an inductor, they can be used to give a resonant peak, thereby selecting and rejecting signals.

Although capacitors are used in a variety of different applications, in fact they perform exactly the same function in each case: it is simply a slightly different end result that is required. ♦

WEB SEARCH

Ian Poole, G3YWX, amateur radio site	www.radio-electronics.com
Ian Poole professional radio site	www.adrio-communications.com

TYPES OF CAPACITOR

There are many different types of capacitor that can be used, each having slightly different properties as a result of the dielectric. The most commonly used types are ceramic, plastic film, electrolytic and tantalum, the names referring to the type of dielectric in the capacitor.

Ceramic

Ceramic capacitors are normally used for radio frequency and some audio applications. They range in value from as low as a few picofarads to around 0.1 microfarads. In view of their wide range and suitability for RF applications they are used for coupling and decoupling in particular. They have the advantage that they are cheap and reliable. Their stability and tolerance is not nearly as good as silver mica types, and as a result they are rarely used in tuned circuits.

There are a number of variants of ceramic dielectrics. For low values a dielectric designated 'COG' is normally used. This has the lowest dielectric constant but gives the highest stability and lowest loss. Where higher values are required in a given size, a dielectric with a higher dielectric constant must be used. Types with designations X7R and for higher values, Z5U are used, however, their stability and loss are not as good as the capacitors made with COG dielectric.

Silver Mica

Silver mica capacitors are not as widely used these days. However, they can still be obtained and are used where the stability of capacitance value is of great importance and where low loss is required. In view of this, one of their major uses is within the tuned elements of circuits like oscillators, or within filters. The values of these capacitors range from just a few picofarads up to two or three thousand picofarads.

These capacitors are manufactured by plating silver electrodes or plates directly on to the mica dielectric. Like most other capacitors several layers are used to achieve the required capacitance. Wires for the connections are added and then the whole assembly is encapsulated. Early types used a wax encapsulation, although ceramic encapsulations are used now.

Plastic film capacitors

There are a number of different types of plastic film capacitors, polycarbonate, polyester and polystyrene being the most common. Each has its own properties, allowing them to be used in specific applications. Values range anywhere from several picofarads to a few microfarads, depending on the type. Normally they are non-polar, ie they are not sensitive to the DC bias across them. In general they are good general-purpose capacitors that may be used for a variety of purposes, although their high frequency performance is not normally as good as the ceramic types.

Electrolytic

This type of capacitor is the most common for values greater than about 1 microfarad. It is constructed using a thin film of oxide on an aluminium foil. An electrolyte is used to make contact with the other plate. The two plates are wound around one another and then placed into a can, often of aluminium.

These capacitors are what is termed 'polarised': they must be connected into a circuit so that any DC bias placed across them aligns with the markings on the can. If they are connected incorrectly they can be damaged and, in extreme instances, explode.

Care should also be taken not to exceed the rated working voltage, operating them well below their rated value. In power supply applications significant amounts of current may be drawn from them. Current flowing in the capacitor can place a stress on the component and as such many large value capacitors have a maximum ripple current which should not be exceeded. It is also worth noting that electrolytic capacitors have a limited life. It may be as little as 1000 hours at the maximum rating, although it will be considerably longer if run well within specification.

Electrolytics have a wide tolerance. Typically the value of the component may be stated with a tolerance of -50% +100%. As such they are used in smoothing applications for power supplies. They are not normally used for high frequency applications as their performance falls with frequency.

Tantalum

Ordinary aluminium electrolytic capacitors are rather large for many uses. In applications where size is of importance, tantalum capacitors may be used. These are much smaller than the aluminium electrolytics and instead of using a film of oxide on aluminium use a film of oxide on tantalum. They do not normally have high working voltages: 35V is normally the maximum, and some even have values of only a volt or so.

Like electrolytics, tantalums are polarised and are very intolerant of being reverse biased, often exploding when placed under stress. They are also very intolerant of over voltage situations. However, their small size makes them attractive for many applications.

Table 1 summarises a number of different applications and explains which type of capacitor would best be used for that application.

Table 1
Uses of various types of capacitor.

Application	Suitable types	Reasons
Power supply smoothing	Aluminium electrolytic	High capacity, high ripple current
Audio frequency coupling	Aluminium electrolytic	High capacitance
	Tantalum	High capacitance, small size
	Polyester / polycarbonate	Cheap, but values not as high as electrolytics
RF coupling	Ceramic COG	Small, cheap, low loss
	Ceramic X7R	Small, cheap, but higher loss than COG
	Polystyrene	Very low loss, but larger than ceramic
RF decoupling	Ceramic COG	Small, low loss. Values limited to around 1000pF
	Ceramic X7R	Small, low loss, higher values available than for COG types
Tuned circuits	Silver mica	Close tolerance, low loss, but expensive
	Ceramic COG	Reasonable tolerance, low loss, although not as good as silver mica

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* LCD readout
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Gain 2.15/6.2/8.4dB
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Butternut HF-6V
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Height (Adj): 26 ft (7.9 m)
Weight: 12 lbs (5.4 kg)
Impedance: Nom 50 ohms
VSWR: 1.5:1 or less
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5 Bands - 80-10m
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CR-627 6&2&70 Mobile	£33.95
X-200 2&70 Base	£58.95
X-300 2&70 Base	£63.95
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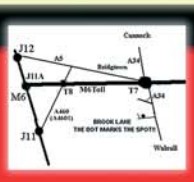

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AT-1000

1KW Auto ATU - 1.8-54MHz - 1-8 secs Tune - Approx SWR Rating of 10:1

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Power rating 200w

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One-Plug Power is the internal FT-817 battery solution you have been waiting for until now.

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One-Big Punch

One BIG Punch (OBP) is a custom add-on accessory for the Yaesu MH-31 microphone commonly used with many Yaesu amateur radios

OBP £49.95

Speech Compressor for the Yaesu MH-31 mic and FT817 FT857, FT897. Improve the TALK POWER.

Hand Mike £57.95

W4RT Electronics Microphone with One BIG Punch Speech Compressor included.

The One BIG Punch is an AF-based speech compressor specifically configured to provide remarkable increase in talk power while maintaining good audio quality. The OBP is NOT a clipper, but a compressor providing great voice compression, high-level limiting, and noise gating. The unit can be mounted inside the MH-31, requires no additional electrical power, and can be turned on or off by using the MH-31's TONE switch.

One-Board-Filter

The One-Board Filter (OBF) affords you the opportunity to have both the Collins CW and SSB mechanical filters available in your FT-817 together!

OBF £229.95

Replace two filters in the space of one. OBF includes the two optional filters and fitting.

Collins Mechanical Filters
for the Yaesu FT-817, 857 & 897.

500 Hz CW - £94.95 ***2.3kHz SSB - £94.95***

This is the option that many, many FT-817 owners have requested. The OBF utilizes Collins Mechanical Filters that are the same as used in the optional Yaesu filters for the FT-817. The bandwidth of the 7-pole CW filter is 500 Hz and the 10-pole SSB filter is 2.3 kHz. The One-Board Filter is NOT available for installation by FT-817 owners. This is not a "do-it-yourself" option. The One-Board Filter must be installed by RADIOWORLD, or a competent engineer . If in doubt please call for details.

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It requires no external power and works with both manual and automatic tuners.

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Simply snaps into position. Adjust for desired height. Complete with non slip feet and allen wrench.

Professional-Grade FT-817 Stand

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Suits most Icom Radios

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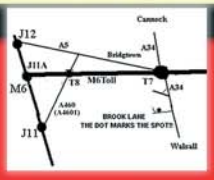

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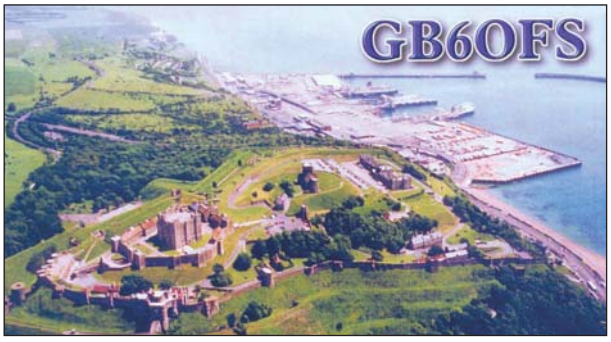
A compilation of reports from radio clubs around the country received by the time of going to press.

D-Day 60th anniversary

DOVER CASTLE

It comes as a surprise to many people to learn that, at the same time as preparations were being made for the landings in Normandy, a massive plan of deception was taking place in Dover. Artificial ships were docked in Dover harbour, cardboard lorries and inflated rubber tanks stood on the roads approaching the coast, bogus tents were erected on the hillsides and, from high up on the hill at Dover Castle poured a stream of important-sounding radio messages, many of them in meaningless code. The signallers operated their red-hot radio sets from the tunnels underneath the Castle, feeding their aerial arrays on the surface through three ventilation ducts. This was known as Operation Fortitude South - and it was all a hoax.

The object was to deceive Hitler into thinking that the invasion by the Allies was going to take place at Calais some weeks later. It worked. The deception was so successful that Hitler moved one division of his army *from* Normandy, right up to the Pas de Calais coast. Rommel felt so secure that he even took the week-end off and returned to Germany to celebrate his wife's birthday.



An aerial photograph of Dover Castle and harbour forms the GB6OFS QSL card.

Without the operations in the Dover area and the radio messages from Dover Castle, the D-Day landings would have been even more hazardous, not to say almost impossible.

Although little was organised by Dover Castle or the town of Dover to commemorate these events, the Dover Amateur Radio Club took up the challenge and set up an exhibition and special event station in the grounds of Dover Castle on 5 and 6 June. Many of the club members appeared in authentic uniforms. They had modern HF and VHF stations, keeping in touch with both fellow radio amateurs locally and throughout the world, and also with other special D-Day stations in the UK and Normandy. Their main task was to tell the story of Operation Fortitude South and how Dover contributed to the success of the D-Day landings.

Under the callsign GB6OFS, they made over 200 contacts in 26 countries, including Utah Beach on VHF thanks to a tropo opening, and an unconfirmed contact with Juno Beach on HF.

In addition, there were three vintage radio sets working and operational, plus five army portable sets which were also still functional. They were able to contact amateurs as far away as Scotland, plus stations on the Normandy beaches Gold and Omaha using AM and CW.

But this is only a small part of what was on show. One of the most exciting parts, perhaps, because it was live and immediate, but the historical side was not forgotten. Over the weekend of 5 / 6 June a large number of people visited the site, from as far afield as Japan, Australia, the USA and Russia. One German visitor had an exceptionally interesting tale to tell, as he had been a boy in Berlin when, in 1945, the Russians marched in just after Hitler had committed suicide.

The tourists and local residents were able to inspect the historic tunnels under Dover Castle from where the actual radio messages were sent and Operation Fortitude South controlled, and then visit the Dover Radio Club site to look at some of the interesting exhibits. The exhibition comprised a wide range of vintage radio equipment actually used during WWII, including some fascinating spy sets and a genuine working German Enigma coding machine (a valuable rarity). Apart from this, club members prepared displays of relevant wartime photographs, carefully collected and researched.

Altogether, a most worthwhile and successful venture, well in the tradition of the Dover Radio Club.

David Harding, G0DQI

Two of the Dover Amateur Radio Club's younger members, 15-year old Nathan De-Thabrew, 2E1NFD, and Martyn Austin, M3MSN (age 12), in authentic 1940s uniform in the field station produced by Ian Keyser, G3ROO. The No 19 set behind was used to contact special event stations on the Normandy beaches.

John Elgar-Whinney behind his collection of WWII radios. A suitcase radio can be seen and to the left is a fully restored Enigma machine. The circular chart is one of the early plotting charts used by the Royal Observer Corps.

YEOVIL

Members of the Yeovil Amateur Radio Club with their impressive display of WWII radio equipment.

On 10 June, Bob Woolbridge, G7LNJ, and other members of the Yeovil Amateur Radio Club put on a narrated display of WWII radio equipment as an event to mark the 60th anniversary of D-Day. The comprehensive display included CR100, R1155 and HRO receivers, a 19 Set, and a Class D wavemeter. The event was well attended and a VIP guest was David Laws, MP, the Member of Parliament for Yeovil. Other visitors included the Chairman and Secretary of the South Dorset Radio Society.

Rob Micklewright, G3MYM, gave an interview on BBC local radio about the importance of radio during WWII and this was broadcast live during the afternoon of 11 June.

A massive force was collecting secretly in the south and west of England. It was 5 June 1944, and they were preparing to travel to the Normandy coast. The code-name for the undercover operation was Overlord. During the night, soldiers embarked, ships put to sea, and aeroplanes, some dragging gliders, took off. By the gloomy dawn of the next morning, the D-Day landings had started, heralding the start of operations which aimed to bring WWII to an end. Radio amateurs marked its 60th anniversary with exhibitions and special event stations throughout the country…

commemorations

SOUTH DORSET

Members of the South Dorset Radio Society operated GB6OD from Nothe Fort in Weymouth on 6 June. During the course of the day permission was received to fire a field gun to commemorate the D-Day anniversary. Several members of the club took time off from operating GB6OD to take part in the firing.

PHOTO BY STEVE WHITE, G3ZVW

Members of the South Dorset Radio Society take time off from GB6OD to fire the field gun at Nothe Fort to commemorate the D-Day anniversary.

SOUTH YORKSHIRE

The South Yorkshire Amateur Radio Society combined forces with the Mexborough and District Amateur Radio Society to put on 1940s-themed special event station GB0DDL (standing for 'D-Day Landings') at Harrop Hall. Some spectacular contacts were made among the 350-plus world-wide QSOs including stations in Pearl Harbour, Hawaii, and Arnhem, Netherlands, as well as more run-of-the-mill contacts with France, Canada, USA, Germany and the UK. Most notable was a contact with the battleship *New Jersey* which served with the Fifth Fleet in the Pacific Ocean during WWII.

Members of the SYARS and Mexborough & DARS said, "It was a pleasure to speak to so many people who had relatives, and in some cases

Members of the South Yorkshire ARS and the Mexborough & DARS gather outside Harrop Hall, venue of GB0DDL. The clock is in memory of one of the Mexborough club members, Roy, G0FYM, now sadly a silent key, who used to bring it along to club activities.

Operating GB0DDL from under the flags of the Allies.

took part in themselves, operations encompassing the D-Day landings. Our station was in remembrance of not only the soldiers who fought on the beaches (on all sides), but also the 'secret warriors' and radio operators, who helped Operation Overlord reach its objectives, thereby bringing the war to a quick close. Special mention should be made of Chris, G1VDP, for his perseverance on HF, and to everyone who helped get the station ready, too numerous to name - it was a good example of amateur radio co-operation. Harrop Hall looked spectacular, and had a great 1940s 'feel'."

All the GB0DDL station operators were given an A4 'Certificate of Participation' by Andrew Lomas, M0ALA.

ISLE OF WIGHT

The Brickfields Amateur Radio Society operated GB60NL ('Normandy Landings') from the airport at Sandown on the Isle of Wight during the two-day Sandown airshow. The show attracted some 7000 visitors - although not all of these visited the GB60NL 'hospitality suite'!

Over 300 contacts were made during the time the show was open to the public. A H Gardner, G0NTH, of the Brickfields Amateur Radio Society said: "We used a 'tactical' antenna in the form of a delta loop and with a 100 watts output worked 16 countries - 15 of these on 40 metres - although our aim was to work as many UK and nearby countries as possible. For us the station was also a further success because as a result of our efforts we have now been asked to run a special event station for a 1940s re-enactment group on 10 / 11 July."

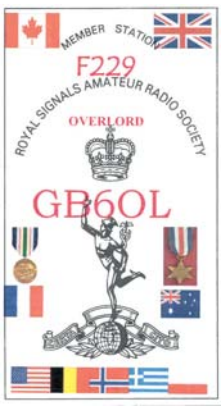
ROYAL SIGNALS ARS

Members of the Royal Signals Amateur Radio Society (RSARS, www.rsars.org.uk) operated GB6OL, standing for 'Overlord', to commemorate the 60th anniversary of D-Day. Mike Humphrey, G0SWY, writes: "We, the members of the RSARS, are remembering those that did and did not survive the beaches on this 60th anniversary of the invasion. The flags on the front of the GB6OL QSL card represent some, but by no means all, of the Allied countries that took part in Overlord."

In addition to the QSL card, a free certificate (shown here) is available for those who made contact with GB6OL. Contact g0swy@aol.com for information.

Membership of RSARS is open to all members and ex-members of the British Army or overseas Signal Corps or Regiments, British Commonwealth Forces, NATO or UN attachments. E-mail memsec@rsars.org.uk for more details.

The certificate available for stations contacting GB6OL.



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BNC Solder type plug (Small entry).....**£1.00**
BNC Solder type plug (Large entry).....**£2.50**
N-Type plug (Small entry).....**£2.50**
N-Type plug (Large entry).....**£2.50**
SO239 Chassis socket (Round).....**£1.00**
SO239 Chassis socket (Square).....**£1.00**
N-Type Chassis scoket (Round).....**£2.50**
N-Type Chassis scoket (Square).....**£2.50**
SO239 Double female adapter.....**£1.00**
PL259 Double male adapter.....**£1.00**
N-Type Double female.....**£2.50**
SO239 to BNC adapter.....**£1.50**
SO239 to N-Type adapter.....**£3.00**
SO239 to PL259 adapter (Right angle).....**£2.50**
SO239 T-Piece adapter (2xPL 1XSO).....**£3.00**
N-Type to PL259 adapter (Female to male).....**£2.50**
BNC to PL259 adapter (Female to male).....**£2.00**
BNC to N-Type adapter (Female to male).....**£2.50**
BNC to N-Type adapter (Male to female).....**£2.50**
SMA to BNC adapter (Male to female).....**£3.95**
SMA to SO239 adapter (Male to SO239).....**£3.95**
SO239 to 3/8 adapter (For antennas).....**£3.95**
3/8 Whip stud (For 2.5mm whips).....**£2.95**
Please add just £2.00 P&P for connector only orders

10/11 METRE ANTENNAS

G.A.P.12 1/2 wave alumimum (length 18' approx).....**£24.95**
G.A.P.58 5/8 wave aluminium (length 21' approx).....**£29.95**
S27-3 3-element yagi. Freq: 27-28MHz. Length: 2.5mtrs. Gain: 8.5dB.....**£59.95**
S27-4 4-element yagi. Freq: 27-28MHz. Length: 3.8mtrs. Gain: 10.5dB.....**£69.95**

BALUNS

MB-1 1:1 Balun 400 watts power.....**£24.95**
MB-4 4:1 Balun 400 watts power.....**£24.95**
MB-6 6:1 Balun 400 watts power.....**£24.95**
MB-1X 1:1 Balun 1000 watts power.....**£29.95**
MB-4X 4:1 Balun 1000 watts power.....**£29.95**
MB-6X 6:1 Balun 1000 watts power.....**£29.95**
MB-Y2 Yagi Balun 1.5 to 50MHz 1kW.....**£24.95**

TRI/DUPLEXER & ANTENNA SWITCHES

MD-24 HF or VHF/UHF internal duplexer (1.3-225MHz) (350-540MHz) SO239/PL259 fittings.....**£22.95**
MD-24N same spec as MD-24 but "N-type" fittings.....**£24.95**
MX2000 HF/VHF/UHF internal Tri-plexer (1.6-60MHz) (110-170MHz) (300-950MHz).....**£59.95**
CS201 Two-way di-cast antenna switch. Freq: 0-1000MHz max 2,500 watts SO239 fittings.....**£18.95**
CS201-N Same spec as CS201 but with N-type fittings.....**£28.95**
CS401 Same spec as CS201 but4-way.....**£49.95**

ANTENNA ROTATORS

AR-31050 Very light duty TV/UHF.....**£24.95**
AR-300XL Light duty UHF\VHF.....**£49.95**
YS-130 Medium duty VHF.....**£79.95**
RC5-1 Heavy duty HF.....**£349.95**
RG5-3 Heavy Duty HF inc pre set control box.....**£449.95**
AR26 Alignment Bearing for the AR300XL.....**£18.95**
RC26 Alignment Bearing for RC5-1/3.....**£49.95**

MOBILE MOUNTS

Turbo mag mount 7" 4mtrs coax/PL259 3/8 or SO239.....**£14.95**
Tri-mag mount 3 x 5" 4mtrs coax/PL259 3/8 or SO239.....**£39.95**
Hatch Back Mount (stainless steel) 4 mts coax/PL259 3/8 or SO239 fully adjustable with turn knob.....**£29.95**
Gutter Mount (same as above).....**£29.95**
Rail Mount (aluminium) 4mtrs coax/PL259 sutiable for up to 1inch roof bars or poles 3/8 fitting.....**£12.95**
SO259 fitting.....**£14.95**
Gutter Mount (cast aluminium) 4mtrs coax/PL259 3/8 fitting.....**£9.95**
SO259 fitting.....**£12.95**
Hatch Back Mount 3/8 4mtrs coax/PL259.....**£12.95**
Roof stud Mount 4mts coax/PL259 3/8 or SO239 fitting.....**£12.95**

ANTENNA WIRE & RIBBON

Enamelled copper wire 16 gauge (50mtrs).....**£11.95**
Hard Drawn copper wire 16 gauge (50mtrs).....**£12.95**
Equipment wire Multi Stranded (50mtrs).....**£9.95**
Flexweave high quality (50mtrs).....**£27.95**
PVC Coated Flexweave high quality (50mtrs).....**£37.95**
300Ω Ladder Ribbon heavy duty USA imported (20mtrs).....**£15.00**
450Ω Ladder Ribbon heavy duty USA imported (20mtrs).....**£15.00**
(Other lengths available, please phone for details)

HF BALCONY ANTENNA

BAHF-4 FREQ:10-15-20-40 Mtrs LENGTH: 1.70m HEIGHT: 1.20m POWER: 300 Watts.....**£159.95**

MISCELLANEOUS ITEMS

CDX Lightening arrestor 500 watts.....**£19.95**
MDX Lightening arrestor 1000 watts.....**£24.95**
AKD TV1 filter.....**£9.95**
Amalgamating tape (10mtrs).....**£7.50**
Desoldering pump.....**£2.99**
Alignment 5pc kit.....**£1.99**

TELESCOPIC MASTS (aluminium & fibreglass options)

TMA-1 Aluminium mast ★ 4 sections 170cm each ★ 45mm to 30mm ★ Approx 20ft erect 6ft collapsed.....**£99.95**
TMA-2 Aluminium mast ★ 8 sections 170cm each ★ 65mm to 30mm ★ Approx 40ft erect 6ft collapsed.....**£189.95**
TMF-1 Fibreglass mast ★ 4 sections 160cm each ★ 50mm to 30mm ★ Approx 20ft erect 6ft collapsed.....**£99.95**
TMF-2 Fibreglass mast ★ 5 sections 240cm each ★ 60mm to 30mm ★Approx 40ft erect 9ft collapsed.....**£189.95**

HF YAGI

HBV-2 2 BAND 2 ELEMENT TRAPPED BEAM FREQ:20-40 Mtrs GAIN:4dBd BOOM:5.00m LONGEST ELEMENT:13.00m POWER:1600 Watts.....**£399.95**

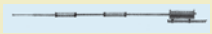
ADEX-3300 3 BAND 3 ELEMENT TRAPPED BEAM FREQ:10-15-20 Mtrs GAIN:8 dBd BOOM:4.42m LONGEST ELE:8.46m POWER:2000 Watts.....**£329.95**

ADEX-6400 6 BAND 4 ELEMENT TRAPPED BEAM FREQ:10-12-15-17-20-30 Mtrs GAIN:7.5 dBd BOOM:4.27m LONGEST ELE:10.00m POWER:2000 Watts.....**£599.95**
40 Mtr RADIAL KIT FOR ABOVE.....**£99.00**

HF VERTICALS

VR3000 3 BAND VERTICAL FREQ: 10-15-20 Mtrs GAIN: 3.5dBi HEIGHT: 3.80m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials).....**£99.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**

VR5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 4.00m RADIAL LENGTH: 2.30m (included). POWER: 500 Watts.....**£189.95**



EVX4000 4 BAND VERTICAL FREQ:10-15-20-40 Mtrs GAIN: 3.5dBi HEIGHT: 6.50m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials).....**£119.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**
OPTIONAL 40mtr radial kit.....**£14.95**

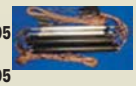
EVX5000 5 BAND VERTICAL FREQ:10-15-20-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 7.30m POWER: 2000 Watts (without radials) POWER: 500 Watts (with optional radials).....**£169.95**
OPTIONAL 10-15-20mtr radial kit.....**£39.95**
OPTIONAL 40mtr radial kit.....**£14.95**
OPTIONAL 80mtr radial kit.....**£16.95**

EVX6000 6 BAND VERTICAL FREQ: 10-15-20-30-40-80 Mtrs GAIN: 3.5dBi HEIGHT: 5.00m RADIAL LENGTH: 1.70m(included) POWER: 800 Watts.....**£299.95**

EVX8000 8 BAND VERTICAL FREQ:10-12-15-17-20-30-40 Mtrs (80m optional) GAIN: 3.5dBi HEIGHT: 4.90m RADIAL LENGTH: 1.80m (included) POWER: 2000 Watts.....**£319.95**
80 MTR RADIAL KIT FOR ABOVE.....**£89.00**
(All verticals require grounding if optional radials are not purchased to obtain a good VSWR)

TRAPPED WIRE DI-POLE ANTENNAS

(Hi Grade Heavy Duty Commercial Antennas)



UTD160 FREQ:160 Mtrs LENGTH:28m POWER:1000 Watts.....**£49.95**
MTD-1 (3 BAND) FREQ:10-15-20 Mtrs LENGTH:7.40 Mtrs POWER:1000 Watts..**£44.95**
MTD-2 (2 BAND) FREQ:40-80 Mtrs LENGTH: 20Mtrs POWER:1000 Watts.....**£49.95**
MTD-3 (3 BAND) FREQ:40-80-160 Mtrs LENGTH: 32.5m POWER: 1000 Watts.....**£89.95**
MTD-4 (3 BAND) FREQ: 12-17-30 Mtrs LENGTH: 10.5m POWER: 1000 Watts.....**£44.95**
MTD-5 (5 BAND) FREQ: 10-15-20-40-80 Mtrs LENGTH: 20m POWER:1000 Watts.....**£79.95**
(MTD-5 is a crossed di-pole with 4 legs)

PATCH LEADS

STANDARD LEADS
1mtr RG58 PL259 to PL259 lead.....**£3.95**
10mtr RG58 PL259 to PL259 lead.....**£7.95**
30mtr RG58 PL259 to PL259 lead.....**£14.95**

MILITARY SPECIFICATION LEADS
1mtr RG58 Mil spec PL259 to PL259 lead.....**£4.95**
10mtr RG58 Mil spec PL259 to PL259 lead.....**£10.95**
30mtr RG58 Mil spec PL259 to PL259 lead.....**£24.95**
1mtr RG213 Mil spec PL259 to PL259 lead.....**£4.95**
10mtr RG213 Mil spec PL259 to PL259 lead.....**£14.95**
30mtr RG213 Mil spec PL259 to PL259 lead.....**£29.95**
(All other leads and lengths available, ie. BNC to N-type, etc. Please phone for details)

SPX-100 'PLUG N GO'

Normally £49.95. This month **£39.95**!! Plus £6.00 P&P
6mtrs through to 80mtrs.
Change band by using a simple fly lead and socket at the base coil and fine tune with the adjustable telescopic whip.
Standard 3/8 thread 1.65mtrs fully extended.

ALL PICTURES ARE FOR REFERENCE ONLY

By Tim Seed, M0FGC / A45WG/M

PO Box 2260, Ruwi PC 112, Oman.

E-mail: deepstar@omantel.net.om

If you want the ultimate in HF mobile performance you will need a big antenna. The High Sierra 1800/Pro may be just the thing.

The High Sierra 1800/Pro

The basic antenna, without the 6ft whip attached.

A close-up of the High Sierra universal mounting bracket.

The control box and cable.

I am lucky in that I live in the Middle East, in a country, Oman, that allows and encourages ham radio. At home I have a modest base station set-up, but often at the weekends (Thursday and Friday here in the Middle East) we head out into the desert for camping, exploring and socialising with friends. In summer, these trips head to the mountains as the weather is too hot at sea level (50°C). As we often visit remote places, and are always in a very hostile climate, I had taken to packing a small HF emergency radio kit. Despite much fun, it never really gave me the confidence that, if we needed it for real, we would be able to contact anyone. So the idea of a bigger, better, more trustworthy mobile installation was born. We drive a five-year old Land Rover Discovery Turbo Diesel - so how difficult can it be to go mobile? The answer, surprisingly, was very easy indeed.

WHICH ANTENNA?

There are two antenna routes you can take for HF mobiling: a set of monoband antennas that you stop and switch, or a single antenna that you can tune to work on any band. As we often spend four to five hours in the Land Rover just getting to a location, the thought of extra delays just so that I could see if anything was happening on 20m did not sound like a plan. So for us it had to be a tuneable antenna. I was also able to save some money and space by not requiring an ATU in the vehicle.

After several weeks of searching, head scratching, reading, considering building my own and costing we went for the High Sierra 1800/Pro. One of the main factors were the reviews from other hams on eHam.Net and the RSGB recommendations for mobile operations, which I found very helpful for a starting point [see 'Further reading' - *Ed*].

A very short time expired between ordering the antenna and a large box over 6ft long arriving. The process of reading the antenna installation manual began. After two or three reads I went outside and had a good look at the vehicle - then came back in and re-read the manual again.

With the basic components out of the well-packed delivery material I thought, "wow… how are we going to fit that!", or words to that effect. Let me make this very clear: the 1800/Pro is a large antenna. It weighs 2.5kg, and requires some substantial mounting to be secure and safe. It consists of a 4ft tuning / lower section that can be used without the second item, a 6ft steel whip. A control box with a simple rocker switch allows you to tune the antenna from inside the vehicle. Fully assembled the antenna ranges from between 10 and 14ft tall, so take care with those multi-storey car parks.

The initial shock of seeing how large this antenna was subsequently quietened by the absolutely excellent instruction manual. The images of the fitting to previous vehicles could be clearer, but as they are nearly all large US pickups, 'RVs', truck cabs and a tractor, alas I did not get too many ideas. The 4ft lower section mates into a very neat and well-designed supplied fixing plate, the construction of which allows you quickly to install and remove the antenna when you require.

The Pro pack also included the coax cable, PL259s, a mounting plate, as well as the antenna control box. The only thing you have to do is somehow attach the mounting plate to your vehicle.

MOUNTING

My goal was not to drill anything, install roof bars, or do anything that would ultimately damage the resale value of the vehicle. Magnetic mounts for a smaller antenna may be the easiest solution, but an antenna of this size requires firmly bolting on. The second requirement was that the antenna had to be in a safe place, somewhere where it did not interfere with the driver's view of the road (so not on the bull-bars), and did not require taking apart when parking the car (we have a car shade, a sort of a Middle Eastern version of a garage, a little over 2.0m high. When installed the antenna is now below the height of the Discovery).

Just as I had formulated a plan, we were joined by Rodger Baines, A4/G3YBO, who was on a visit to Oman. Rodger was soon co-opted on to the antenna installing committee, and off we sped to get some welding and construction done. Rodger may be well known to many readers as he works for W&S in Matlock, but I'm sorry to say that site visits are not included in the HS1800/Pro package!

The following day Roger and I picked up a sturdy steel bracket that had been made by two fine gentlemen from Bangladesh. Trying to describe in Arabic what we needed was certainly difficult, but the boys did us proud. Taking off the spare wheel on the rear of the car, two long threaded bolts that had been welded to a flat stout bar were passed through the unused wheel nut holes and the spare wheel

The author, Tim Seed, A45WG/M, with his mobile station.

Speeding along at up to 120KPH, contacts around the world are commonplace using the HS 1800/Pro.

mobile antenna

This is how A45WG/M solved the problem of mounting the antenna to the vehicle.

then replaced. Next the spare was re-attached as normal and on to these slightly protruding bolts a bracket was now firmly mounted. The High Sierra plate fitted snuggly to this bracket. This method of hanging an antenna will work for any 4WD with a spare wheel on the rear door, or you could fit the antenna to a tow hitch with some ingenuity and planning.

I did break the no drilling holes rule just once and drilled one very small hole in the spare wheel holder so I could *firmly* attach the supplied earthing cable. You cannot see the hole with the spare tyre on and I could not see any other way around this. Good grounding seems to be the key for HF mobiling.

ON THE AIR

So it was with some trepidation that the family assembled as we powered it all up. The radio hissed, and tuned, but the antenna alas refused to budge. I soon traced the problem to a connector that had a break in it. I made up a replacement part from some Bosch cable connectors, and we now had life. Later that day I wrote to the manufacturers, to explain my problem and was amazed: they replied, were helpful and replacement parts were immediately dispatched! Way to go, High Sierra - full marks for customer service!

Reduce RF power, tune the antenna, RF power up, and call CQ. Straight away I received a call from the Ukraine. Having used the antenna for several weeks now, I am still impressed. We have already clocked up 500km of off-roading, and given everything a really good shake and rattle, and nothing has dropped off. Even now the antenna looks in new condition. I've not, however, been able to test its waterproofing and am going to have to leave that part of the test to the UK boys!

For driving around town, we usually use only the lower 4ft section. Noise levels are generally high here in town, so we only work 'loud' stations: RA, YB and VU. However, the antenna does work very well even without the extension on it, with central USA being the furthest contact so far (12,000km, the same distance as working Argentina from the UK).

When we travel out of the city and into the desert we always put on the extra 6ft steel whip. There is a marked improvement in your received reports, as you would expect.

At all times the antenna tunes well. A warning light in the control box comes on when you have reached the maximum or minimum travel of the lower section. I generally tune only once for the 20, 15 and 10m bands, especially if I am moving, although on the lower bands you have to tune as you change frequency within the band. This is only to be expected with such a short antenna compared with the wavelength of the band in use.

I have placed eight small blobs of Tip-Ex on the rear glass on the vehicle, which helps me visually align the antenna before I start tuning. This has massively reduced the time and effort required to re-tune. I actually use two vertical indexes, one with the whip attached, and the other without.

One of the unexpected advantages of HF mobile is that my normal radio working times have been altered. Most of us are only able to operate at certain times, and possibly on certain bands. This ultimately stops yielding new countries. However, by being able to operate outside the normal 'window', I am now ticking places off I never even hear at my home station.

In late January, we were parked out in the desert and operating on 20m. I had a nice pile-up of VK,YB and even ZL-yes, even mobile you can run pile-ups! I managed to bag two new countries. What was more astounding was that most people did not believe they were working a mobile station, with 59 reports coming in. I was even logged on the *DX Cluster*.

Operating whilst driving at up to 120KPH we often work Thailand (59), 4X4 (59) and the UK (RS 45). Now how can you complain at that? My wife writes the log for me, while our daughter in the back shouts things like "take the VK, she sounds funny" - and the whole family is occupied.

One spin-off from having the mobile installation is that many people have asked me "what is it?" I do not think one of them has not been impressed when I have said "let me show you" and we have called up someone for them. They have all gone away thinking good things about amateur radio, so maybe you too can be a smaller form of GB4FUN! The best thing is that my wife thinks it is really cool and now wants to take her own licence. Had I known HF mobile would have been this easy, I would have done it ages ago.

[The High Sierra 1800/Pro mobile antenna is available in the UK from Waters & Stanton plc, tel: 01702 206835, for £379.95. Two versions are available: grey or black. An HS-160 160m adapter is available as an option for £89.95 -*Ed.*] ♦

FURTHER READING

The Amateur Radio Mobile Handbook by Peter Dodd, G3LDO. RSGB. Available from the RSGB Shop.

Wireless Waves at Bletchley Park

31 July - 1 Aug 2004

STATION X BLETCHLEY PARK

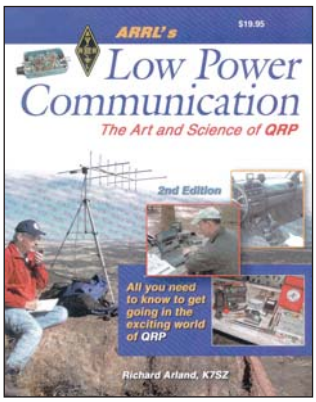
This annual event held at the home of the Second World War codebreakers celebrates the importance of the Y Service during the war. 'Wireless Waves around Bletchley' will explain their contribution to the war effort with a number of special events happening across the two days, including:

- **A special display on Y stations and spy sets**
- **Exclusive lectures including:**
  'Funkers and Sparkers' - 13:00 on both days
  'The Importance of Y stations' - 14:00 on Sunday
  by Gwendoline Page, a former Wireless Operator
- **A German field radio station outside the Mansion**
- **Milton Keynes Amateur Radio Society will be running a temporary station on the croquet lawn**
- **Original wireless and landline communications equipment will be on view in the Diplomatic Wireless Service Museum**
- **The Enigma Cinema will be showing documentaries on how communications have changed the world**

Admission prices: £10.00 per adult; £8.00 for concessions; under 8's are free. Admission includes FREE GUIDED TOUR and full access to the Park

For more information call Bletchley Park on 01908 640404
www.bletchleypark.org.uk

Book review



LOW POWER COMMUNICATION – THE ART AND SCIENCE OF QRP
edited by Richard Arland, K7SZ
Published by ARRL, 2nd edition, 2004
Reviewed by RSGB Staff

Richard Arland is well-known to *QST* readers as the author of the 'QRP Power' column. It therefore seems fitting that he should compile this book about his favourite subject, to try to infect others with his enthusiasm.

The first chapter is a collection of frequently-asked questions (FAQ), to ensure that the reader can understand what is to follow. The next chapter sums up the advantages of QRP operation in terms of 'RF ecology', RF exposure, using battery or solar power, virtual lack of EMC problems, the ability to work from apartments, and its relative cheapness.

Next we come to 'Getting Started', where the easy ways into QRP are discussed. Using an 'ordinary' base transceiver turned down to the 5W level is the easiest of all, and a circuit for external ALC control is given. After that, it is a matter of finding a commercially-built item via rallies, the Internet, or brand new. A comprehensive list of QRP equipment is given, which includes the Elecraft K1, K2 and KX1, the Icom IC-703, the Oak Hills Research OHR-100, the SGC 2020, the Small Wonder Labs Rockmite, the Wilderness Radio SST, Norcal-40A and Radio Sierra, the Yaesu FT-817, the MFJ 90-series, not forgetting the Ten-Tec Argonaut and Argosy, the Heathkit range, the Kenwood TS-120V and 130V, and the Index Labs QRP-Plus. An appendix gives the URLs of the manufacturers involved.

We are then introduced to QRP operating strategies, and the preference of many operators to use Morse code to make the most of their low powers. A good range of scenarios is covered – listening, DX searching, awards, DXpeditions, contesting, and unusual use of the *DX Cluster*.

A 41-page chapter on antennas follows. After all, if you're short of output power from the transceiver, you need the best antenna possible to make up the shortfall, at least partially. Several practical designs are presented.

A useful chapter on propagation follows, and some items of test equipment are then presented. Specialised QRP modes are then described; these are mainly digimodes, but mention is also made of satellites, milli- and micro-watt operation, and portable use.

Finally, emergency communications and vintage radio are covered.

This is an ideal book for the newcomer to QRP. There are no circuit diagrams of equipment to build – in fact, the only circuit I found in the entire book was one for the external control of transmitter ALC, mentioned previously. This book will get you started in QRP; how you proceed from there is up to you. An excellent companion volume (with circuit diagrams) is *QRP Basics*, by Rev George Dobbs, G3RJV, also available from the RSGB Shop.

Low Power Communication – the Art and Science of QRP
Published by American Radio Relay League, 2nd edition, 2004.
Softback, 183 x 228mm
ISBN 0 87259 917 5
Members' price £11.04
(non-members £12.99) plus P&P
Available from the RSGB Shop

HAM RADIO FOR DUMMIES
by Ward Silver
Published by Wiley, 2004
Reviewed by Dave Lawley, G4BUO

The yellow and black cover of the '…for Dummies' series is instantly recognisable, and one of the latest additions is *Ham Radio for Dummies* by Ward Silver, N0AX. The style is consistent with other books in the series, and a great deal of ground is covered.

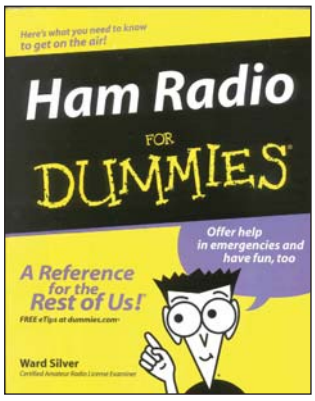
I think the main audience for this book is the newly-licensed ham rather than someone who has just encountered amateur radio for the very first time at a special event station or exhibition. The UK licence courses cannot cover everything, and this book comes into its own as a comprehensive primer covering all the varied aspects of our hobby, from contesting to repeaters, satellites to direction finding, QSLs to computers. Few hams of 25 or more years experience would have tried their hands at everything in the book, and there are tips and pointers that are valuable to all of us.

Unavoidably in a book written in the US, some parts are less relevant than others and this is particularly true of part II which tells you how to get a licence. UK readers could skip this part, pausing only to ponder the introduction in which the author says, "If you can fill out the application for a driver's license, you can get a ham radio license".

I would have liked to have seen more detail in the book on how to construct antennas such as a simple dipole - I'm dismayed by the number of ready-made dipoles in plastic bags sold by traders at rallies. The illustration of open-wire line is misleading, and the term 'balun' is used but not explained. There are many references to the *Ham Radio for Dummies* website, and practical construction of antennas gets much better treatment in the 1.5MB down-loadable 'bonus content' on the site.

In keeping with the house style, part V is the 'part of tens' in which the author dispenses ham wisdom, ten tips at a time. There's something for everyone here, from beginners to masters to station builders, and finally 10 ways to give back to ham radio. By writing a book in a friendly, accessible style and covering just about every aspect of this hobby, Ward Silver has certainly given more than his share back to ham radio.

Ham Radio for Dummies
Published by Wiley, 2004
Softback, 187 x 234mm
ISBN 0 7645-5987-7
Members' price £12.74
(non-members £14.99) plus P&P
Available from the RSGB Shop



WIN! WIN! WIN! WIN! WIN!

Five lucky people can win a copy of Ham Radio for Dummies. All you have to do is answer this simple question: what is Ward Silver's callsign?

Send your answer on a postcard or the back of a sealed envelope (no letters accepted) to: Book Competition, RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE. Entries must be received at RSGB HQ by first post on Tuesday 31 August. You must be a current member of the RSGB on the closing date of the competition (31/8/04) in order to enter.

Only one entry per member (multiple entries will be disqualified). No other correspondence can be entered into. All entries will become the property of the RSGB. Please state on your entry if you do not wish to receive further promotional material or offers from the RSGB. The competition is open to current RSGB members only. Employees of the RSGB are not eligible to enter.

By Angus Annan, MM1CCR

Easter Cottage, Blairlogie, Stirling FK9 5PX.

E-mail: emc.chairman@rsgb.org.uk

The RSGB and Power Line

Angus Annan, the RSGB Board Member with responsibility for the Environment portfolio and Chair of the RSGB EMC Committee, brings us up to date with how the RSGB is responding to the threat posed by PLT

Most members are by now aware of the concerns that have been expressed about the possible introduction of PLT in the UK and the implications for amateur radio. This article sets out how the RSGB has been addressing the problem and how PLT developments stand now.

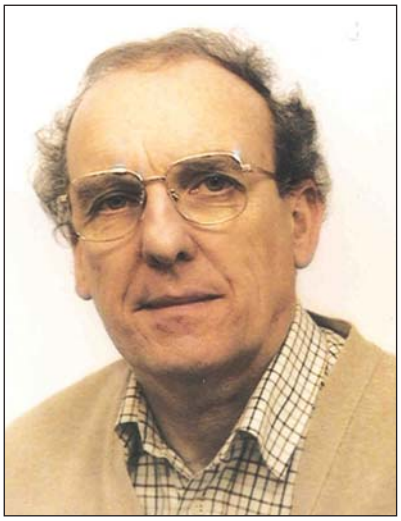
SO WHAT IS THE PROBLEM?

RadCom has published a number of articles setting out the issues, starting with 'PLT and the Future of the HF Spectrum' by Hilary Claytonsmith,G4JKS, in February 2003, 'So Why all the Fuss about Broadband and PLT?' by the President in April 2004, and 'PLT in a Nutshell' in the June 2004 'EMC' column by Dave Lauder,G0SNO.

Put simply, PLT is a technology that has been developed for using sections of the ordinary AC mains electricity supply wires as a cable network for the Internet, so bringing Internet access to businesses and households without the need for a telecoms or a cable company connection. The Internet signals would be injected at the local electricity substations and fed to households on the AC supply cables. Superficially, this may seem to be an attractive technology with an economic advantage, but the fundamental problem is that the AC mains network is totally unsuitable for this purpose. PLT signals contain RF components to over 10MHz and it is clear that the use of ordinary unshielded and unbalanced electricity cables for PLT distribution will cause interference to HF radio services. Although the idea of PLT is not new, it has assumed some significance with the move of power companies in the UK into new business areas including telecoms operations. Thus PLT has again become a concern for amateur radio and for a range of other HF radio users.

ECONOMICS AND POLITICS

Much has been heard in the news media about 'Broadband Britain' and it is clear that the UK government wants to encourage competition and



Chair of the RSGB EMC Committee, Angus Annan, MM1CCR.

choice for consumers of Internet services. This inevitably means that PLT is viewed by the UK government as a contender with other technologies such as ADSL operated over the BT telephone network. The expression 'level playing field' is often used in the economic sense, rather than the technical sense, but it is worth pointing out that ADSL operates over twisted pair telephone cables using frequencies below 1.6MHz and poses little threat of causing interference to HF radio users. Against these drivers for competition and supposed economic advantage, HF radio users have pressed for recognition of the technical realities and the potential interference problems that any wide deployment of PLT technology will cause.

PROTECTING THE HF SPECTRUM

The RSGB reaction to the PLT issue started with the first efforts by Nor.Web to launch a PLT service in the north-west area in 1997. RSGB Honorary EMC Consultants, Robin Page-Jones, G3JWI, and Dave Lauder, G0SNO, met with representatives of the company to express concerns and ensure that if the service went ahead there was an awareness of the necessity for mitigation measures on HF interference. The RSGB was foremost in urging that users of the HF spectrum should work together and the EMC consultants were instrumental in forming the UK HF Users Group. The group comprised a number of influential users and following some pressure, including arranging for questions to be asked in the House of Lords, Nor.Web dropped their plans for a PLT service. The RSGB was aware that this was unlikely to be the last that would be heard of PLT and so raised the matter at IARU Region 1in 1998.

The Radiocommunications Agency (RA) was made aware of the concerns and formed a Technical Working Group (TWG) to examine the issues on the "Compatibility of VDSL and PLT with Radio Services in the Range 1.6 to 30MHz." The RSGB played an important part in this group and was a member of the sub-group drafting the final report, ensuring that points of concern to the RSGB were included. As a result of this RSGB activity, the Honorary EMC Consultant, Hilary, G4JKS, was invited to address an EU hosted PLT workshop and the PLT Congress in Brussels. These activities were important moves in raising awareness of the issues at international levels and resisting the strong pressures from power companies and PLT equipment manufacturers.

More action followed when a European HF Users Group was formed in conjunction with IARU and was able to join in the work of EU Project Team SE 35. Voting membership of this team was restricted to national administrations, ie the DTI etc, but nevertheless the RSGB and other HF users were able to influence the final report. The result of all this effort by the Society was to ensure that officials at national and EU levels

Telecommunications (PLT)

who may feel they have to make decisions on grounds of politics, competition and economics were made fully aware of the possible EMC problems that could arise if they authorised a wide deployment of PLT systems.

CABLE NETWORKS AND RF STANDARDS

From the outset the RSGB was aware of the importance of collaborating with other parties who shared the concerns of radio amateurs and of putting the case for the protection of the HF spectrum, rather than the interests of the RSGB as a single entity. Perhaps not all members will be aware that no matter how keenly our concerns are felt, the RSGB has no real leverage to stop PLT in the UK and the real controls lie with Ofcom and the DTI. The battle really focuses on the standards to be adopted by the EU for the control of RF emissions from cable networks and here again RSGB consultants have been vigorous in pressing the case for effective controls.

At the IARU Region 1 Conference in 2002, the RSGB supported a proposal that IARU should become a member of ETSI, and so be able to participate directly in the discussions on PLT standards. The relevant forum is the ETSI/CENELEC Joint Working Group. Here HF users, including G4JKS representing the RSGB and IARU Region 1, have played a significant role in pressing for the adoption of an effective standard.

A further group, on equipment standards, revising the EU standard CISPR 22 came under pressure to "give PLT a chance" and here RSGB Honorary Consultant Richard Marshall, G3SBA, with expert knowledge of RF product emission standards, has for the last four years been actively influencing the UK response to draft changes in the standards. The objective is to ensure that expediency does not attempt to overrule the laws of physics.

ON THE GROUND AND IN THE AIR

Trials of PLT have taken place at Crieff in Scotland and other locations in the UK, sometimes supported by naive and misleading articles in the press. Wherever possible, the EMC Committee has been active in countering this publicity by responding with factual statements but, inevitably, our efforts do not achieve the same exposure as the original wonders of PLT articles that some papers chose to run.

More importantly, some of these trials have been monitored by RSGB consultants and results show conclusively that any deployment of PLT will cause local interference to reception of HF radio services. The companies promoting PLT have tried to take the line that nobody has complained during the trials, so there must be no problem, but the monitoring conducted by the RSGB, the BBC and others has been able to show that this is not the case.

Members can view and hear the results of these monitoring exercises on the RSGB website and access some of the important reports that RSGB has contributed to.

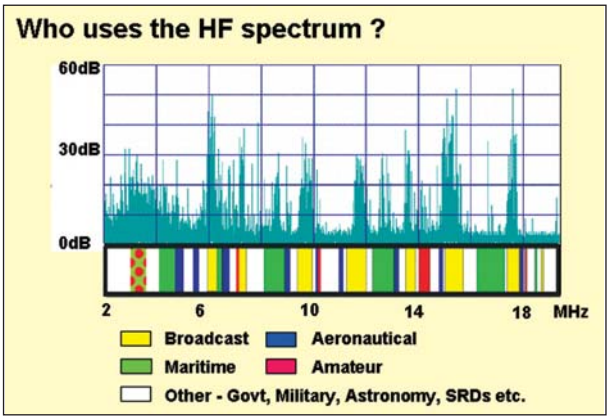
In an effort to understand better why the power companies think there is a business value in PLT technology, the Chair of the EMC Committee, Angus Annan, MM1CCR, has met with the MD of one of the companies that has been most active in this area. It was interesting to find that the company does not view PLT as a comprehensive solution to Internet distribution, but rather as an element that could be used in some locations. The company is now aware also of the necessity of having mitigation methods in place to deal with complaints of interference.

WHERE PLT STANDS NOW

It is clear that the EU Commission would like to have a standards position that enables PLT services to be launched on a wider scale, and the power companies want a set of standards that would allow them to justify further investment and development of PLT. Radio users want to see standards that will protect the HF spectrum for HF communications now and for the benefit of future generations. This has led to something of a stalemate as the two are clearly not compatible.

Meanwhile, coming up fast there are alternatives that would seem to eliminate any justification for PLT. It is ironic that the alternatives are, of course, based on 'wireless' and are creating a need for a new breed of network engineer, well versed in RF and wireless technologies. Good examples of the wireless alternatives are the pilot satellite link to provide ADSL services to Aberfoyle in Scotland and the new WI-Max standard that will provide network links at speeds up 66Mb/s.

The complexity of this work and the effort involved may seem a long way from the practicalities of operating an amateur radio station, but the RSGB has been in no doubt about the importance of the issues at stake and has been active at every accessible forum in the UK and mainland Europe. It is hoped that this article demonstrates to members the serious efforts and the achievements that have been made by the Society and a core team of volunteer experts to influence legislation and standards in this important matter. ♦



It's not just amateurs who would be affected by the introduction of PLT, as this spectrum analyser display of the RF spectrum from 2 - 18MHz clearly shows.

WEB SEARCH

RSGB website	www.rsgb.org
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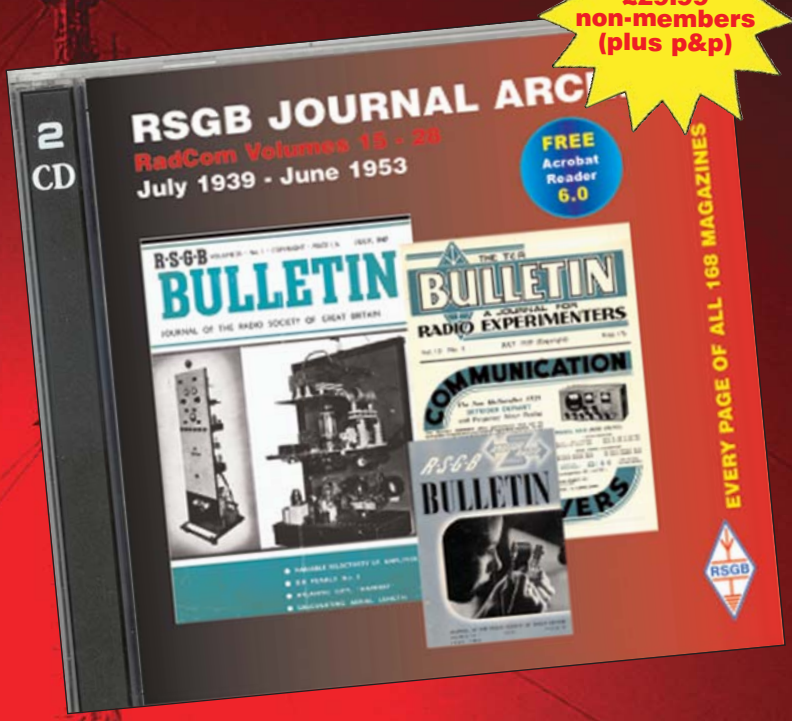

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By PAT HAWKER, G3VA

37 Dovercourt Road, London SE22 8SS

TT

This month, G3VA traces the history of amateur SSB, enlarges on coaxial stub matching, comments on the legal aspects of buying and selling equipment, and brings to light new information on the possible involvement of Eddystone with the HRO.

SSB – START 1932 TO SIMPLE 2004

There are times when a glance at the Silent Keys lists in *RadCom* or *QST* brings one up with a start – and memories come flooding back. Although I met him personally only once (at an IEE HF Conference in London in 1988), the name of 'Dr O G ('Mike') Villard, W6QYT' in the *QST* SK list in the April 2004 issue rang several bells. There can be few people who, with his long association with the Department of Electrical Engineering at Stanford University. California, have influenced the course of the hobby to the same extent. If he had wished, he could have claimed (correctly) to have been the prime mover in the radical change of amateur radio telephony from Amplitude Modulation (AM) to Single Sideband Suppressed Carrier (SSSC or SSB). For he was 'Trustee' of the Stanford University amateur station, W6YX that, on September 21, 1947 made the first, generally acknowledged, two-way amateur SSB QSO with Winfield Wagener, W6VQD. Shortly afterwards, following construction of a higher-power transmitter, W6YX made a 14MHz two-way SSB QSO with W0NWF.

The January 1948 issue of *QST* was strap-lined 'In This Issue – Single-Sideband Telephony for Amateurs', with an editorial by Ken Warner, W1EH, and three feature articles: 'What is Single-Sideband Telephony?', by the Technical Editor (Byron Goodman, W1DX); 'Single-Sideband Operating Tests', by O G Villard Jr, W6QYT, that included an explanation of how to tune an SSB signal etc; and 'A Single-Sideband Transmitter for Amateur Operation', by Arthur Nichols, W0TQK

W1EH began his editorial: "Several articles in this issue of our magazine point the way toward the most significant development that has ever occurred in amateur radiotelephony: carrier-less single-sideband emission. After years of fearing that our receivers weren't stable enough to permit the use of SSSC – as we're calling it– the adventitious appearance on the air of an experimental station with this method of emission has shown that it isn't so difficult after all and that its merits are waiting for all of us." W1EH concluded: "Brother, won't it be something when we are all carrier-less and with only one set of speech frequencies? Everything points to SSSC becoming the accepted amateur method in the near future…"

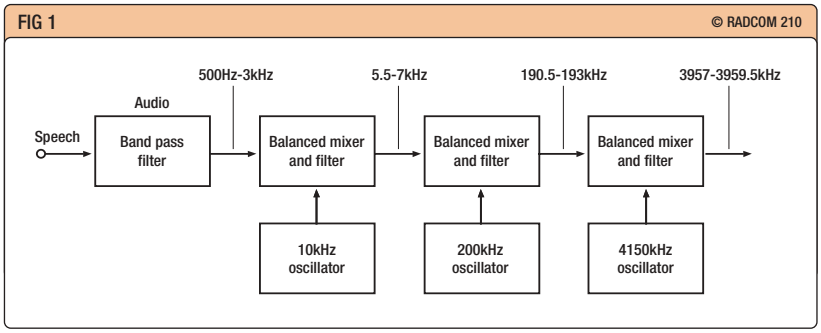

Fig 1
Block diagram of the 3.5MHz SSB transmitter developed and described by Robert Moore, W6DEI in the magazine R/9 about 1933. His design was based on commercial practice in using LC filters at very low frequencies. This diagram is reproduced from an article by K4KJ in Ham Radio, It was not until many years later that suitable HF crystal filters were available at HF and the phasing system developed to permit direct SSB generation at HF. The 1933 amateur work on SSB was not pursued.

Amateur SSB spread slowly at first, but soon exponentially. In the UK, G2NX of Oswestry is usually accepted as being the first British amateur to start the ball rolling though, as noted below, not the first to try SSB on the amateur bands. G2NX adopted the system from August 1949; he was soon followed by G3CWC, G3FHL, G3FDG, G2CR and G3CU, mostly on 3.5MHz with, naturally, home-built transmitters. It was in 1957 that Collins began advertising the KWM-1, seemingly the first HF/SSB transceiver. Although the KWM-1 was initially intended as a compact mobile unit, it paved the way for the widespread marketing of SSB transceivers as home stations, including the British-made KW2000 series which, apart from the absence of the Collins permeability tuning and with a Japanese mechanical filter, was virtually a 'Chinese' copy at significantly lower cost. The KWM-1 was also soon joined by the early Japanese-made transceivers initially marketed in Europe under brand names such as Sommerkamp, Trio etc. By the 1970s, double-sideband AM had largely, if unfairly, disappeared from our HF bands. Today it can still be found, but only if you know where to look.

The commercial use of HF SSB with a low-level pilot carrier was developed in the early 1930s by Alec Reeves, a major English inventor working for LMT (an ITT-affiliate) in France – later he devised the far-reaching pulse-code-modulation (PCM) destined to become the lynchpin of digital systems.

Although now largely forgotten, there had been attempts before 1947 to introduce SSB into amateur radio. I noted in 'TT' (March 1989) that, in the 1930s, two groups of American amateurs began investigating the possibility of using SSB on the amateur bands. These included Robert M Moore, then W6DEI, who early in 1933 described a 3.5MHz SSB transmitter in *R/9*, an American magazine that later merged with *Radio*. The block diagram of this transmitter, based on techniques developed by Bell Laboratories, used low-frequency LC sideband filtering at 5.5 - 7kHz with additional filtering at 190.5 -193kHz: see **Fig 1**. This work was acknowledged by John J Nagle, K4KJ, in a detailed article 'The Development of Amateur SSB' (*Ham Radio,* September 1984).

A second group was led by James J Lamb (of crystal-filter fame) of ARRL who, in September 1933, produced a 12-page report describing the feasibility of amateur SSB, but the ARRL management decided not to pursue development on the assumption that SSB equipment

would prove too complicated for the average amateur. Lamb's report was never published in full.

In the March 1989 'TT' I also revealed for the first time that a wartime senior signals officer who was a pre-war amateur, Christopher Henn-Collins, G(U)5ZC, while on leave in Guernsey in 1947, had built and used an SSB transmitter. Contacts had proved disappointing since nobody seemed to know then how to tune an SSB signal. He explained in a letter: "As Head of the Radio Division of the Signal Section of AFHQ in Algiers in 1942/43, I soon became acquainted with, and was much impressed by, the Western Electric (ITT) independent sideband and linear amplifier with which the US Signal Corps worked to the States running a plurality of RTTY and other circuits. The Royal Signals had only a single channel of high-speed Morse back to the UK. Yet, at four times the range, the Americans often operated their transmitter at less power than we found necessary. I quickly became hooked on the merits of SSB."

Attempts by G5ZC to interest the Signals Research and Development Establishment in RTTY and SSB proved unsuccessful, with SRDE minuting that "due to the frequency stability requirements and complexity, SSB was quite unsuitable for military communications". G5ZC continued "However I gained an ally in the GPO who promised to update some of their SSB equipment for use on main-line Army circuits...

"In 1945 I was posted away from the War Office, determined to build a mobile SSB rig to prove its feasibility for military use... I consulted the late Sir Archibald Gill, Engineer-in-Chief of the GPO, who warned that it was a considerable project to build an SSB station from scratch, but added that, should I encounter any difficulty with his engineers in regard to the conditions of the amateur licence, I was at liberty to refer to him any GPO inspector or engineer raising difficulties.

"There were no textbooks to rely on. The Germans had left behind on Guernsey a Frequenz Gerat equipment that provided the basic SSB signal at 36kHz. I bought a surplus Canadian C43 transmitter to house the equipment and provide the basics of a linear amplifier. A leave was then spent building test gear to check what I had done. On one leave in 1947, it all worked. However, contacts proved disappointing since nobody seemed to know then how to tune SSB signals.

"The disappointment stayed with me for about ten years. Then, on a visit to my mother in Guernsey, I put the equipment on the air again. By then SSB had become established on the amateur bands and I must be a candidate for an award for creating one of the biggest pile-ups on 14MHz when I put the beam on to North America. Later I gave the whole equipment to the local radio club..."

The way of a pioneer can be hard!

The adoption of SSB as the prime HF telephony mode brought about the need to rethink the approach to receivers: improve stability; tune accurately to frequency; change to product detection and, particularly, the need to develop high-performance crystal and phasing-type filters. Initially, amateurs constructed their own crystal filters at 455kHz whereas the phasing system allowed SSB to be generated directly at the signal frequency. However, Collins introduced high-quality 455kHz mechanical filters and, subsequently, lattice-type HF crystal filters at 9MHz became available (at some cost), both providing a performance beyond what could be readily achieved by the home constructor. It was not until the recognition of the simplicity of the HF ladder-type filter using identical frequency crystals or ceramic resonators that SSB filters re-entered the purview of the impecunious home-constructor. Phasing type systems have never regained their initial popularity, although the polyphase network and potentially the digital signal processing approach (see 'A Digital SSB Phasing Network', by Peter Martinez, G3PLX, *RadCom*, June 2004, pp84-86) would seem to provide new scope for experimental work on high-performance HF SSB phasing-type systems.

But, if such advanced digital signal processing is still a closed book to many of us, there is no need to despair. Generation of an SSB signal can be a far simpler matter than the early valve-based pioneers could ever have imagined. **Fig 2** shows a very simple, fixed-channel SSB generator suggested by P M Prabhu of Kerala, South India in the 'Circuit Ideas' feature of *Electronics World* (June 2004, p30). The *EW* item appears to have errors and omissions in connection with the pin numbers of the IC and I hope that my amended diagram corrects these.

This generator is based on the NE612 (alternative NE602) IC which combines a double-balanced mixer (Gilbert cell), oscillator and internal voltage regulator. The output from pin 5 is a low-level double-sideband suppressed-carrier signal when audio is applied to pin 1. The nominal frequency is governed by the crystal, X5, with its frequency trimmed by C10 (22pF trimmer). This signal is then passed through a ladder crystal filter (four identical crystals X1 - X4).

P M Prabhu recommends that all the crystals used in the ladder filter should be of the same frequency and from the same manufacturer "since different company crystals have different internal capacitance." Capacitors should be high-stability types such as Styroflex or polyester. It is claimed that the circuit has been tested at 9, 7 and 14MHz. SSB output is of the order of 1V and needs to be followed by linear amplification to the required power level. The author also suggests that the circuit can be readily adapted for transceiver operation.

Components list: C1, C2 - 10nF; C3, 4, 5 - 18pF; C6 - 10µF 16V; C7 - 270pF; C8 - 50pF, C9 - 10pF; C10 - 22pF trimmer. X1 to X5 - identical crystals of the required frequency. IC1 - NE602/NE612.

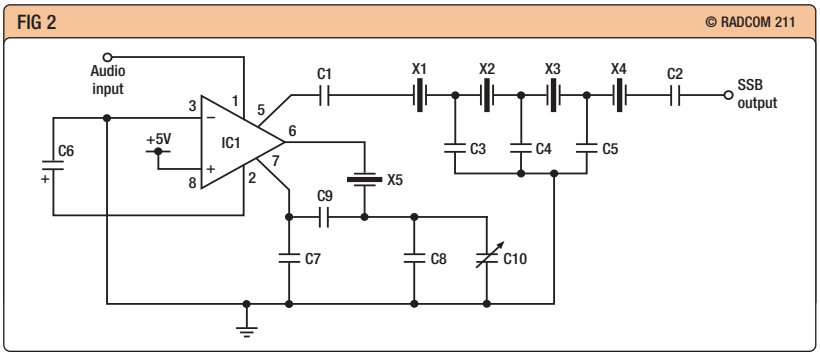

Fig 2
Simple experimental SSB generator based on the NE612 IC plus a crystal ladder filter as described by P M Prabhu in the "Circuit Ideas" feature of Electronics World.

MORE ON COAX STUB MATCHING

The May 2004 'TT' item 'Stub-Feeding λ/2 and 5λ/8 Verticals' has attracted a number of relevant comments, including the extension of this approach to multi-band vertical antennas.

Anthony Plant, G3NXC, draws attention to the article he wrote in the October 1966 *Radio Communication*, pp702 - 04 (with small correction in the January 1987 issue) 'The Transmission Line as an Impedance Transformer'. This provides a detailed mathematical approach to calculating the lengths of line required for impedance transformation in both series and parallel input configurations. He writes: "A year or so back I designed a stub network for a 10m 5λ/8 vertical using the method given in my article. The dimensions came out at 52in and 12in – quite a good correlation with the figures in your Fig 1 (May 'TT') for a 20m version! Production of this network did, though, teach me a

lesson about making assumptions. The intended use was with a telescopic mast owned by the local club. When we tried the arrangement it was a total failure, which sent me back to the drawing board only to confirm all the calculations. Measurement directly at the base of the antenna showed an impedance miles away from that expected. It was a week or so later that we discovered that the various sections of the telescopic mast were insulated from each other by plastic bushes – we had been trying to load up a 4ft vertical!

"Although the stub method has a lot to commend it, the series arrangement described in my 1986 article is also quite useful and has the advantage that adjustment can be a little easier in some cases."

Mike Faulkner, G3IZJ, comments: "I have been using quarter-wave shorted coax stubs with good results for some years. My 32ft vertical for 7MHz matches for 18MHz (approximately 5λ/8) using UR-67 cable and a T-piece at the tapping point as in **Fig 3(a).** The bonus is low SWR on 24MHz (approximately 2.5:1). This has brought many good DX contacts on 12m, despite the theoretical high-angle radiation. I have also made another stub for use on 14MHz with the same antenna: **Fig 3(b)**. This has a second match point but not at a useful amateur frequency. If I unplug the stub, the 32ft vertical is again ready for use on 40m and 15m. With the two stubs, the vertical antenna is suitable for 7, 14, 18, 21 and 24MHz.

Lutz Kutscha, DL6FCU, draws attention to an article by Karsten Koch, DL8LBK '7-Band-Reiseantenne – eine Unverkurzte Vertikalantenne' [roughly: '7-Band Travelling Antenna – an Unshortened Vertical Antenna'], *Funkamateur* (June 2002, pp686-87). In this, DL8LBK described semi-vertical wire antenna suitable for fixed or 'travelling' applications using the stub-matching principle. The sloping wire element could be fixed to any convenient support over 11m high, with a selected single radial on some bands, and using coax matching stubs tapped into the coax feeder. In essence, it is similar to G3IZJ's antenna, but with an arrangement of pre-constructed wires and cable lengths that provides antenna combinations that can be plugged together to provide effective operation on the 28, 24, 21, 17, 14, 10 and 7MHz bands without any form of loading or traps, and light enough to be used for portable or field operation, using buildings, existing masts or trees etc to support the top end of the radiating element. It could presumably be used without an ATU on transmitters capable of coping with a reasonable SWR without automatic power reduction. It would also probably be well within range of transceivers incorporating automatic matching.

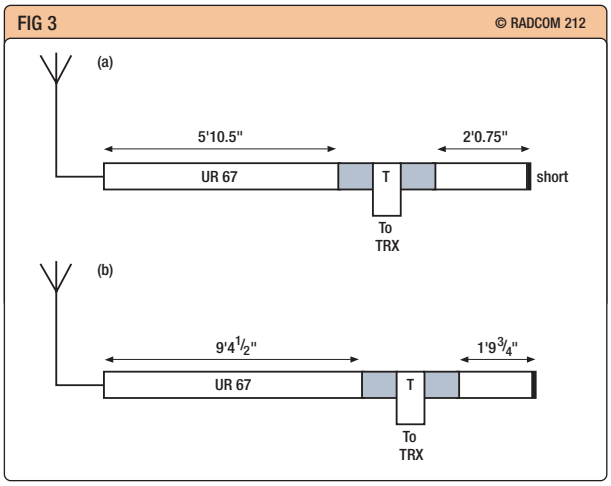

Fig 3
G3IZJ's use of quarter-wave shorted coax stubs to match his 32ft vertical antenna (quarter-wave on 40m). (a) Arrangement designed for 18MHz with the bonus of a low SWR of about 2.5:1 on 24MHz band. (b) Stub as used on 14MHz with the same vertical antenna. With the stub unplugged, it again became useful for 7 and 21MHz.

The German text is not easy to understand (even with the aid of a good German-English dictionary), although DL6FCU rubs salt into my *amour-propre* by commenting: "Why don't you do a reprint of the almost self-explanatory original and learn a bit more of the German language as we do with the English language? A EU-community project!" Perhaps later. Meanwhile some basic information, and my interpretation of the basic construction of this relatively low-cost antenna will have to suffice: **Fig 4** (on following page) and **Table 1**.

If operation is not required on the 12 and 30m bands, only one length of radiating element (9.3m) is required. This length represents approximately 1λ on 28MHz, λ/2 on 14MHz, 3λ/4 on 21MHz, 5λ/8 on 18MHz, and λ/4 on 7MHz. The second 7m wire element is approximately 5λ/8 on 24MHz, λ/2 on 21MHz and λ/4 on 7MHz. It is claimed that the maximum SWR is in the range 1:2.5 to 1:3. The tapping point on the coax feeder, C, is given as the velocity factor times 0.216λ and the stub, B, as the velocity factor times 0.034λ. Velocity factor for such cables as RG-59, RG-62, RG-213 and RG-174 is 0.66.

Band	Element X(m)	Radial Y(m)	Stub B(m)	Tap C(m)
10m	9.40	-	0.24	1.46
12m	7.00	2.84	0.34	1.46
15m	7.00	-	0.34	2.03
15m	9.40	9.40	-	-
17m	9.40	3.93	0.48	2.03
20m	9.40	-	0.48	2.98
30m	7.00	7.00	-	-
40m	9.40	9.40	-	-

Table 1: Dimensions of element X, radial Y, coax tapping point C, and length of shorted coax stub B, for HF amateur bands. Keyed to Fig 4.

DL8LBK provides a parts list covering all seven bands. This includes one T-connector with three PL-258 sockets, two 9.40m wires; two 7.0m wires; 2.84m wire radial for 12m band; 3.03m wire radial for 17m band; a connecting SO-238 socket with two banana connectors; three lengths of RG-58, each with two PL-259 plugs – 2.98m, 2.03m, and 1.48m; three lengths of RG-58 with one PL-259 plug to provide the shorted stubs – 0.48m, 0.34m and 0.24m.

BUYING & SELLING OF EQUIPMENT

Purchase of top-of-the-range amateur transceivers can involve the expenditure of thousands of pounds and can represent for many a major investment in 'chattels'. Most purchasers have in recent years become aware of the advisability of ensuring that valuable equipment should be adequately covered by insurance, but there would appear to be less awareness of current legislation determining the protection now afforded to purchasers and the responsibilities of sellers. It could prove important to recognise that the established ' Sale of Goods Act, 1979' was, on 31 March 2003, supplemented by 'The Sale & Supply of Goods to Consumers Regulations 2002' that sets a minimum standard throughout Europe, and gives the consumer greater rights when buying across frontiers.

My own ignorance of both the original Act and the supplementary regulations was profound, but has been considerably lessened by reading the first of a two-part article 'The Sale of Goods Act', by Michael Maurice in *Television* (Part 1 – June 2004, pp458 – 61). Michael Maurice admits that he is not a lawyer and cannot accept responsibility for any errors, He acknowledges that much of the information in his article has been obtained from a document called *A Trader's Guide* published by the Department of Trade & Industry (DTI), available from the DTI and local Trading Standard Offices. His article is written from the viewpoint of how the regulations affect the trade rather than the customer. Nevertheless, it does seem to give useful information to those on both sides of the counter. Presumably, the DTI publication is available not only to the trade.

The amateur radio trade has generally a good reputation for dealing with complaints without resource to legislation, but problems can occasionally arise. To quote briefly from the article: "According to the Act, a product should be of satisfactory quality and fit for the purpose for which it is bought. Thus, if the customer tells the retailer that the product he requires must be capable of doing X, Y and Z, should he subsequently find that it doesn't do what he wants, he is entitled to return the goods and receive a full refund. If, however, the customer does not tell the salesperson his requirements and then, having made the purchase, finds that the product does

not meet his expectations, the retailer is under no obligation to accept the goods back." It is advisable for the customer to set out particular requirements in writing.

It is important to note that the contract between customer and retailer is for the supply of products of satisfactory quality, taking into account purchase price and other relevant factors. If an item has a fault that was present at the time of purchase, sometimes called a 'latent' or 'inherent' defect, the customer can complain when this is discovered.

There is no legal definition of what is 'reasonable' although this word crops up often in the article. As has long been the case, responsibility for faulty or unsatisfactory goods supplied to a customer is with the retailer rather than the original manufacturer. To quote: "When a product is faulty, the first course of action on the part of the customer is to return it to the retailer or, if it is a large item, like a TV set, call the service department. If the product is virtually new, ie under 14 – 28 days old, a replacement can be requested as it should be obvious that there was an inherent fault from new. The retailer should either exchange the product, repair it or arrange for the manufacturer's service department to repair it. There are circumstances under which a customer cannot expect legal redress. First, fair wear and tear... Secondly, misuse or accidental damage, for example if a customer drops the product or spills water into it. In such circumstances, the customer cannot expect the product to be rectified as though there was a defect. Thirdly, when the purchaser simply decides that he no longer wants the product. The retailer is under no obligation to accept a product back simply because the purchaser, having got it home, decides he doesn't want it or it doesn't fit... An exception to this is goods bought by mail order or over the Internet... A customer cannot expect legal redress if an item had a defect that was pointed out at the time of sale, or has a defect that should have been evident on reasonable inspection... Customers generally have to prove that the product was faulty at the time of sale, although there is an exception when the customer returns a product to the retailer within six months of the date of sale... On servicing and repairs, the Supply of Goods and Services Act, 1982 requires a service to be carried out with reasonable care and skill within a reasonable time and, where no price is agreed, the charge should be reasonable; this does not apply in Scotland, where common law prevails."

A problem that can occur with amateur radio equipment is the legal status of a manufacturer's 'specification' set out in advertising material. To quote Michael Maurice: "When a customer buys a product, he enters into a contract with the seller. Products do not conform to contract when they are defective at the time of sale or they fail to work later, even after a number of years, because of an inherent fault... Products do not conform to contract if they do not comply with any description given by the retailer prior to the sale The Sale of Goods Act, 1979 determines whether there is lack of conformity with the contract... The product should match any description given to it. It should be of satisfactory quality, ie it should meet what any reasonable person would regard as being satisfactory, taking into account any description provided, the price paid and all relevant circumstances. For example, you wouldn't expect a £25 radio to provide high-fidelity performance but, if the description said the frequency response was 20Hz to 20kHz, then it should conform to this specification."

FIG 4 © RADCOM 213

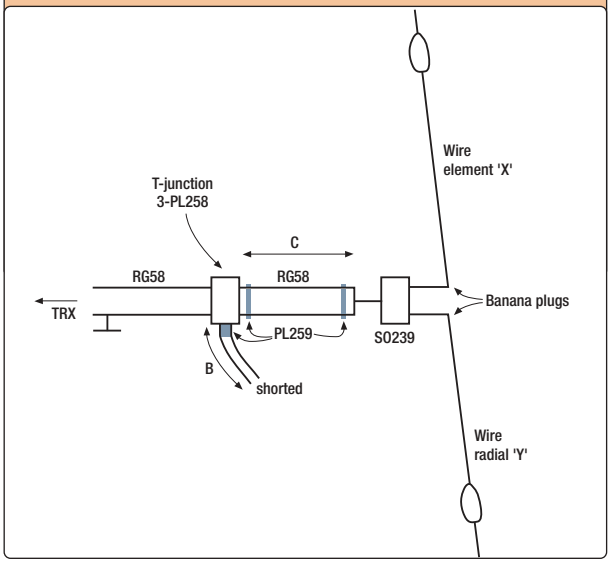

Fig 4
DL8LBK's 7-band travelling (or fixed) antenna described in Amateurfunk using various combinations of wire elements and radial with coax stubs and tapping points. See Table 1 and text for dimensions etc.

A point of considerable importance to amateurs is the supply of spare parts. There is a legal obligation on suppliers, retailers and manufacturers to make spare parts available for at least seven years from the time of selling a product to the consumer. Seven years is not a long time in the life of amateur equipment, and it would appear that if a manufacturer is unable to supply a spare part without which a product is unusable, the consumer has a legal right against the dealer who supplied it for the remaining time during which he could have expected it to last. Apparently this depends to a certain extent on the original cost of the product. I wonder what would be a reasonable life for a modern high-cost solid-state transceiver?

There can also arise difficulties when either a retailer or a manufacturer has ceased trading, or has withdrawn from the amateur equipment field, in the interim period. Remember that the buyer's contract is with the retailer or supplier, not with the manufacturer. Keep receipts to prove date of purchase. A detailed credit card statement is often acceptable as proof. Michael Maurice concludes the first part of his article: "If the consumer can offer no proof that he bought the product from the retailer on the date claimed, he would be unlikely to be able to pursue a legal remedy."

I would emphasise that the recognised amateur radio equipment dealers have generally a good reputation when dealing with customer complaints etc and would certainly not wish to give the impression that the occasional dissatisfied customer should resort to the courts other than in exceptional circumstances. Many in the trade do their utmost to preserve their reputations for fair dealing, even at times accepting responsibilities beyond those laid down by law. Problems are more likely to arise in the case of the private and retail purchase of second-hand electrical goods which may transgress current European safety regulations, etc a matter not covered at least in the first of these informative *Television* articles.

I also note that Charles Miller in a letter to Rob Mannion, G3XFD, editor of *Practical Wireless* (July 2004), adds to previously reported cases of apparently deliberate fraud. There appears to be an unscrupulous dealer, sometimes claiming to represent a club or association, who calls on the surviving partner or representative of a silent key amateur or vintage-equipment collector and suggests that the equipment is little more than junk and makes derisory offers.

EDDYSTONE AND THE HRO

Graeme Wormald, G3GGL, who publishes *Lighthouse* – the magazine of the Eddystone User Group – adds to rather than solves the mystery of the possible manufacture or assembly of a version of the National HRO in the UK ('TT' June 2004). He writes: "The Stratton Company was rather eccentric by normal industrial standards. One of its records was its *B P Register* (with B P standing for Blue Print), in the form of a hand-written ledger covering the years 1932-1994. I have a photocopy. The period 1932-1940 is completed only in retrospect (and full of gaps) as presumably the original was lost, with everything else, in the Blitz. On 29 January 1941, it 'starts again' with BP440 – Map of West Heath. This is quite understandable as the firm had just moved to its famous 'Bath Tub' location on the southern outskirts of Birmingham, an area likely to be unfamiliar to most of the staff. Three

lines later is the entry: 'BP443 Power Supply Unit – Circuit 427 HRO receiver 10 May, 1941.

"The number '427' represents the 'Specification or S-number' and is exactly the same series as in S358 or S640 [Two well-known Eddystone 1940s communications receivers - *G3VA*]. The S-numbers were frequently transposed and had gaps for no known reason. Even when the 'new numbers' were adopted, the S-numbers were still logged. For instance, the EC10 (BP1099, theoretical circuit, 23 September 1963) was also the S907, although never mentioned as such in any other literature."

So why in 1941 did Eddystone apparently register a blueprint of the HRO? Was this part of a careful investigation of the HRO as was clearly carried out by the Marconi company? It seems highly unlikely that Eddystone ever produced HROs at the Bath Tub without any further record surviving of what would have been a major wartime undertaking, and without any of such models surviving among the hundreds imported from National. But, it is known that some 300 receivers (including HROs, Hallicrafters etc) imported by the GPO for RSS and the Y services were destroyed in the fire-bomb attack on the City of London on 31 December 1940. This could have prompted requests that Eddystone investigate the possibility of producing replicas, or does anyone know differently?

LOW-VOLTAGE VALVES & GDOs

I always felt there was something odd about my continued interest in, and use of, thermionic valves. But I find that whenever I mention them, or the equipment that used them, it attracts comments from others who share, at least, my interest.

For example, my mention (January) of the low-voltage valves that could operate directly from 12V vehicle supplies to provide milliwatts of drive to an early power transistor output stage resulted in several comments. Peter Chadwick, G3RZP, noted that there were several valves that could be used at relatively low voltages. He writes: "The data sheet for the Marconi Z77 valves gives information for anode and screen voltages of 28. While one of the Marconi Marine emergency receivers used a pair of PL84s to get 20W of audio with 24V of anode supply (transistors weren't considered to be of sufficiently-proven reliability for emergency equipment at that time!)."

Roy Loveland, G2ARU, writes: "In the early 1960s, Short Wave Magazine published a design using the Mullard 12V range in a receiver for the 1.8 and 3.5MHz bands. This used the ECH83 triode heptode in all stages: RF stage, conventional frequency changer and IF stages. The triodes served as BFO and audio-amplifier, with some [one?] triodes not used. I made a receiver from this design for 1.8MHz that I used to take in my motor caravan for listening to top band. I used four ECH83s but, as I only used the set with headphones, I had no need for a power output stage. I seem to remember that it worked very well, Unfortunately I do not have any information or even a copy of the circuit although I still have the valves.

"Like you, I am enthusiastic about valves. I have many items of gear made over the years that continue to give good service. In the rare event of a fault I can usually fix it in a very short time – more than I can say of the items I have made using semiconductors.

"I also have great interest in aeronautics – I served in the RAF as a wireless mechanic and then signals officer in WWII. I like to listen on the civil air band and, about 10 years ago, I built a valved receiver for 118 to 137MHz (see SWM, March 1994). The receiver has served me well and is still in regular use. It has a great advantage over the commercial channelised sets in that it adapts well to changes. Channel spacing is being changed gradually from 25kHz to 8.333kHz but, since my receiver is fully tunable across the band, this presents no problems. A few years ago, the band was widened by adding 1MHz at the top end (137-8MHz). I easily accommodated this by adjusting the trimmers."

Godfrey Manning, G4GLM, believes that low-HT valves may still be available as he obtained an ECH83 not so long ago; and, if it fails, selected examples of the normal HT types may work to some extent. He suggests trying the usual current suppliers of valves such as Chevet, Colomor, Langrex and Wilson. Incidentally, G4GLM is anxious to acquire a hybrid valve/transistor car radio (or at least the usually-separate transistor audio power amplifier). Contact him on 020 8958 5113. On offer he has a limited supply of some early audio power transistors, including OC16. He also has a selection of some 'old germanium' types available free to anyone who justifies genuine need and provides return postage: "When asking me about availability, please state acceptable equivalents. Note that the following popular types are not available: AF117, OA70, OA79, OA91, OC45, OC71, OC72, OC78, OC78D, OC81, OC81D. If a 4-wire device is needed, I can offer the OC170. Any requests for OC44 would be met with CV7003, a metal-can equivalent."

The mention last year of the excellent performance of some valved GDOs has also been bringing in comments. Michael O'Beirne, G8MOB, comments: "I never was able to make a transistor GDO work properly. I put this down to my incompetence, so I am delighted to read that others feel the same way. The best commercial model I know is the old valved Heathkit GD-1U that has been around since the 1960s (if not before). It works very well from 360kHz to 250MHz and also acts as a diode detector. The scale is easy to read and the meter is a decent size - more than be said of the 'unique' RadCom design. For use outdoors there is a very simple solution – use a long mains extension cable." The GD-1U used a built-in 125V PSU and EC92 in a fairly standard circuit with 500µA meter and phone jack

Ken Melton, GM3WKM, during his time with REME on the South Uist missile range came across some new (unopened) professional Megacycle Meter GDOs made in the USA by McGraw-Edison of New Jersey – high-cost instruments that were priced at almost $2000 – over $3000 with three oscillator heads for different frequency ranges, and even (in 1984) a carrying case priced at $284 (see the account by Geoff Arnold in Radio Bygones, No 36, August/September 1995). The basic unit had a 955 'Acorn' valve and covered 2.2 to 400MHz, with a built in PSU with 5Y3GT rectifier, VR150 voltage stabiliser and 200µA meter.

HERE & THERE

Denzil Roden, G3KXF, notes that in 'TT', January 1992 (*TT Scrapbook, 1990-19,* p128), Dave Lauder, then G1OSC, suggested using Letraset protected by several coatings of aerosol clear lacquer (RS 568-477) as a means of producing good-looking front panels. This was suggested as an addition to a previous 'TT' item (March 1991) that provided an elegant method learned by Kunio Mitsuma, KA3RRF (*QST,* December 1990, 'TT' March 1991 and *TT Scrapbook 1990-1994,* p73-74,) as a youngster in Japan for producing a matt-finish hair-line silver effect on a basic aluminium front panel. Later ('TT' July 1992, *TTS 90-4.* p158) R C Arnold, G3DZU, offered a foolproof method of overcoming lettering falling off front panels by carefully preparing the panel before and after using Letraset letters. Now G3KXF notes that "the aerosol clear lacquer (RS 568-477) recommended by Dave Lauder seems to have become extinct, but constructors might be interested to know that its current equivalent is RS 569-307 which is formulated for dry transfer markings and similar." He adds: "Incidentally, I use some sheets of Chartpack lettering which, though purchased over 25 years ago, are still perfectly usable." ♦

By Peter Dodd, G3LDO

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G3LDO goes bicycle-mobile this month, and explains why some electrically-short antennas are better than others

Antennas

Some time ago I visited the planning department of our local council to discuss my antenna mast and the required size of my proposed antenna installation. During this discussion, the planning officer asked if antennas could be made smaller - after all electronic and communication equipment is now only a fraction of the size that it used to be. Why not smaller aerials?

Well, I did try to explain that the size of electronic components is determined by electronic component manufacturing processes whereas the length of the antenna element is related to the wavelength and the laws of physics. And although you can use inductors to load electrically-short antennas there is a penalty in terms of efficiency and bandwidth. Yes, I know that there is the Crossed-Field and EH antennas that claim to be able to circumvent the traditional antenna design restrictions, but you don't hear many on the bands even though they have been around for years.

SIZE MATTERS

With the advent of smaller and smaller rigs there has been a renewed search for small antennas that match the portability of small rigs. Some designs use a whip with variable base-loading, such as the 'Miracle Whip', or the 'Wonder Wand', reviewed in [1]. These antennas use short whip antennas with variable base-loading. This type of loading has the advantage of being easy to adjust and the antenna can made of rugged copper-coated thin-wall steel tubing, as used in military installations. The disadvantage is that, for a given electrically-**small** antenna, it is the least efficient.

The current distribution of full quarter-wave vertical and two eighth-wavelength verticals, one using centre-loading and the other using base-loading, is illustrated in **Fig 1**. The relative radiation power density can be estimated by counting the number of small squares under the curves. This is a very simplified method of illustrating these relative antenna efficiencies and shows a big improvement in radiation power as the element length approaches a quarter wavelength. The counterpoise or ground also carries RF current, so it also will radiate, but this aspect is not shown in Fig 1. If you can use a full half-wavelength then that is even better because the maximum current point is raised at least quarter wavelength above the ground.

FIG 1 © RADCOM 209

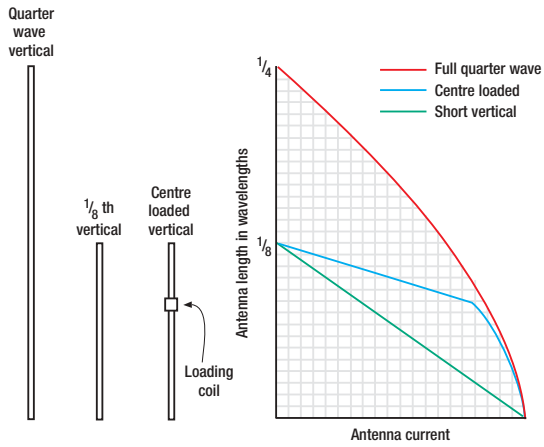

Fig 1
The current distribution of a full quarter-wave vertical and two λ/8 verticals, one using centre-loading and the other using base-loading.

The MP-1 antenna used for bicycle mobile, being tested for radiation efficiency with the FSM in the background. The MP-1 is being used here with a larger stainless steel whip rather than the 110cm telescopic whip provided.

I was much taken with the description of the pedestrian mobile set up described by Tom Robinson, G0SBW [2, 3]. Tom uses big whip antennas in the range 13ft 8in (4.16m) to 18ft (5.48m) as an all-band verticals fed via automatic ATUs. On 10m these antennas are nearly half-wavelength long, while on 20m close to a quarter wave - an efficient antenna arrangement for the higher frequency bands.

THE MP-1 PORTABLE ANTENNA

The use of large whip antennas is not practical for many situations. If you are taking your small rig, such as the FT-817, on vacation or on a business trip then an antenna that can be fitted inside a briefcase is obviously very useful. The 'Wander Wand' antenna described above is a solution; however, with a whip length of only 1.2m this equates to say around λ/16 on 20m. This doesn't result in a lot of squares under the 'short vertical' line in Fig 1.

A better solution is to use centre-loading, preferably with some way of varying the inductance. The MP-1 portable antenna does just this in the same manner as is used in the Sierra Sidekick described in [4], the only difference is that it is not motor-driven but operated manually. There is nothing new about the design of this antenna - the method was used in Webster Band-Spanner mobile antenna in the late 1950s [5]. The MP-1 comes with a telescopic whip, universal clamp with base mount, together with the all-important wire radials. I found the MP-1 very good for bicycle mobile. A bicycle frame appears to make a good RF ground on the higher LF bands.

My thanks to Waters & Stanton for the loan of the MP-1 portable antenna. ♦

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[1] RadCom June 2004, page 29
[2] 'The Field trials of the IC-703', Tom Robinson, G0SBW, RadCom, October 2003
[3] 'HF Backpacking', Tom Robinson, G0SBW, RadCom, June 2004
[4] 'Antennas', RadCom, June 2004
[5] The Amateur Radio Mobile Handbook, Peter Dodd, G3LDO, p40.

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..... **£398.95**

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- TX - all HF + 6mtr
- 100W output on HF & 6mtrs
- RX - general coverage 150kHz - 30-MHz, 50MHz - 54MHz
- SSB, CW, AM, FM and digital modes
- 100 memories
- Detachable faceplate and remote mounting kit available
- Speech processor standard
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EMS-14

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By Andy Talbot, G4JNT

15 Noble Road, Hedge End, Southampton SO30 0PH.

A RTTY beacon keyer design

G4JNT describes the reasons for adding a RTTY identifier to the GB3SCX 10GHz beacon, and why 50-baud is used with 850Hz shift ♦ More information on PC operating systems

The GB3SCX 10GHz beacon has recently been upgraded so that the fundamental source frequency is now generated from a direct digital synthesiser and phase-locked loop, driven from a high stability reference. This combination means that the frequency can be changed by small increments quite rapidly, and so the opportunity was taken to add a low-to medium-speed data transmission facility, as well as the normal CW identification message. To allow the maximum number of users to be able to receive the data without difficulty (microwavers are not known for their interest in datacomms!) it was decided to use 'old fashioned' RTTY rather than ASCII or a more complex, more efficient code, as there is a very wide range of RTTY decoding solutions available, from dedicated hardware to several soundcard-based programs.

The vagaries of microwave propagation, in particular the fact that the frequency can easily be spread many tens or even hundreds of hertz, by rainscatter, mean that a wide frequency shift is needed. 850Hz is the widest shift offered by all the standard software packages, and a rate of 50-baud was chosen, because some of the software only offers 50-baud reception in combination with 850Hz shift.

The old PIC-based CW-only keyer was originally designed by G0IAY, and allowed simple on-site reprogramming of the beacon message by plugging in an RS-232 terminal - a laptop running *Hyperterminal* for example. As well as the text itself, the message can be programmed to include a range of user delays from a few seconds to minutes, with key up/down, and the option of controlling a transmit/receive line for each individual delay. A range of CW speeds is available and the speed can be varied within the message. This is useful, for example, to allow the callsign to be sent slowly with additional information such as locator, frequency etc to be sent much faster.

By re-writing the CW coding within the PIC, it was possible to free up enough capacity to add the extra code for generating RTTY. The DDS has its own PIC controller, and this was programmed to generate the two frequencies for mark and space tones, based on the state of a single input line. So the beacon keyer had to have a single RTTY data output line, as well as the CW keying line which goes to a conventional on-off RF switch in the signal path. The new version of PIC firmware retained the fully-programmable delay and CW speed facilities, and also allowed a single-line RTTY message. The PIC 16C84 (or 16F84) was chosen as, although it is verging on obsolete, there are quite a lot on the surplus market to be recovered from old PCBs. This device allows up to 64 characters to be stored in its non-volatile memory and, for the new keyer, these have to be shared between CW text/delay data and RTTY characters. A simple beacon message in both formats is accommodated by 64 characters. If the later 16F628 is used, 256 spaces are available for a longer message, although the software will need a few lines of code changed to accommodate this device. Each delay/CW speed change occupies one element of message storage. The circuit of the dual-purpose beacon keyer is shown in **Fig 1**. PIC software for the 16F84 is available directly from me.

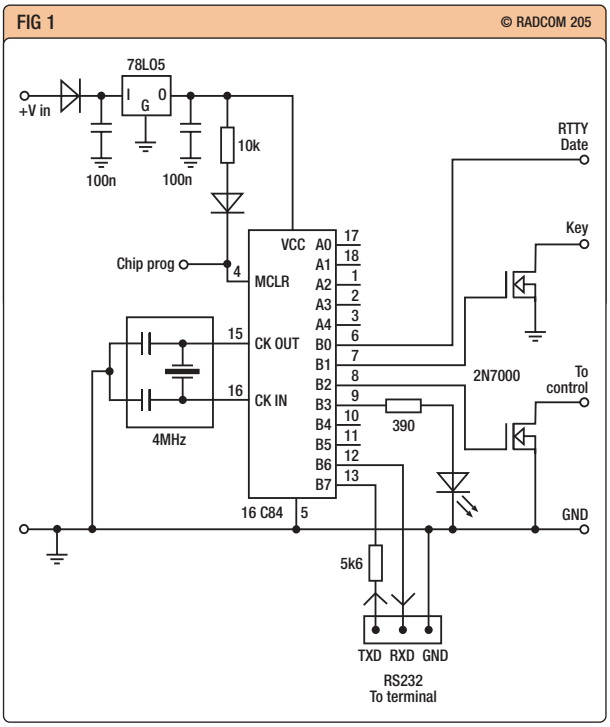

Fig 1
Circuit diagram of the PIC-based CW / RTTY beacon keyer.

RTTY SOFTWARE

All these programs satisfactorily decoded the RTTY message off-air:

MMTTY	For Win 95+ & soundcard
True TTY	For Win 95+ & soundcard
MultiPSK	For Win 95+ & soundcard
SBRTTY	Soundblaster & DOS

MORE ON PC OPERATING SYSTEMS

Mark, G8PHM, wrote in with these comments on alternative operating systems for PCs. I'm not sure if they can be installed on top of the various flavours of Windows, or require a dedicated disc / PC, but here is what he says...."I read your article with interest in June 2004's *RadCom* regarding frustrations associated with attempting to run Microsoft *DOS* in *Windows*. There are several other possibilities which could well be considered by the more computer-literate radio amateur.

"1. *Freedos* - is free! Comes complete with source code, and has been tested on much modern hardware. It is a clone of *MSDOS*, as far as the authors have been able to manage it.

"2. *DRDOS* - free for non-commercial use. The latest version is (I think) 7.03. It is probably more polished than *Freedos* in some respects, but has not been so well maintained.

"3. *Linux* - if you just want to run a Baycom modem, *Linux* supports this directly. Any recent distribution should have the Baycom kernel module pre-compiled. I prefer *Debian*, but that is regarded by many as very 'techie'. *Red Hat* (*Fedora*), *Mandrake* and *SuSe* are all available free. *Linux* has BBS software, full IP stack and associated programs and AX25 support built into the kernel.

"4. Linux with either *Dosemu* or *Dosbox* – it has been noted by many people that the *Linux* support for *DOS* is better than that of *Windows XP*. I've not personally compared them, so I couldn't comment, but I do know that many *DOS* programs can be run in this way.

"All of these OSs can be downloaded free from the Internet. For those without high-speed net access, the front of a magazine such as *Linux User* will frequently have a full distribution of *Linux* on CD, or you could telephone the *Linux* Emporium, and buy some CDs.

Some effort is required to install any of these OSs on a machine, but they are designed to be installed by the user rather than by an OEM, so anyone who's reasonably competent with a computer should be able to do it. Otherwise, look up your local computer club or *Linux* User Group for help." ♦

WEB SEARCH

Freedos	www.freedos.org/
DRDOS	www.drdos.com/

By David Lauder, G0SNO

20 Sutherland Close, Barnet, EN5 2JL.

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

EMC

EMC is about *Electromagnetic Compatibility*, that is the *absence* of interference. EMC has two aspects, *immunity* of electronic equipment to electromagnetic signals such as nearby radio transmissions and *emissions* of interference from electronic equipment that may cause interference to nearby radio reception. Since this 'EMC' column started in 1989, the immunity situation seems to have improved, but the number of emission problems has grown steadily.

BT has recently announced plans to make Asymmetric Digital Subscriber Line (ADSL) available to 99.6% of the UK population by summer 2005. This would leave only 100,000 premises in rural areas where no ADSL would be available. For those not served by ADSL, other possible methods of broadband distribution include microwave radio links (see 'Whatever Next', *RadCom*, November 2003, p93). It seems likely that such widespread availability of ADSL will make it more difficult for 'access' Power Line (Tele)Communications (PLC/PLT) to compete as a means of delivering broadband Internet access in the UK.

HOME NETWORKS

Whatever method is used to provide broadband Internet access to homes, many users want to connect more than one computer to the broadband service via a home network. Such networks may use dedicated data cables, 2.4GHz wireless networks (WLLANs), home phoneline networks or home powerline networks. Home powerline networks are a particular concern because they could cause significant interference on the HF bands.

At the time of writing, *Personal Computer World* magazine was planning a report on in-building powerline networking products, probably for the July 2004 edition. It appears that *PCW* gets angry letters from radio amateurs whenever they mention powerline communications, so they asked the RSGB for some brief comments. I provided some and it will be interesting to see what they print.

PLT IN THE USA

In the US, Power Line (Tele)Communications (PLC/PLT) is called Broadband over Powerline (BPL). The situation is different from Europe, because the US power distribution system is completely different (see 'EMC' August 2003). A news item on the ARRL Web site dated 9 June 2004 has the title, 'NTIA Claims BPL Could Help Alleviate Power Line Noise' (see 'Web Search'). The NTIA is the National Telecommunications and Information Administration and is the principal US adviser to the White House on telecommunications policy.

The NTIA has made comments to the Federal Communications Commission (FCC) on the BPL Notice of Proposed Rule Making (NPRM). The NTIA Phase 1 report was largely scientific and clearly established the interference potential of BPL, but the NTIA's formal comments filed on 4 June 2004 show that political pressure is being applied in favour of BPL.

The NTIA even claims that widespread deployment of BPL could lead to a *reduction* in power line noise and says, "Substitution of BPL emissions for the strong, much wider-bandwidth power line noise emissions will broadly reduce risks of interference to radiocommunications." The NTIA claims that its measured power line noise levels are higher than the proposed BPL emission limits. The ARRL does not agree, however. In a news item on the ARRL web site dated 5 May, the ARRL calls BPL deployment on HF "a mistake, purely and simply". The ARRL has asked the FCC to put its BPL proceeding on hold. Further details are also available on the ARRL web site (see 'Web Search').

NEW EUROPEAN EMC DIRECTIVE

Following the European EMC Directive 89/336/EEC in 1989, EMC emission and immunity standards became compulsory from 1996. Compulsory EMC immunity standards are unique to Europe. Elsewhere in the world, the situation is the same as we had in Europe before 1996, where immunity is regarded as a 'quality issue'. This means that manufacturers choose how much (or little) RF immunity their product has, but when an immunity problem arises, few admit that it is due to insufficient quality of their product!

Although there had been an improvement in immunity, the emissions situation has become steadily worse due to the ever-increasing amount of electronic equipment in a typical home, much of it using high-speed digital circuitry and/or switch-mode power supplies. There have also been attempts to introduce a large relaxation in emission limits to allow PLT to operate. At the time of writing, the outcome of the PLT standards battle is not clear, but a proposed new European EMC Directive is likely to be of interest to radio amateurs and short wave listeners.

There was a European Parliament Report A5-0113/2004 dated 25 Feb 2004, on the subject of the proposal for a new European Parliament and Council directive on EMC (see 'Web Search'). The original text proposed by the European Commission was approved by the European Parliament who made various amendments, including Amendment 1 Recital 2, which is quoted below, with the new text in italics.

"(2) Member States are responsible for ensuring that radio-communications, *including radiobroadcast reception and the amateur radio service operating in accordance with ITU radio regulations,* electrical supply and telecommunications networks, as well as equipment connected thereto, are protected against electromagnetic disturbance."

It is to be hoped that the above text will stay in the final Council Directive. This will be an instruction to EU member states to introduce national legislation to meet particular objectives, in this case related to EMC. It could be a number of years before any such national legislation is in force in the UK, but the amended wording above implies the need for some sort of protected status for amateur radio reception and broadcast reception including HF broadcasting.

FIG 1

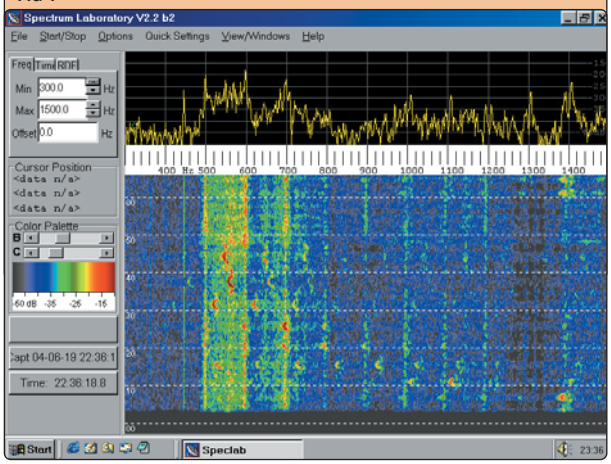

FIG 2

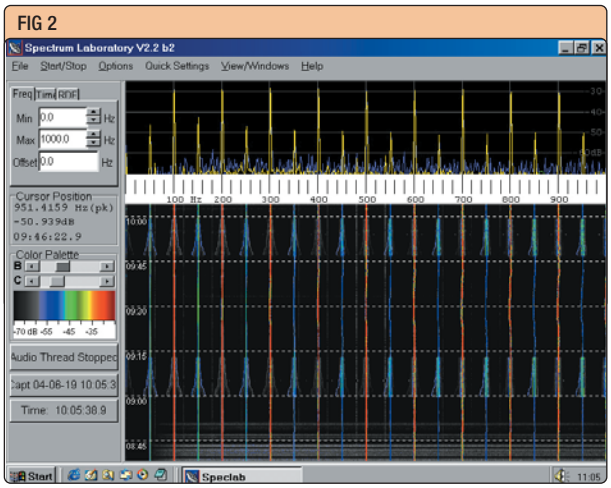

Fig 1
Audio spectrum plot of a mystery noise on 14MHz.

Fig 2
Audio spectrum plot of interference from a fridge 'Sava Plug' on 3.5MHz.

INTERFERENCE ANALYSIS

Although many sources of interference on amateur bands do not have any identifying characteristics, some do have distinctive characteristics. Audio spectrum analysis software can be used to characterise some types of QRM that have identifiable characteristics. Two popular software packages are *Spectrogram* and *Spectrum Lab* (See 'Web Search'). These take audio from a receiver into a PC sound card and produce an audio spectrum analyser plot, with the option of a 'waterfall' display which shows how the spectrum changes with time. This can be very useful for analysing QRM sources and has been used for two different sources, one known and one unknown.

A 14MHz MYSTERY

Peter, G3LDO, reports that in summer 2003, he became aware of a high level of QRM centred on the 14MHz band and covering a bandwidth of 2 - 3MHz.. It peaks at around S7 on an IC-706. At first it appeared to be coming from a nearby telephone pole, but Peter has now discovered that it is more widespread. Although it seems to be radiated from telephone lines, there are also some 'hot spots' where there are no telephone lines. Another Peter, G3CCX, who lives 2km away suffers similar QRM that prevents him from operating on the 14MHz band. Peter, G3LDO, thought that it might be some electronic equipment in the BT telephone network. He made contact with the BT interference section and they came to investigate, but did not find a source or identify the cause. Recently, there was a power cut at Peter's home and, when using a battery-powered receiver, he noticed that the QRM had stopped. This makes it unlikely that the source is any equipment that is part of the BT network as such equipment is normally line-powered from the telephone exchange and continues to operate during a power cut.

Peter, G3LDO, sent me an audio cassette recording of the QRM made with the receiver set to AM mode. It is a repetitive noise that sounds like a slow Morse letter 'R' followed by a burst of data lasting about two seconds. Sometimes the repetition rate speeds up. It sounds like regular 'polling' in data communications, so it could be some sort of home computer network using wires, phone-line networking or powerline networking. It could also be something with a microprocessor such as an alarm system, a TV set-top box or even an electronic water conditioner. Whatever it is, there appear to be a number of them around East Preston in West Sussex.

Fig 1 shows a screen capture from *Spectrum Lab* with a 'waterfall' display of the G3LDO mystery noise received on the 14MHz band with the receiver in AM mode. Audio frequency increases left to right, from 300Hz to 1500Hz. On the coloured waterfall display, time increases from bottom to top and the white grid lines are 10 seconds apart. The intensity of the signal at is represented by colour from grey to red. Most of the spectral energy is between 500Hz and 600Hz, but there are peaks at multiples of 100Hz. As the plot was made from a short cassette recording rather than directly 'off-air', it is not possible to determine whether the 100Hz component is mains-related or not. Distinguishing features are the red 'C'-shaped areas which occur during the bursts of what sounds like data. These indicate frequency 'chirp'. If anyone knows what goes 'dit-dah-dit buzzz' on 14MHz, 24 hours a day, I, and at least two Peters would like to know.

FRIDGE SAVER PLUGS

'Sava Plug' is the trade name for a mains plug with built-in electronics that is claimed to save energy when used on fridges and freezers. A report on these devices was published in October 2002 'EMC', with an update in February 2003 'EMC'. A recent report of Sava Plug QRM indicates that the same design of plug is still being sold.

Interference from a 'Sava Plug' has some unusual characteristics. **Fig 2** shows a spectrum display from the audio output of the author's TS-850 tuned to 3505kHz in AM mode. As the aerial is right over the house where the 'Sava Plug' was being tested, the level of interference was about S9+30dB, which was much higher than signals at the bottom of the 80m band during daytime. This produces a very clear high-contrast waterfall display. The frequency scale is 0 – 1000Hz, and the time scale covers from 0845 – 1000UTC with white grid lines at intervals of 15 minutes. There are strong spectral lines at multiples of 100Hz with smaller peaks at odd multiples of 50Hz. The bending of the higher frequency lines between 0915 and 0945 indicates that the mains frequency was varying slightly during this time. The fridge switched on at 0900 and off at 0912 then on again at 0947 and off at 0959. When the motor is not running, the 'Sava Plug' powers the auto-defrost heater element and the spectral lines are narrow. When the motor is running, it modulates the current drawn from the mains slightly, producing a pair of sidebands which show up as a broader line on the higher harmonics of 50Hz, such as 750Hz, 850Hz, etc.

So, if you have a continuous buzzing noise on the 3.5MHz band, tune the receiver to a quiet spot in the CW section of the band during day time, select AM mode and connect the audio output to the line input of a sound card in a PC that is running a program such as *Spectrum Lab* or *Spectrogram*. Use a slow waterfall display that will take at least an hour to fill the screen and take a close look at a spectral line at an odd multiple of 50Hz, somewhere between about 500Hz to 1000Hz. If it becomes wider and narrower at a rate that is consistent with a fridge switching on and off, it is probably a nearby 'Sava Plug'. If it has some other distinctive characteristic, please let me know. ♦

WEB SEARCH

American Radio Relay League, BPL information	www.arrl.org
European Parliament	www.europarl.eu.int
Report A5-0113/2004	http://tinyurl.com/2noko
Spectrum Lab audio spectrum analysis software by DL4YHF	www.qsl.net/dl4yhf/spectra1.html
Alternative download site for Spectrum Lab and other LF radio-related software	www.wireless.org.uk/software.htm

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The auto ATU that has a digital data display and can even handle wires!

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A true balanced line ATU that is ready made for open wire feeder. Extremely accurate balancing provides optimum performance. It can also be used for long wires and coax. Great for all-band doublets. **1.8-54MHz (MFJ-974H) *300W *Balanced, wire or coax *SO-239 sockets *Size 195 x 155 x 220mm *Weight 2.05kg*

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Similar to the MFJ-993 but handles 150W SSB/100W CW and matches 6-3200 Ohms. Does not have digital VSWR meter LCD readout aural VSWR, antenna switch or 4:1 balun.

Auto ATU

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MFJ-890UK DX Beacon Monitor

**Beacon frequencies: 14.1/18.110/21.150/24.930/28.200MHz*
**Configuable to local 60kHz time signal*
**Built-in Atomic clock receiver*
**Manual or Atomic sync*
**18 Red LED's on world map*
**Supply 9V int or 12V*

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3kW fast differential tuning design. 1.8 - 30MHz. Wire balanced and coax systems. Full metering and switching.

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Antenna switch for balanced line antennas.

**Balanced line , 6x antenna switch *Heavy duty twin terminal posts *Power rating 1kw *Size 230 x 80 x 125mm *Weight 800g*

6-Way Balanced Line Switch

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MFJ-9340

CUB CW Transceiver Kit

**Adjustable tx power*
**40m 2.2W*
**Covers 50kW segment*
**Power 12-15V DC regulated*
**Size 90 x 47 x 98 mm*

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MFJ-949E

1.8 - 30MHz. 300W wire, balanced and coax. Inc dummy load, metering and antenna selector.

£159.95 B

MFJ-941E

A great budget ATU. All the great MFJ features that make it ideal for base station use. **1.8-30MHz *300W *Cross needle meter *VSWR & PWR 30/300W *Terminals for wires and bal. lines *Internal 4:1 balun *Ext. Dummy load socket *SO-239 sockets *Size 260 x 180 x 70mm*

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Just the job for portable use. It's so small! **3.5-30MHz (80 - 10m) *150W wire, coax, balanced *Internal 4:1 balun *SO-239 sockets *Size 180w x 60h x 80d (mm) *Weight 650g*

Mobile and portable use

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£129.95 B

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MFJ-447

**Speed: 2 - 65 wpm*
**Tone 200-1000Hz*
**Supply PP3 or ext. 12V*
**In/Out: 1/4in jack / phono (sockets)*
**Size: 162 x 127 x 38mm *Weight 460g*

Memory Keyer

£79.95 B

MFJ-962D

Ideal for use with linears. Gandles balanced, coax and wire. **1.8-30MHz *1.5kW Roller Coaster *VSWR meter *6-way antenna/load switch *Built-in 4:1 balun *2 coax positions *Size: 270x375x115mm*

Manual ATU

£279.95 C

MFJ-910

Mobile Matcher. Connect between mobile whip and transceiver. See your VSWR come down as you switch impedance match.

£24.95 A

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Auto ATU extender. It let's your internal transc. ATU handle difficult coax antennas such as G5RVs etc. Greatly extends the range capability.

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MFJ-815B VSWR / Power Meter

The MFJ-815B offers the convenience of a dual needle meter that permits monitoring forward and reflected power at the same time. **1.8-30MHz *200W, 2kW *Cross Needle Type *Connector S0-239 *12V DC Lamp *180x85x110mm *Weight 700g*

£82.95 B

MFJ-1704 4-Way Coax Switch

**4-Way *Connections S)-239 / N*
**Power 2.5kW *Range DC - >500MHz*
**Isolation 60dB at 30MHz / 50dB at 500MHz *Centre Earth Position *Static Discharge Protector*

£69.95 B

MFJ-969

The latest design from MFJ, this unit features an active power meter for really accurate PEP measurements. Powered by an internal PP3 battery (not supplied) or an external 12V source. This is one of the most popular 300W models, having a very wide frequency range an excellent power and VSWR accuracy.

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Combined dummy load and in-line watt meter. Just switch between one or the other. **1.8 - 54MHz *300/3000W/3kW *50 Ohms *SWR/Wattmeter *3in Cross-needle meter VSWR/PWR *Reads PEP or AVG *Load: 1.5kW 10secs - 100W 1min *SO-239 x2 Sockets *9V int or 12V DC ext *Size 110 x 80 x 265mm *Weight 1kg*

£139.95 B

MFJ-1624 HF Mini-mobile Bugcatcher

**8-bands 40-6m (inc WARC) *300W (PEP) *Very high 'Q' 2.5" coil *0.8 / 1.67m telescopic whip *Standard 3/8in fitting *Max/min height: 1.67m/0.8m *Mobile or base use*

£89.95 B

MFJ-260C Dummy Load

MFJ-260C 1.5MHz - 150MHz 300W
50 Ohm SO-239
**Size 180 x 57 x63mm *Weight 450g*

Handles 300W for 30 seconds and lower powers proportionally longer.

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If there is an item of new technology about which you would like to know more, or think it ought to be mentioned here, drop a line to the author, or e-mail him. His addresses are at the head of this page.

Whatever next

Alpha Power, the company best known in amateur radio circles for producing linear amplifiers, launched an interesting new power and SWR meter at this year's Dayton Hamvention. Its model 4510 incorporates extensive electronic processing and uses an interesting combination of digital display and analogue meter to display power and SWR. It works across the HF spectrum from 2MHz to 30MHz and auto-ranges in nine steps from 0.3W to 3kW, although it can actually measure power down to 30mW.

At just over 4kg in weight, this is a substantial item of equipment, Alpha Power's publicity material stating that the 4510 incorporates temperature and frequency compensation and measures to within 3% accuracy. It also has an RS-232 socket, so that readings can be computer-logged. The power supply requirement is a modest 600mA from a 12VDC supply.

KEYRING CAMCORDER

Dutch electronics giant Philips has introduced a digital camcorder the size of a key fob. It includes a 2-megapixel pickup chip and a 1.5GB hard drive that can store up to 24 minutes of video in MPEG4 format. The KEY019, which is roughly half the size of a mobile phone, weighs only 45g and can also hold digital still photos, MP3 music and data files. It connects to a computer via a USB port, so can't be used directly in combination with a television set. Most of the controls are located in the lead to the headphones.

222 MILLION... AND COUNTING

In the world of chip building, transistor sizes just keep going down and the numbers just keep going up. By the end of this year, Intel is expected to start shipping CPUs based around their 90nm production process. Codenamed 'Prescott', they will contain 150 million transistors and will be identifiable by the letter E after the clock speed (eg 3.2E GHz). Despite the fact that they will be considerably more complex than existing Pentium® 4 CPUs, they will still be called P4s (the P5 is a little way off yet). The company has also produced wafers on the 65nm process, transistors on the 45nm process, and prototype transistors for the 32nm and 22nm processes.

Meanwhile, graphics card manufacturer Nvidia's latest offering, the GeForce 6800, contains a 222-million transistor Graphics Processing Unit (GPU) chip built by IBM. "The GeForce 6800 is one of the most complex, advanced chips in the world," said Chris Malachowsky, co-founder and Vice President of Hardware Engineering for Nvidia. It is said to be capable of rendering graphics of the same quality as a Pixar movie, but the current consumption and heat output of many modern high-powered graphic cards result in a lot of users complaining about fan noise and having to upgrade their power supplies.

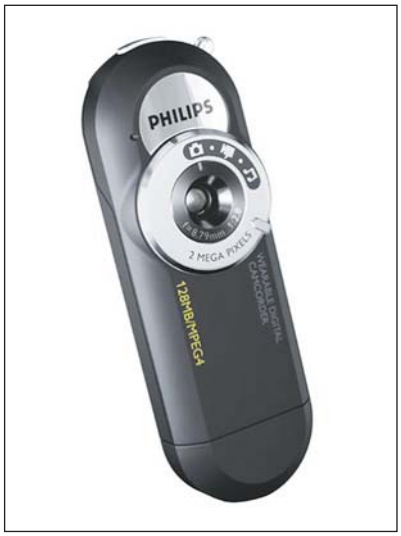
What all this means is that the next landmark in semiconductor integration - the billion transistor chip - is now thought to be just three years away, whereas a couple of years ago it was not thought likely until 2010.

RFID

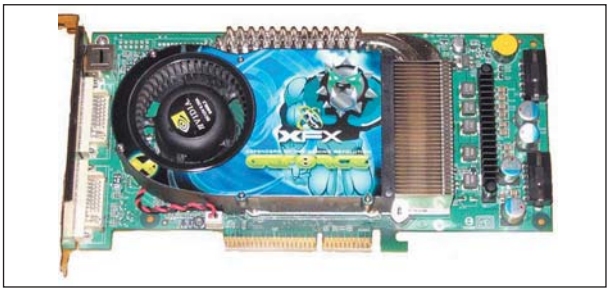
In last month's column, I painted a disturbing vision of the future, in which everyone's movements and actions could be trackable in minute detail, thanks to the future possibility that everything we buy, carry and wear will contain RFID chips. Simon Warren e-mailed to tell me how to disable them and, although I haven't tried doing it, it seems surprisingly simple. As Simon says, "The quickest way to do it is to stand it on a cup of water in a microwave oven and give it a two-second cook. That kills them straight away".

I'm not suggesting that anyone with an RFID pass card for work should try this to see if it works, but it does seem that all you need to preserve a degree of anonymity is a microwave oven. ♦

Above
The Alpha Power 4510 auto-ranging power/SWR meter.



The Philips KEY019, a digital camcorder not much bigger than your thumb.



Below
The Nvidia 6800 graphics card. With its 222-million transistor graphics processor, it contains one of the most complex chips ever built.

WEB SEARCH

Alpha Power 4510	www.alpha-amps.com/Wattmeter%20cutsheet.pdf
GeForce 6800	www.electronicstalk.com/news/syn/syn232.html
Philips KEY019	www.press.ce.philips.com/press/2004-2-23-Cebit2004-568.html

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In practice

G3SEK concludes his discussion of materials for relay contacts, and looks briefly at some common SWR bridge circuits.

RELAY CONTACT MATERIALS - CONCLUDING JUNE'S ITEM...

We had identified that the best contact material for a relay that has to handle both receiving and transmitting signal levels is probably gold plating on silver. Other contact materials will certainly work, especially when the relay is new, but gold is particularly good for the receive side where the currents and voltages are too low to have any electrical 'self-cleaning' effect.

There aren't many available relays that have both Au/Ag contacts (gold on silver) and a reasonably high current rating. Even in an industrial-sized component catalogue you may only find a few options, and in a smaller catalogue you might find none at all. These relays are neither intended nor rated for RF use, so you have to look at the DC/50Hz ratings and use some judgment. Higher current ratings imply larger contacts, so those are the ones to choose. As for voltage, any relay that is rated for 250V RMS at 50Hz should be fine in a 50Ω RF system at amateur power levels. All of the Au/Ag relays you'll be able to find will be physically small, so they shouldn't create much of an impedance bump at HF.

The most important thing is to make sure that these relays never actually have to *switch* RF while the transmitter is on. Any contact arcing will be fatal to gold plating, and the violently changing load impedance may also harm your transceiver or power amplifier. Ideally you should interlock your relay switchbox with the PTT line, so that the relay contacts will always stay put while you're transmitting. The good news is that the ability of mated contacts to *carry* RF power is always far greater than their ability to switch it.

As well as choosing the right contact material, there is another way to improve the ability of switch contacts to carry very small audio/RF signals. In the early days of automatic telephone exchanges, engineers discovered that the reliability of relay contacts was dramatically improved by passing a small DC current through the contacts, along with the low-level audio signals. This is because of the electrical self-cleaning effect mentioned last month. An open-circuit voltage of about 10V is sufficient to punch through any thin insulating film that might be forming on the contacts, and a DC current of only a few milliamps creates a high enough local current density to force a good contact. This technique is sometimes called 'DC wetting', harking back to the even earlier technique of using contacts that are wetted by a liquid film of mercury.

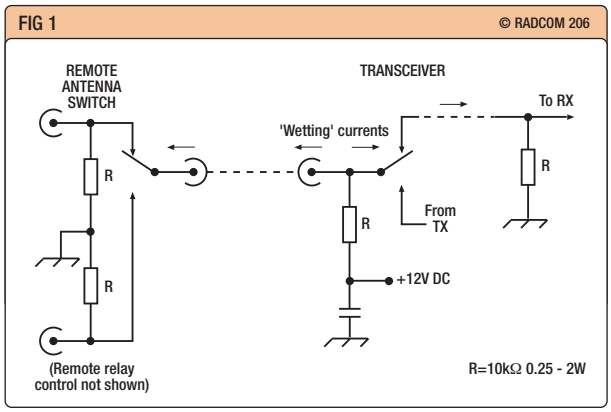

Fig 1
A few added resistors provide 'DC wetting' of relay and switch contacts along the receive path.

The circuit of the front-end board for the *CDG2000* transceiver [1] shows how DC wetting can be applied, in conjunction with carefully selected relays with gold-plated contacts. **Fig 1** shows how easy it is to add the same feature to any existing system. All it needs is a small 10kΩ resistor from each antenna output to a bypassed +12VDC supply, and a similar resistor to ground at the far end of the signal path. 10kΩ is a good value because it allows sufficient current from a typical 12V supply, without significantly disturbing a 50Ω RF system. By making the 12V connection at the transceiver's antenna terminal, it can 'wet' the contacts in both directions, into the transceiver and also out to any connected equipment. For example, if there is a DC path to ground at the antenna end, it will wet all contacts *en route* to the antenna, including the bypass relays in the power amplifier. You may have noticed that, in some configurations, the open-circuit DC voltage will be only 6V, not 12V, and the total current is shared between a variable number of closed contacts. Fortunately, these variations don't matter in practice, and that makes the whole setup very simple and flexible.

However, in applying the DC wetting technique you do need to make some fairly obvious checks. In particular, check that any DC shorts to ground are at the far side of the contacts you want to wet, or else no current will get to them. If necessary, add extra 10kΩ resistors to complete the desired current path, as shown in Fig 1, and/or use blocking capacitors to prevent the DC from flowing where it shouldn't (for example, the wetting current must not be allowed to pass through any input protection diodes).

A useful bonus is that DC wetting allows remote monitoring of the state of the cables, connections and contacts all along the current signal path. Simply measure the DC voltage at the transceiver output, using an accurate digital voltmeter, and note the result in your logbook. Repeat this measurement at some later time, and if there is *any* significant difference you'll know that something must have changed. Measuring the DC levels at other points along the path should quickly find the problem.

WHERE'S THE 'BRIDGE'?

Q Why do people so often talk about 'SWR bridges'? I don't see any 'bridge' in most published circuits.

A 'SWR bridge' is mostly jargon, so you can't necessarily expect it to make complete technical sense. Even so, the name had to come from somewhere...

The term 'Standing Wave Ratio' has come to have two separate meanings. The original meaning is related to the amplitudes of standing waves on a transmission line; but that meaning is strictly limited, because it implies that nothing else except a transmission line can *have* an SWR. Likewise, a transmission line is the only object for which we can directly *measure* SWR, by probing the voltage variation along the line.

However, 'SWR' has also come to

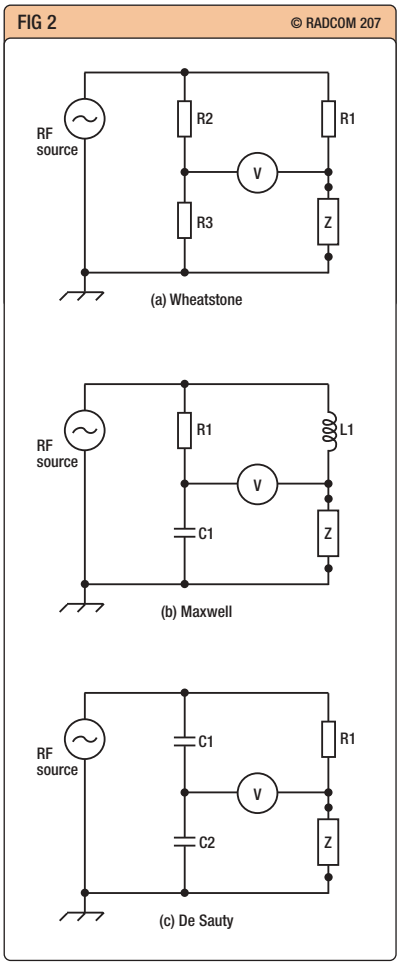

Fig 2
Three classical impedance bridges, any one of which can also be used as a reflection-coefficient or 'SWR' bridge. V is an RF voltmeter.

have a second meaning, as a way of comparing any given impedance against a system reference impedance (typically 50Ω). When used in this second sense, 'SWR' is purely a mathematical relationship between two impedances, so it is no longer restricted to transmission lines. Many different kinds of components have an impedance, so they can also have an equivalent SWR value - but that value cannot be measured directly. Instead, we have to measure something related to the impedance of the component, and then *calculate* the equivalent SWR.

All so-called 'SWR meters' follow this second route. What they actually measure is the *reflection coefficient* of any impedance that is connected to the socket marked 'ANTENNA' [2]. The reflection coefficient $|\rho|$ is a quantity that runs between 0 for a perfect match to the system reference impedance, up to 1 for a complete mismatch. If the meter scale was calibrated in terms of reflection coefficient, it would be a simple linear scale from 0 to 1. You may not have noticed, but the calculation to convert $|\rho|$ into the equivalent SWR value is happening right in front of you - it is the reason for the non-linear SWR scale.

The earliest of these 'SWR meters' were simplified forms of impedance bridges. That's how they came to be called 'SWR bridges', and the name has stuck. **Fig 2** shows three examples of SWR bridges from early editions of the *ARRL Handbook*, and they are easily identified as three of the classical impedance-measuring bridges named after Wheatstone, Maxwell and De Sauty. To use any of these circuits as a reflection-coefficient bridge (and indirectly, as an 'SWR bridge') the instrument must first be connected to a precision 50Ω load, and then one of the other three arms of the bridge must be adjusted until the meter reads exactly zero ($|\rho|=0$). This setup procedure only needs to be done once, and it calibrates the bridge to the system reference impedance of 50Ω. Each time you use the bridge, you first connect a short-circuit load ($|\rho|=1$) and then adjust the RF input and/or the meter sensitivity for a full-scale reading. Most practical SWR meters achieve the same full-scale calibration in a slightly different way, but the principle is the same. You can then connect the impedance you want to measure, and read its SWR directly from the meter scale.

Most SWR meters are actually used to monitor the load impedance into which your transmitter is working. The reflection bridges in Fig 2 are not very suitable for this, because they require a bridge component to be permanently inserted in series with the RF path (R1 in Fig 2(a) or 2(c); or L1 in Fig 2(b)). For continuous monitoring, the true bridges have been replaced by a variety of in-line instruments described below. However, the Wheatstone bridge has made a comeback in the popular 'antenna analysers' by MFJ, AEA and Autek [3].

Fig 3 shows the key features of two types of SWR indicators that can be left permanently in-line for continuous monitoring. **Fig 3(a)** is the 'Bruene bridge' which works well at HF, and this simplified circuit shows it to be a relative of the Maxwell bridge. The difference from the classical Maxwell bridge in Fig 2(b) is that the inductance is inserted in-line by the transformer action of the centre conductor passing straight through the middle of the toroidal secondary winding. When the instrument is terminated with a standard reference load and calibrated to give a null on the RF voltmeter, you are effectively balancing the Maxwell bridge. However, the same circuit can also be analysed in a different way, as a directional coupler. You can think of C1 and R1 as taking a sample of the RF voltage V across the line, and T1 as taking a sample of the current I along it (which is then converted into a voltage across R2). When you physically reverse the whole instrument in the line, the phase of the current sample reverses but the phase of the voltage sample does not, and that is how the instrument gets its directional properties [2].

The parallel-line type of SWR meter (**Fig 3(b)**) relies on the distributed inductance and capacitance between the main line and the secondary line. Some authors have likened it to a Maxwell bridge; but I find it much easier to think of the distributed inductance as taking a sample of the line current, while the distributed capacitance samples the voltage. The analysis is then the same as for the Bruene circuit in Fig 3(a) [2]. However, I must stress that the 'bridge' and the 'sampling' analyses are equally valid. The choice between them depends on which properties of the circuit you want to see more clearly, either its bridge-like nature or its directional-coupler nature.

There are many more details that I've had to leave out, but I hope this has explained how the term 'SWR bridge' has become so common. ♦

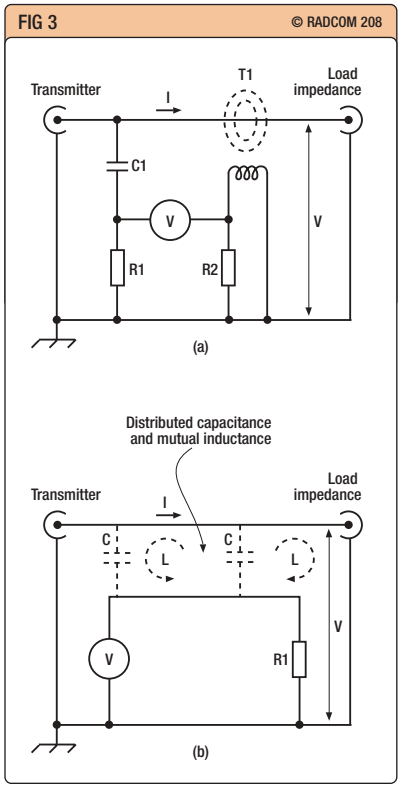

Fig 3
Elements of two in-line 'SWR indicators': (a) Bruene type and (b) parallel-line type.

REFERENCES
[1] 'The CDG2000 HF Transceiver' by Colin Horrabin, G3SBI, Dave Roberts, G8KBB and George Fare, G3OGQ (Part 2, Fig 12), *RadCom*, July 2002.
[2] 'In Practice', September 2002.
[3] 'In Practice', May 2000.

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"The RSGB Technical Committee reviews technical articles prior to publication, to ensure that they do not give incorrect or misleading information. Like all peer-review activities, however, this process can result in controversial views being suppressed, albeit with the best of intentions. It has been decided that we will, from time to time, and if the subject appears appropriate, publish articles of a controversial nature in order to stimulate debate. These articles on loops (*RadCom* June – September) fall into that category, have received only a minimal review, and carry the caveat that their publication does not imply that the RSGB, its Technical Committee or *RadCom* necessarily agrees with the contents."
Tony Plant, G3NXC
Chairman, RSGB Technical Committee

New truths about small tuned loops in a real environment Part 1

In the first of his two 'pro-loop' articles, G3LHZ discusses how these antennas work, the gaps between theory and measurement, and how to make simple loop efficiency measurements to demonstrate that the small loop is not inefficient

'The Truth about Loops' [1] in the RSGB book *International Antenna Collection* ended by saying that there was considerably more 'truth' about loops to be discovered. At that time, I had in mind a follow-up loop design article along the lines of 'Loops - the Best of the Bunch So Far'. But more recent work shows that the loop environment is usually by far the most dominant factor. The 'new' title reflects this.

The controversy about loops (and small antennas) rages on in the pages of 'Technical Topics' in *RadCom* and elsewhere – but goodness knows why! "The truth is the truth", at least scientifically speaking. But we do progress: the critics now realise that loop efficiency measurements do indeed challenge old traditional theory and formulas and 'current' EM simulators such as *NEC*. The *technical* attacks now focus on different interpretations of the measurements and on challenges to measurement techniques. See, for example, the offerings of Jack Belrose, VE2CV, in *RadCom* June and July 2004 [2]. My answers to these challenges will be found below.

My two-part article covers four topics. The first is about 'how antennas work'. For small loops, the gaps between 'real' measurements, and existing theory and simulations, are so stark that some 'new' additional theory is obviously required [3]. The second topic is 'how to make simple loop efficiency measurements' to dispel the myth that the small tuned loop antenna is fundamentally very inefficient. The third topic is how to place and use the loop optimally in a given environment as determined by 'real' measurements. The fourth addresses how to make efficient and high-power loops with emphasis on home-made components.

What I hope also becomes clear in this article is my abiding respect for 'real' (not simulated) measurements. Theory and simulations are always subservient to 'real' measurements. If the measurements demand it, it is the theory and the simulations that have to be changed and upgraded, and not the measurements.

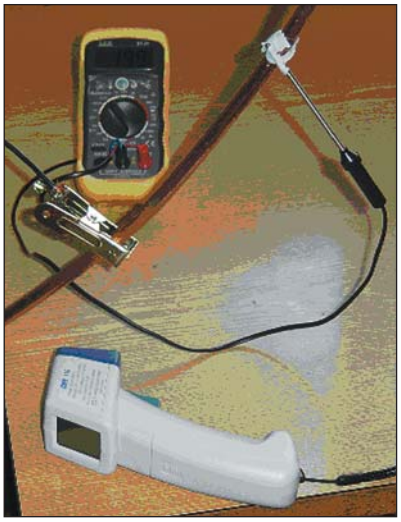
HOW ANTENNAS WORK

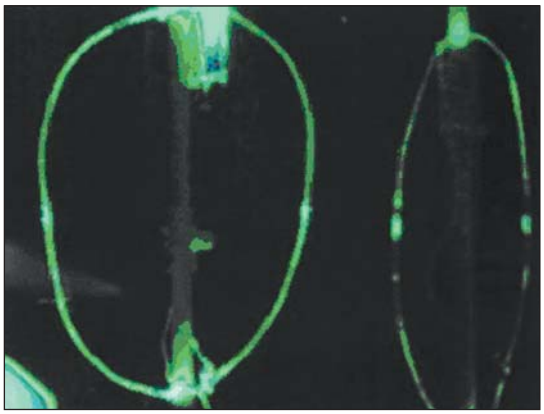
Here is my 'alternative' shot at explaining how antennas actually work. It is based on 'A Sketch of Antenna Impedance Theory and How Antennas Radiate', which is my appendix to a paper written with my student Marc Harper and presented to the Nordic HF04 conference in Fårö, Sweden [3].

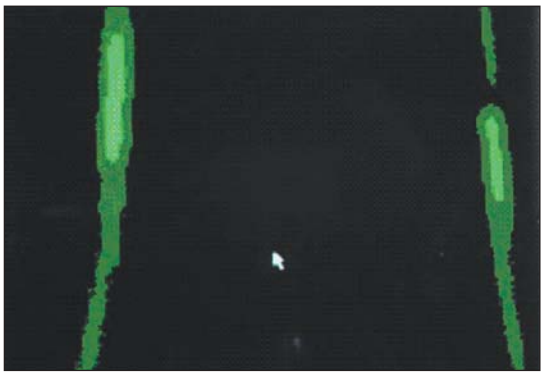
ANTENNA AND SURFACE WAVE IMPEDANCE THEORY

Maxwell's 'electromagnetic' equations, the 'magneto-static' Biot-Savart field equation (and similar), and the Gauss field equation (and similar) of 'electrostatics' are combined. An assumption is that fields rather than potentials travel at the speed of light. Potentials are derived from fields by line integration from infinity (a very classical definition!).

This new approach introduces additional antenna radiation modes that correspond closely with those found from many 'magnetic loop' measurements. These additional modes also indicate how such







antennas as the CFA and other 'E-H antennas' could be said to 'work', in the cases where the measurements show that they do 'work'!

A summary of radiation and propagation to and from an antenna is:

ANTENNAS

1 'Antenna impedance modes' exist distributed in the near-field space as a result of the shape, surface properties and *termination impedance* of the antenna. They do not depend on having current or power supplied to the antenna.
2 Each impedance mode can be associated with a particular field (or flux) type, selected from, D, E, B, H, or any of their spatial derivatives. *A mode is the distribution of local impedance, Z, in the near-field space* for the local ratio of the displacement current, σ, to the potential, ϕ, associated with one particular field type. We have $Z = \phi / \sigma$. But it should be stressed that Z exists and has a value even if ϕ and σ are zero.
3 For each mode, you can choose a reference phase, so that at any point in the near field: (a) the real part of the impedance represents the power flow transfer impedance, and (b) the imaginary part represents the stored energy capacity.
4 Each mode has a defined Q-factor in free space, which can be lowered by coupling to a lossy ground.
5 Each mode is coupled to the antenna surfaces. The coupling is determined by the antenna size, shape and surface properties.
6 The antenna conductors and tuning components store energy. There is an increase in overall Q-factor associated with this.
7 Each mode has its own radiation resistance, appearing at the antenna terminals.
8 Because the modes are distributed and overlap in space, the radiation and loss resistances obey the 'power-combining' RSS (Root of the Sum of the Squares) law. (The overall resistance seen at the terminals is the square root of the sum of the squares of the individual loss and radiation resistances.)
9 The impedance mode defines the local velocity and velocity gradient at any point in space. In this way a 'refractive index' is defined at any point, so that (reversible) power flow 'geodetics' or 'streamlines' may be determined.
10 For reception, the impedance mode acts as a 'lens' to focus incoming radiation onto the antenna surfaces. The 'aperture' of the lens is the antenna 'aperture' as determined in the direction of look.
11 For transmission, the 'lens' works in reverse to create an extended 'image' of the antenna, as seen at a distant point. The perceived image area is again the same as the area of the antenna aperture. (The antenna gain on transmit is always the same on transmit as on receive.)

SURFACE (GROUND) WAVE PROPAGATION

12 Above any surface, the fields E, B, D and H are partially independent of each other and have to satisfy the surface boundary conditions. Each has its own separate wave equation and these are partially coupled. There is reasonably strong, but not 100%, coupling between E and B, and D and H. The coupling between these two pairs is much weaker.
13 The consequence is that there are *two* possible vertically-polarised surface-wave solutions. One of these, the DH-wave, has maximum energy density at the surface. The other, the EB-wave, has a maximum at about $\lambda/4$ above the surface. These waves can have slightly different surface velocities, typically differing by 1% to 4%. (The two horizontally-polarised solutions have a higher attenuation with distance.)
14 The two ground-wave types couple differently to the various modes of any given antenna.
15 The existence of two surface waves is not encompassed within the classical Norton *semi-empirical* surface-wave propagation formula, or in the Somerfeld formulation of the ground losses under a dipole.

A simple summary of the above points is "Any antenna acts as a lens that focuses and couples radiation between free-space and the antenna. The lens is the local impedance distribution in the near-field space and it is caused by the shape, size and termination impedance of the antenna.

"There are two types of surface waves (over ground), which differ slightly in velocity, have different vertical field distributions, and have different coupling factors to any given antenna."

Left
Thermometers – Thermocouple above and 'contact-less' CHP 110 below.

Thermal camera picture of a pair of loops, RF (left) and DC (right).

Thermal camera picture of the black paint 'hotspots' of the pair of loops, RF (left) and DC (right).

Right
Thermal camera, and PC display picture of Marc Harper.

FIG 1 © RADCOM 231

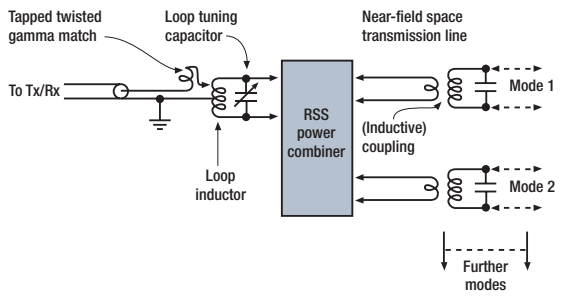


FIG 2 © RADCOM 232

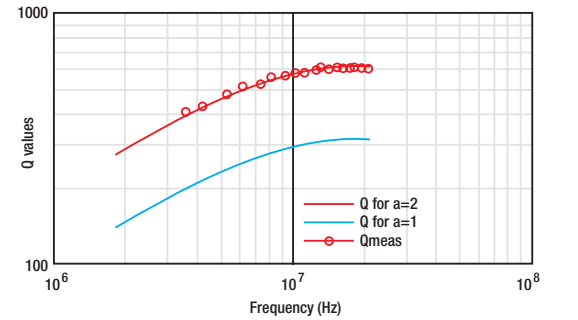


Fig 1: Multiple mode model of a loop.

Fig 2: Log Q versus log frequency for a 68cm copper loop.

ANTENNA MODES FOR SMALL ANTENNAS AND LOOPS

Fig 1 shows a 'multi-mode' model of a small tuned loop.

Each mode has its own radiation resistance R_{rad1}, R_{rad2} etc. Because the resistances are actually all distributed in space, transmission-line theory requires that they are combined by the RSS method originally derived from many practical loop *Q* measurements [4, 5, 6]. The RSS method gives the total radiation resistance as **Equation 1**.

The modes that have been identified so far are:

1 The 'new' loop mode. This is a B-field mode with a *Q* of about 300. Because the coupling is proportional to loop area we get $Q \approx 500/D$, but with an asymptotic limit of $Q \cong 300$ when $D \cong 1.5$m, at which point we start to get 'over-coupling'.

2 The '(folded) dipole' mode. This is a D-mode with a *Q* of about 6 or 12 (2π or 4π) for large enough conductor size. The coupling is also proportional to loop size (as a consequence of Maxwell E = curl B equation reversed). For small loops, this gives $R_{rad} \propto D^2$ and $Q \propto D^{-1}$.

3 The 'traditional' loop mode, (the only one?) which obeys Maxwell equations, the Chu-Wheeler equation $Q = (ka)^{-3} \propto D^{-3}$ and the Kraus formula [1].

4 Two ground-wave modes. Both of these are low-*Q* with values yet to be determined.

LOOP EFFICIENCY

We should not confuse the 'intrinsic' efficiency of the antenna itself, with the gain or loss of the antenna in its real environment. Perhaps much of the 'small loop controversy' comes from (the IEEE and broadcast engineers) defining the overall gain in the environment as efficiency. It is not!

The physicists' efficiency definition is the proportion of radiated RF that is *not* dissipated as heat from the operative surfaces of the antenna. This is my 'intrinsic efficiency'. It is arguably the only measure that is almost independent of the antenna environment [1].

SIMPLE AND RSS EFFICIENCY MEASUREMENTS

The formula for loop efficiency is **Equation 2**, but we measure $R_{total} = X_{loop} / Q$, where *Q* is the measured *Q* and X_{loop} is the loop reactance.

In order to find R_{rad} from R_{total} and R_{closs}, the debate is whether to use RSS combination or not. We have to decide between

(a) $R_{rad} = R_{total} - R_{closs}$, and

(b) $R_{rad} = \div(R_{total}^2 - R_{closs}^2)$. The efficiency difference is a maximum of about 15%. More measurements are needed to decide. In summary, the choice is between **Equation 3(a)** and **Equation 3(b)**.

Equation 1: $$R_{rad} = \sqrt{(R_{rad1}^2 + R_{rad2}^2 + \text{etc})}$$

Equation 2: $$\eta = R_{rad}/(R_{rad}+R_{closs}) = 1/(1+R_{closs}/R_{rad}.)$$

Equation 3a: $$\eta_{simple} = 1/(1+R_{closs}/R_{rad}.) = 1 - R_{closs}/R_{total}$$

Equation 3b: $$\eta_{RSS} = 1/(1+R_{closs}/R_{rad}.) = 1/\{1+1/\sqrt{(R_{total}^2/R_{closs}^2 - 1)}\}$$

Equation 4a: For pure copper
$$R_{closs} = 0.000222\ (f_{MHz})^{1/2}\ D/d$$

Equation 4b: For plumbing copper
$$R_{closs} = 0.000333\ (f_{MHz})^{1/2}\ D/d$$

Equation 5: $$R_{total} = \sqrt{(R_{rad1}^2 + R_{rad2}^2 + etc + R_{loss1}^2 + R_{ross2}^2 etc)}$$
$$= \sqrt{\{(a_1 f)^2 + (a_2 f^2)^2 + (a_4 f^4)^2 + b_0^2 + b_2^2 f\}}$$

The three main components of R_{total} are: the total radiation resistance, R_{rad}; the conductor loss, R_{closs} that varies as $\sqrt{f}$; and an unknown fixed loss component, R_{floss}, that does not vary with frequency. When R_{floss} is negligible, we can use the conductor loss, R_{closs}, as computed from the 'skin effect' formula below.

To check whether the fixed loss is negligible, we plot the log of the measured loop *Q* against log of frequency over a wide band. **Fig 2** shows this for the 68cm loop results of Fig 10 in 'The Truth about Loops' [1]. At the low-frequency end, the slope is 0.5 and this confirms that the loop conductor losses proportional to $\sqrt{f}$ are dominant. If the fixed loss were dominant the slope would be unity.

At the low-frequency end, the drop in *Q* signifies a loss in efficiency. But, at the high-frequency end, the *Q* drops as the dipole mode and the traditional loop modes 'kick in' and it signifies an increase in efficiency.

The RF conductor loss, R_{closs}, is calculated from the 'skin effect' resistance formula. For a loop of diameter D and tube diameter d (both in metres) at a frequency f_{MHz} (in MHz) we have **Equation 4(a)** and **Equation 4(b)**.

As an example, a 1m-diameter loop of 10mm-diameter pure copper tubing at 2MHz will have a series loss resistance, R_{closs}, of 0.0314Ω. For plumbing copper it is 0.0471Ω.

The loop inductance, L, is nearly the loop circumference in micro-henries. So the reactance is

$X_{loop} = 2\pi fL = 2\pi^2 f_{MHz} D$.

For example, at 2MHz, $X_{loop} = 39.5\Omega$.

For a *Q*-value of 220 at 2MHz for the 1m loop, the efficiency estimates are $\eta_{simple} = 73.7\%$ and $\eta_{RSS} = 78.6\%$. The difference is small! The efficiency is lower if there is any fixed loss, or if the copper resistivity is actually higher.

A 1.7m loop of two turns of 10mm tube has a measured *Q* of 350 at 2MHz, and a measured inductance of 24μH. The efficiency estimates are 81.4% and 84.1%. The problem is that the '3dB bandwidth' is only 2MHz / 350 = 5.7kHz. The operational bandwidth is 0.41 x 5.7 = 2.3 kHz for SWR = 1.5, and it is not enough for full-power

TABLE 1

Frequency (MHz)	Antenna Q	RF Power (W)	DC Power (W)	RF Temp (°C)	DC Temp (°C)	Efficiency (%)
1.98	180	9	24	30	30	74
3.7	287	100	15	23	23	85
7.03	321	100	12	21	21	88
10.12	343	100	10	19	19	90

Table 1
Loop 1m-diameter – intrinsic efficiency from thermal camera heat-balance method.

SSB operation of most SWR-protected solid state rigs. See Part 2 for the solution!

Q MEASUREMENT BY SWR METHOD

Q measurement by SWR requires a near-perfect match to 50Ω at the antenna terminals at the frequency of interest, f_0. The 3dB bandwidth is then $(f_2 - f_1)$ where f_1 and f_2 are the frequencies at which the SWR degrades to 2.62:1.

The *Q* is then $Q = (f_2 + f_1) / f_0$. The 2.62 value corresponds to the input impedance 'detuning' to 50 ± j50 and a reflection coefficient of $\rho = 1/\sqrt{5}$. SWR = $(1 + \rho)/(1 - \rho)$.

For accurate *Q*-measurements with a small loop, the three essential requirements are:

1 A near perfect, better than 1.05:1, SWR match to 50Ω at f_0, *at the antenna terminals*.
2 No matching capacitors. (Capacitors will increase the measured *Q* by an uncertain amount, depending on the frequency.)
3 A stable, low-FM-noise measurement source. (The MFJ Antenna Analysers (259, 269, etc) are recommended. Their LC oscillators are sufficiently low-noise and stable for accurate measurement of narrow bandwidths.)

The three recommended input matching methods are: the 'Twisted Gamma Match' [1]; a suitably 'squashed and distorted' subsidiary loop, also in [1]; and I occasionally use a 'Delta-Match' with the coaxial feeder connected at the apex of the delta near the centre of the main loop. (See Part 2 for more.)

THE WIDEBAND-*Q* MEASUREMENT METHOD

The wideband-*Q* measurement method [4] delivers each of the non-negligible loss and radiation mode resistance terms over the entire loop tuning range, and allows the radiation pattern of the loop and its 'directivity' to be predicted [1], together with the 'intrinsic' efficiency.

The *Q* and the total input resistance is found and plotted at 10 or so frequencies. We note that the various mode radiation resistances vary as different powers, n, of the frequency. Each has its own coefficient, *a*, to be found from the set of measurements. The powers assumed are n = 0, 1, 2, 4, as discussed above. The loss resistances are assumed to vary with n = 0 and 0.5.

The RSS equation for the total input resistance is then given by **Equation 5**.

The five mode and loss coefficients, a1, a2, a4, b0, b2, are found by curve-fitting to the measured values and comparing with a simple circuit model [4]. We find that manual fitting is as accurate as any of the curve fitting programs so far tried. The intrinsic efficiency is computed from the coefficients over the entire tuning range of the loop.

THERMAL (HEAT BALANCE) EFFICIENCY MEASUREMENT METHODS

ABSOLUTE TEMPERATURE RISE METHOD

The temperature rise of a loop antenna relative to the ambient temperature is a function of the power, P_{diss}, dissipated in the antenna. For input power, P_{in}, the efficiency can be directly computed as $E_{ff} = (1 - P_{diss}/ P_{in}) \times 100\%$. Estimated P_{diss} accuracy is ± 25%.

SINGLE ANTENNA HEAT BALANCE METHOD

A length of resistance wire is threaded through the loop tubing. First, the temperature of the tubing at some suitable point is measured for a given fixed RF power input, P_{in}, typically 100W. Then, with the RF source switched off, the resistance wire is supplied with DC power from an adjustable DC power supply. When the DC power has been adjusted to give the same temperature as was reached with the RF power supplied, then by definition the supplied DC power is equal to the RF P_{diss} power lost as heat. Again we have $E_{ff} = (1 - P_{diss}/ P_{in}) \times 100\%$.

The temperature can be measured by a contact thermometer, or by a non-contact thermometer provided that the measurements are made at points on the loop with exactly the same thermal emissivities (see the equipment shown in the photograph). Typical accuracy is ± 10% by this method.

IDENTICAL ANTENNA PAIR HEAT BALANCE METHOD

With RF supplied to one of an identical pair of loops and DC supplied to the other, the temperature difference between the two may be measured at the same time. The powers are adjusted until the observed temperatures of the two loops are the same.

A thermal camera has been used to measure the temperature difference between two identical loops of 1m-diameter made from 10mm copper plumbing tubing. Typically, the accuracy of P_{diss} is ± 5% by this method. (Acknowledgements to Dstl, Fort Halstead, for the loan of this camera.)

In the second photograph, the thermal camera shows that the tuning capacitor at the top of the left hand loop is getting hot. It has an RF-lossy steel frame. Using steel in loop construction is to be avoided.

Note that the stream of hot air emanating from the open ends of the conductor tubing can be seen at the top of the right hand DC loop in this photograph. Also note that the copper loop on the left is a bit more oxidised than the loop on the right and so it has slightly higher emissivity.

Polished copper has low emissivity, and on a thermal camera it appears to be cooler than it really is. To increase the sensitivity of the thermal camera, small matt black temperature measurement areas were painted on the loops, as seen in the third photograph. Such 'hotspots' should also be created if any kind of 'contact-less' thermometer is used.

Loss measurements made at four (amateur radio) band frequencies are shown in **Table1**.

The calorimetric and heat balance methods described above are 'direct' and confirm the validity of the 'indirect' *Q*-measurement methods unequivocally. The simpler, faster and more accurate 'indirect' measurement methods can thus be used with total confidence. The 80 to 90% efficiency claims, and much of the new antenna theory above are fully confirmed! ♦

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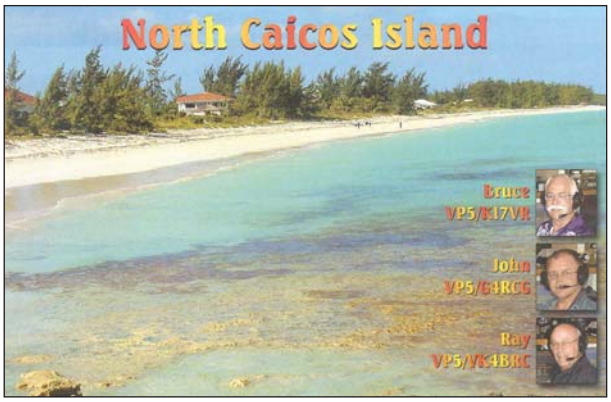
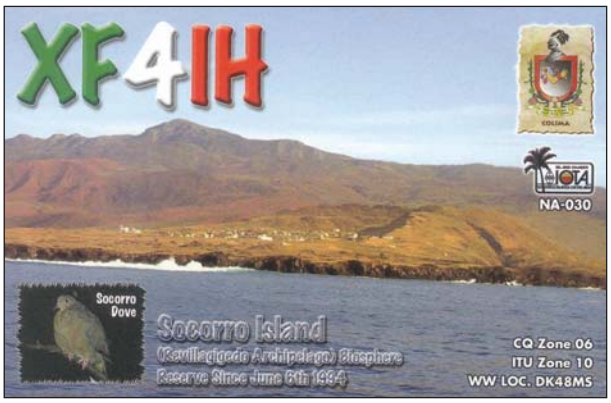
HF

Following last month's 'DXpedition Special' in *RadCom*, Don Field reflects on the role DXpeditions and special event stations play in encouraging activity on the HF bands.

Three QSLs from operations earlier in the year that were spotted at the RSGB QSL bureau.





As I look back over June, there wasn't a lot on the bands by way of rare DX, but some interesting band openings nevertheless. The *CQ* WPX CW contest at the end of May coincided with some excellent Sporadic E conditions, with huge short-skip signals on 10m from all across Europe. At the same time, the low bands were beginning to show the benefits of the decline in solar activity. 40m was open to North America and even Australia / New Zealand well after sunrise (I worked my last VE station about 90 minutes after UK sunrise) and although 160m wasn't in the best shape, OC4WW (Peru) was a big signal at one stage. 9V1GO (Singapore) and VK6VZ (Australia) have also been regulars on the band during June.

EXPEDITIONS

Last month's focus on DXpeditions in *RadCom* got me thinking about the part they play in our enjoyment of HF. Actually, there are probably some who would say that DXpeditions spoil the HF bands, by causing interference as a result of their pile-ups. But it's certainly true that without competitive activity, both DX chasing and contests, the HF bands would be very quiet for much of the time, and we may even be at risk of losing some of our frequency allocations. The same is, sadly, true of many of the VHF / UHF bands, of course.

The simple fact of the matter is that very many HF operators enjoy the chase, either seriously or on a 'for fun' basis. By no means everyone who works a DX operation will send for a QSL card, and even fewer will use that QSL card to claim awards. For many, the pleasure is simply in making the contact with somewhere off the beaten track. Even the arrival of ubiquitous world-wide communications through the telephone and Internet can't take away the magic of speaking to someone over the airwaves in some backwater of Siberia, or maybe to Tom Christian, a direct descendant of Fletcher Christian, on Pitcairn Island.

Of course, DXpeditions take many forms, as I have discussed in these pages on previous occasions. They can be a casual holiday operation, taking along one of the modern lightweight transceivers and benefiting from the CEPT licensing arrangements which allow amateurs to operate far from home without having to do any paperwork. At the other end of the spectrum, a DXpedition may be a mammoth undertaking by a large team, travelling by ship to a remote Antarctic island such as Peter 1, where they may have to helicopter everything ashore and will then have to handle all their own logistics in a harsh and unforgiving environment. The former are sometimes criticised because they, quite obviously, aren't able to provide every band and mode that a DX chaser might want. The latter are

sometimes criticised for their sheer size and expense, with one view being that they are somehow too 'commercial'. Actually, I don't think any DXpedition has ever escaped criticism completely, because some part of our mentality seems to condemn any DXpedition as hopeless until we have worked it, and after that we have nothing but praise! On our recent 3B9C DXpedition to Rodrigues (see *RadCom* July 2004 pp36 - 40), we had been active just 10 minutes when the first complaint appeared on the *PacketCluster* system: "Why no 40m SSB?" The fact that we had stations active on every HF band at that time, and would be there for over three weeks, was obviously irrelevant to the complainant. We simply weren't meeting his very specific need, to have instant gratification with a 40m SSB QSO.

The question of sponsorship is an interesting one, too. I have just finished reading one of the many books about the climbing of Everest. Expeditions of that sort invariably require sponsorship, and no-one seems to bat an eyelid. This, despite that fact that no-one other than the participants actually benefits directly. In contrast, in our hobby, everyone who makes a contact benefits. And yet there is absolutely no pressure on those DX chasers to actually make a contribution to the costs. I know of several long-time DX chasers who have never made a contribution to a DXpedition and never will, despite having gained huge amounts of satisfaction over the years from the chase. On their conscience be it, of course. The fact is that, like an Everest expedition, the more ambitious amateur radio DXpeditions simply would not be possible without some sort of sponsorship. Personally, I don't agree with sponsorship for *contest* operations, as these are done very much more for the benefit of the participants themselves (they go to a rare spot in order to get a better score) but I suppose, in many ways, it would be no different to the sponsorship we see in many (read "almost all" nowadays) competitive sports. Maybe in a few years we will be using a 'pay per view' system via the Internet to watch the major multi-multi contest teams in action, live, just as we now do for football matches or the Grand Prix.

Of course, the small-scale end of the spectrum is fun, too. Several recent DXpeditions, even to rare spots, have styled themselves as 'Lite' expeditions, taking minimal equipment and antennas. With airlines being ever more vigilant on weight limits, this approach may become more and more the norm. And for the chasers, many of those who have already got high scores are starting over with QRP (conventionally considered as 5 watts output or less). I recently attended an interesting talk on QRP operation by G3YMC (who, as you will see from the tables in these pages, is a very successful QRP operator), and it was clear that nowadays Lite expeditions or QRP operation can achieve a great deal. I say "nowadays" because I truly believe capabilities have changed over the years, probably due in the main to dramatic improvements in receivers, but also to Packet spotting, improved antenna designs, and other factors, all of which help low power stations to achieve better and better results. This became very obvious in the last few years, helped along by the high levels of solar activity. I suspect it may get a little tougher as the sunspots decline.

COUNTRIES WORKED, 2004

(sorted this month by SSB totals)

CALL	CW	SSB	DATA	MIXED
W1JR	226	224	153	250
GM0TGE	118	142	0	178
G3XTT	204	112	76	237
M0BKV	0	101	34	104
VK4BUI	133	93	0	152
GM8OEG	68	89	75	118
G4OBK	130	88	77	182
G0LGJ/M	0	84	0	84
MU0FAL	135	81	0	146
M0CNP	28	75	73	99
G4FVK	54	71	0	88
G4WXZ	143	68	0	143
G0GFQ	32	66	33	79
MM1APX	0	57	62	73
G7CLY	0	38	0	38
G3YVH	151	21	0	151
M5AEF (1W)	9	20	0	25
G3LHJ	87	12	62	114
G4DDL	74	10	14	76
G3ZRJ	129	9	0	129
G4KFT	178	0	0	178
G4IRN	157	0	0	157
G3VDL	154	0	0	154
G3SXW	150	0	0	150
G3TXF	121	0	0	121
G3YMC (QRP)	116	0	0	116
M0BVE	109	0	0	109
GU0SUP	0	0	96	96

DX NEWS

This year's International Lighthouse / Lightship event takes place over the weekend of 21 / 22 August (48 hours). Last year's event attracted 369 lighthouse and lightship stations in 48 countries. This is not a contest, but an opportunity to work lighthouses and lightships or, indeed, to try to activate one. As available space in many lighthouses is filled to capacity, participation in this activity does not have to take place inside the tower itself. Field day type set-up at the light or other buildings next to the light or adjacent field is OK. Permission must be obtained from any interested parties. There are, as I have listed here in previous years, several awards for working lighthouse and lightship stations, so the weekend is a great opportunity to make contacts towards those awards.

Derek, G7LFC, writes that he was a student at Porthcurno, near Lands End, in the early 80s. This location is famous as the UK end of Britain's first major undersea telecommunications link, laid in 1870 via Malta to India. Subsequently the station became the Cable & Wireless Telegraph Engineering College. The last major telegraph cable was laid into Porthcurno in 1952. There is plenty of other history, too much to repeat here. Suffice to say that, by way of commemoration, Derek will activate GX2OA, the callsign of the Southport & District Amateur Radio Club (SADARC), on 16 August from the museum at Porthcurno. More details on the SADARC website and details of museum openings can be found on the Porthcurno website.

St Kilda, EU-059, is said to be the rarest 'Island on the Air' in the UK. Nigel, 2M0NJW/P, and David, GM4RQI, will be there sometime between 22 and 25 August. They will be on 80, 40, 30 and 20m, CW and SSB. QSL via 2E0NJW or G4RQI direct or via the RSGB bureau.

DL2RMC and DL1RTL will be operating from the **Faeroe Islands** for one month, signing OY/home call from 8 August to 9 September. They will be on all bands. QSL via their home calls. Alan ZB2IF writes that **Gibraltar** will be using a special prefix for the whole month of August, to coincide with the Tercentenary Celebrations (300 years of British Sovereignty). Calls will be ZB300 (Zulu Bravo three hundred) followed by the normal suffix.

Gwyn, G4FKH, will be back in **Mauritius** as 3B8/G4FKH from 26 August to 13 September. He will be using 100 watts to a vertical. United Nations World Food Programme worker, Dane, S57CQ, is now on assignment with co-worker Michael, ST2M (PA7M), in Khartoum, **Sudan**. Dan has obtained the call ST2T and plans to be active as much as he can on all bands on CW and SSB. QSL manager will be S57DX.

Carlo, I4ALU, will be on the air from Bonaire, **Netherlands Antilles** (PJ) 11 - 24 August, 40 - 10m CW. QSL to his home call, direct or via the bureau.

CORRESPONDENCE AND TABLES

Andy, GM8OEG, writes that he has "discovered" SSTV, largely as a result of the recent 'how to' article in *RadCom* [May 2004, page 24 - *Ed*] and is having great fun. Early contacts included TF3GC (Iceland), VE9DAN (Canada), N5CST (USA) and plenty of European stations. He also copied a couple of stations in Indonesia, but didn't make a two-way contact. Now Andy is finding it hard to decide how to split his time between all the bands and modes which are of interest!

Mike, G4AYO, passes on a fascinating note from Peter, VK3QI, regarding the recent VI5BR (OC-228) operation. The QSO breakdown shows that 30m was, by far and away, their most successful band. Peter writes, "The really significant thing that we have found is the importance of 30m as a DX band. It was open for over 18 hours every day from 3.00pm local when long-path Europe appears, right through the night until 9.00am when long-path Stateside drops off." Undoubtedly this will be even more true during the next few years as we go through the low point of the sunspot cycle. Worth bearing in mind, when you are planning DX antennas for the next few years.

David, M0CNP, reports that he has been very busy with local special events this month, so not a lot of activity, but bagged the following on 14MHz: YI9ZF (Iraq), TF3RB (Iceland), AP2IA (Pakistan) and OY4TN (Faeroes) on RTTY, EX9A (Kyrgyzstan) on CW, and HI3NR (Dominican Republic) on SSB. David was due to spend two days operating GB2MC for the museums weekend.

Incidentally, some of you have reported that the e-mail address at the top of this column doesn't always seem to reach me. I will take this up with the gurus at RSGB but, if you do have problems, feel free to e-mail me on my direct account (don@g3xtt.com). It should be obvious if e-mails don't get through, as I always send an acknowledgement, albeit on the brief side if I am busy. The only exception is if I am away from home, and again I will acknowledge e-mails promptly on my return.

G3IGW SK

Finally, I was saddened to hear of the death of Mike Whitaker, G3IGW, a keen low-band DXer and contester who I remember sending reports of exotic 160m DX to this column at a time when I was struggling to work outside my own county. The news was passed on by Mike's brother David, who continues to be one of the UK's most active shortwave listeners.

THANKS

Special thanks go to the authors of the following for information extracted: OPDX Bulletin (KB8NW), The Daily DX (W3UR) and 425 DX News (I1JQJ). Please send items for the **October** issue by **21 August**. ♦

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HF F-Layer, Propagation Predictions for August 2004

	3.5MHz	7.0MHz	10.1MHz	14.0MHz	18.1MHz	21.0MHz	24.9MHz
Time	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220	000011111220
(UTC)	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020	246802468020
*** EUROPE							
Moscow	5.....224	63.....1555	.5.1....3551	..65333256..	....6...76..	.....	.....
*** ASIA							
Yakutsk	.....	.....	321....23554	.154445335.	...232.....	.....	.....
Tokyo	.....	.....3..	.....13..	.....1..	.....	.....	.....
Singapore	.....	.....111.	.....331.	.....143..	.....231..	.....1...	.....
Hyderabad	.....	1	1223	13441	..2111362...	..122113....	.....
Tel Aviv	61.....455	66.....4777	..3....36772	..24311277..	...1..1.....	.....	.....
*** OCEANIA							
Wellington	.....	.....1...	.....1...	.....	.....	.....	.....
Well (NZ) (LP)	.....	388.....71.	789.....887	668.....787	85	.....7.	.....
Perth	.....	.....	.....	.....	.....	....1.....	.....
Sydney	.....	.....1..	.....11..	.....	.....	.....	.....
Melbourne (LP)	.....	..61.....	1275.....	2.34.....1	.....1.	.....	.....
Honolulu	.....	.....	..1.....	...11.....	.....	.....	.....
Honolulu (LP)	.....	.....	.....	.1....15....2...1.6311		..2111..641.	...21...53..
W. Samoa	.....	.....	.....	...1111.....1.....		.....	.....
*** AFRICA							
Mauritius	.....	1221	.....232.	.....22..	.....111..	.....	.....
Johannesburg	23.....22	25.....6776	7751	.....2851..	..1....251..	..1....22.....	...322243...
Ibadan	.....	12.....111	553.....2555	..72..136762	..78544588..	...8....66....	...7.....
Nairobi	.....	1.....111	31.....1122	.3.....2344	..31...2562.	..12212462.....	....11116...
Canary Isles	45.....654	675.....2766	6661...14666	..41...47675	...76666784.	...4333.78.....	.....2..
*** S. AMERICA							
Buenos Aires	.....	555.....15	113.....12	..1.....11	.....54.	.....152.	.....13..
Rio de Janeiro	.....	11.....22	1.....121	.....21.	....1...1752	....1...272.	.....15..
Lima	.....	1.....1	1	.....	.....13.	.....11.	.....1..
Caracas	.....	.....	.....	1	.....11.	.....1..	.....2..
*** N. AMERICA							
Guatemala	.....	.....	.....	.....	.....	.....	.....
New Orleans	.....	.....	.....	.....	.....132332.	.....1.11..	.....
Washington	.....	11.....1	31.....13	144	.....132343.	.....	.....
Quebec	32.....4	64.....57	22	.....1123.	.....4..	.....	.....
Anchorage	.....	.....	.....	.....111.	.....	.....	.....
Vancouver	.....	.....	.....	.....	.....11.	.....	.....
San Francisco	.....	.....	.....	.....	.....	.....	.....
San Fran (LP)	.....	.....	.....	.....	.....21...	.....321..	.....11..

Key: Each number in the table represents the expected circuit reliability, e.g. '1' represents reliability between 1 and 19% of days, '2' between 20 and 30% of days, etc. No signal is expected when a '.' is shown. Black is shown when the signal strength is expected to be low to very low, blue when it is expected to be fair and red when it is expected to be strong.

The RSGB Propagation Studies Committee provides propagation predictions on the Internet at http://members.aol.com/g4fkhgwyn The page is updated monthly. The provisional mean sunspot number for June 2004 issued by the Sunspot Data Centre, Brussels, was 43.2. The daily maximum / minimum numbers were 87 on 21 June, and 18 on 12 June respectively. The predicted smoothed sunspot numbers for August, September and October are respectively: (SIDC classical method - Waldmeier's standard) 37, 36, 35 (combined method) 41, 41, 40. Longpath predictions are shown with (LP) following the path name. Higher input power and superior aerials have been used for these predictions; less well-equipped stations may find the longpath predictions somewhat inaccurate.

By Tim Kirby, G4VXE

Willowside, Bow Bank, Longworth, Abingdon, Oxfordshire OX13 5ER.

E-mail: tim@g4vxe.com

Contest

This month, Tim Kirby asks "why do you take part in contests?" - and two correspondents provide some good reasons. Also, have you ever been confused when someone sends you "NN" on CW when you were expecting "99"? Tim explains why.

Why do you take part in contests? This question comes up every now and again, particularly from the *non*-contest types! Reading a discussion thread on an e-mail reflector dealing with that very topic recently, I saw two contributions which I enjoyed and reflected some of my own thoughts on the subject. The first is from Don Field, G3XTT. "For many busy folk, contests have the big advantage of being finite. You can set time aside in a busy schedule for a very specific operating event. Day to day DXing and ragchewing is more open-ended. This was my own situation while I was working and bringing up a family".

Another great contribution came from Jim George, N3BB/5. "I really like the competitive aspect of contests. That is one of my competitive streaks in life. Without contesting, I would not have travelled to Slovenia in 2000 or to Finland in 2002 and met many interesting people. The thrill of operating S563X on top of an 850m hilltop in Slovenia, and awakening the morning of the start of the WRTC to the carillon bells in a nearby church tower at 0600 would not be an indelible part of my memory. My station would not be as modern and efficient as it is".

AN UNUSUAL PRIZE

I was delighted to hear from Steve Cole, GW4BLE, that in addition to the usual cups and certificates, he'd won an interesting contest trophy in the 2003 Washington State QSO Party, aka 'The Salmon Run'. Yes, you've guessed it, a delicious smoked salmon arrived on Steve's doorstep. Congratulations Steve, and congratulations to the organisers of the contest for taking an innovative approach to rewarding the winners in their contest. Any ideas for what we could award the winner of AFS in the same vein?

CW NUMBER EXCHANGES

Another interesting e-mail discussion thread developed over the use of 'cut numbers' in CW contesting. What are they? Simply sending 'A' for 1, 'T' for 0 and 'N' for 9. Is it a good thing: does it save time? Well, it does as long as someone understands what you're sending. Use of cut numbers has probably diminished of late and some operators might be confused by the 'appearance' of letters when they were expecting a serial number! So, it's an interesting decision on whether it will save you time or not. It might depend on which contest you are operating in. For example, you'd probably be quite safe in CQWW sending your zone as A4 (14) – but in an 80m RSGB Cumulative session, you might want to send the serial number in full. In CQWW, most participants know that a G is in zone 14 so the abbreviation will be very easily understood, but you may cause more confusion when the serial number is a 'real' part of the exchange.

On the same theme, I saw someone comment recently that they didn't like it when people omitted leading zeroes in a serial number as part of their contest exchange! I think historically many of us have sent "001" in full. That's a lot of redundant information, when really, you only need to send "1"! The danger, of course, is that someone is expecting three characters and will be confused when you only send them one! The decision on what to send, again, will probably depend on what contest you are in and who you are working.

CONTEST CALENDAR

HF Contests

Date	Time	Contest	Mode	Bands	Exchange
1 Aug	0700-0900	RSGB RoPoCo 2	CW	3.5	RST + Postcode Received
2 Aug	1000-2159	European HF Championship	CW/SSB	1.8-28	RST + Year First Licensed
7 Aug	0000-2400	TARA Grid Dip	PSK/RTTY	1.8-50	Name + Grid (eg IO91)
9/10 Aug	0000-2359	WAE DX CW	CW	3.5-28	RST + SN
16 Aug	0000-0800 and 1600-2400	SARTG WW RTTY	RTTY	3.5-28	RST + SN
17 Aug	0800-1600	SARTG WW RTTY	RTTY	3.5-28	RST + SN
23/24 Aug	1200-1200	TOEC Grid CW	CW	1.8-28	RST + Grid
30/31 Aug	1200-1200	YO DX	CW/SSB	3.5-28	RST + SN

VHF Contests

Date	Time	Contest	Mode	Bands	Exchange
3 Aug	2000-2230 Local	RSGB 144MHz Activity / Club Championship	ALL	144	RST+SN+Locator
7 Aug	1400-2000	RSGB 144MHz Low Power	ALL	144	RST + SN + Locator + Postcode
8 Aug	0800-1200	RSGB 432MHz Low Power	ALL	432	RST + SN + Locator + Postcode
10 Aug	2000-2230 Local	RSGB 432MHz Activity	ALL	432	RST + SN + Locator
17 Aug	2000-2230 Local	RSGB 1.3/2.3GHz Activity	ALL	1.3G/2.3G	RST + SN + Locator
22 Aug	0900-1500	RSGB 70MHz Trophy	ALL	70	RST + SN + Locator + Postcode
24 Aug	2000-2230 Local	RSGB 50MHz Activity	ALL	50	RST + SN + Locator
31 Aug	2000-2230 Local	RSGB 70MHz activity	ALL	70	RST + SN + Locator

RoPoCo 1, 2004

Despite the good conditions, a considerable number of regulars did not join the fun this time and many entrants commented on the low level of activity. On the other hand, there were scarcely any 'casual' participants who did not submit a log. As a result, almost every QSO was checkable, which is why this has to be the most enjoyable of all contests to adjudicate. It's great fun to watch the corruption processes at work as, say, SE25 6HY turns into HE255BHY!

One entrant queried the status of QSOs outside the UK, having made a couple and tried to insert 'TT2 TT2' into the postcode chain. The rules do state that only UK stations count for points. Many of the logs for the RoPoCos are submitted hand-written on paper, and are very welcome. But the absence of computerised dupe-checking means that extra care needs to be taken. There are two entrants who should be thankful that the tenfold penalty for unmarked dupes is no longer applied!

With G0CKP in the ranks of the missing, G4BJM, G0MTN and G3RSD occupy the podium, each moving up one place compared with the August 2003 event. Not much change, then, except to welcome G3ZRJ who shares third place.

But there is one big departure from the norm. Usually, at least one of the leading group submits a perfect log, but not this time. Congratulations to Derek Stanners, G3HEJ, whose error-free entry in 13th position earns him the Verulam Silver Jubilee Trophy.
Steve Knowles, G3UFY

Pos	Callsign	Checked score	Errors	Pos	Callsign	Checked score	Errors
1*	G4BJM	590	1	23	G3JJZ	410	0
2*	G0MTN	560	2	24=	G3JSR	380	3
3=*	G3RSD	540	1	24=	G4RLS/P	380	5
3=*	G3ZRJ	540	1	24=	G3MA	380	7
5	G4EBK	520	2	27	G3RFH	350	2
6	G4OGB	510	4	28=	GW3SB	330	2
7	G3JJG	500	1	28=	G0WBC	330	10
8=	G3XTT	490	1	30=	G4CKH	320	3
8=	GM3JKS	490	1	30=	GM0DHZ	320	5
8=	G4ARI	490	2	32	G3WRR	310	1
8=	G4BLI	490	2	33	G3GMS	270	2
8=	G3LIK	490	6	34	G3WYW	270	4
13=+	G3HEJ	470	0	35	G3AAT	260	4
13=	G4CWH	470	4	36=	G3JKY	250	0
13=	G3ZGC	470	4	36=	G3VQO	250	1
16	G3LHJ	460	2	38	GM4OSS	220	2
17=	G4FON	440	0	39	G3GMM	210	5
17=	G4XPE	440	0	40=	G0IBN	170	0
19=	G3SET	430	1	40=	G0GDU	170	5
19=	G2AFV	430	1	42	GW4KVJ	120	2
19=	G3YEC	430	2	43	G3XYF	40	0
22	GM4SID	420	3				

+ Verulam Silver Jubilee Trophy. * Certificate of Merit. Checklogs received with thanks from GM3UM, G3YMC.

21/28MHz SSB, 2003

This year's contest experienced some of the best conditions on 21/28 MHz for ages. The conditions are reflected in the numbers of QSOs made by the leading stations and in particular the large numbers of JA stations worked on 21MHz, especially by the more northerly stations. A beam antenna seems a must, and the bigger the better!

UK Open entries remain static at 20, UK QRP went up from three to five whilst the UK Restricted increased by one to 14. In general, the number of UK logs received was disappointing. On the other hand, overseas entries were up. Overseas Open went from 22 to 27, Restricted went from 30 to 43, but the QRP dropped from six to two. SWL logs were down to just one. As a result there is only one certificate awarded in some of the sections.

The UK Open leader made 868 QSOs with 170 on 10m alone. In the restricted Section the leader made182 QSOs on 15m and 38 on 10m. G4DHF made a single-band entry on 10m, making 311 QSOs in the process.

As far as the Overseas Section goes, UA9JDP worked 168 UK stations on 15m whilst RA6CT worked 161 on 10m. It was nice to see logs from such exotic stations as EM1U, VK8AV, XU7ACD, AH2J, 5Z4IC, 3XY1L and VP8NO, plus a QRP log from YB2OK.

The Whitworth Trophy is awarded to Chris Swallow, G3VHB, and the Powditch Trophy is awarded to David Johnson, G4DHF. Congratulations to you both! There being no entries in the UK SWL Section, neither the Metcalf Trophy nor the Powditch Receiving Trophy will be awarded. Certificates have been awarded to the leading stations in each section.

Not all entrants completed the Cabrillo headers fully, making it difficult to determine what section was being entered. Please ensure you do this in order that you appear in the appropriate section of the results.

Tom Wylie, GM4FDM

UK Open section

Pos	Call	21 QSO	28 QSO	21 Mult	28 Mult	Score
1 *	GD0EMG	698	170	95	66	417474
(Op: G0HSS, G4XUM)						
2 *	G3VHB	791	87	83	34	308178
3 *	G3NAS	701	101	84	35	286314
4 *	GW6TW	555	56	82	28	201630
(Op: MW0UTD, MW1IRW)						
5 *	GW0GEI	463	76	73	30	166551
6 *	GW4CC	540	40	74	21	165300
(Op: GW4HSH, GW0BBO, MW0JGE, GW3INW)						
7	G4IRC/P	575	18	76	11	154773
(Op: G4BAV, G8LBS, G7SMN, G0DVJ, M0ZZO)						
8	G4NOK	408	59	73	23	134496
9	G3SVD	375	59	76	20	124992
10	MM0CPS/P	500	0	69	0	102465
(Op: GM4UYZ, MM0DXC, GM4XZ, MM0WZ, MM3SLK)						
11	G4DEZ	342	49	64	21	99705
12	G4IUF	276	49	59	14	71175
13	G4DHF	0	311	0	64	59712
14	G4DBL	308	8	53	6	55932
15	G3MGW	240	35	47	15	50406
16	G3JRM	204	13	60	10	45570
(Op: G4CKH, G4RLS, M1TES)						
17	M5RIC/P	174	8	58	7	35490
18	G0MTN	177	6	48	5	29097
19	GM0TGE	171	2	53	2	28545
20	GM0NTL	140	6	38	6	19272
21	G0GFQ	130	0	32	0	12480

UK Restricted

Pos	Call	21 QSO	28 QSO	21 Mult	28 Mult	Score
1 *	G0TSM	182	38	58	23	53460
2 *	G0WXJ	151	46	45	16	36051
3	M5ARC/P	130	34	42	17	29028
(Op: M0CKE, M0CKH, G8HDK, M0BRM)						
4 *	GJ7DNI	92	16	39	6	14580
5	M0REG/P	87	12	38	8	13662
(Op: G3YSW, G7RQD, G4HNU, M3BHF, G4MDP)						
6	MU0FAL	82	0	29	0	7134
7	M0CNP	49	10	21	7	4956
8	G4NXG/M	49	4	23	4	4293
9	G4XPE	28	3	14	2	1488
10	2E1MBO	30	0	16	0	1440
11	G7UGC	22	4	14	4	1404
12	G3VQO	16	1	8	1	459
13	2E1GUA	11	1	7	1	288
14	G0FYX	10	0	8	0	240

UK QRP

Pos	Call	21 QSO	28 QSO	21 Mult	28 Mult	Score
1 *	M3TBK	100	0	36	0	10800
2	M3SGB	68	0	26	0	5304
3	M3RCV	51	0	23	0	3519
4	G0DCK	37	4	21	3	2952
5	GM4HQF	31	1	16	1	1632

Overseas Open

Pos	Call	21 QSO	28 QSO	21 Mult	28 Mult	Score
1	RA6CT	97	161	54	67	91113
2	UA9JDP	168	28	84	22	62328
3	N4UH	148	6	79	6	39270
4	RA9AU	116	16	67	9	30096
5	RA3XO	132	0	74	0	29304
6	US7IGF	93	33	52	23	28350
7	UY0MF	110	0	69	0	22770
8	RZ3BY/0	110	0	64	0	21120
9	9A5KV	77	0	53	0	12012
10	YL1ZS	67	1	42	1	8772
11	AH2J	56	3	37	2	6903
12	YU1AFR	42	0	32	0	4032
13	UA0SMF	32	0	24	0	2304
14	W1AMF	27	2	22	2	2088
15	YO6AJI	28	0	22	0	1848
16	XU7ACD	23	0	21	0	1449
17	JG2REJ	23	0	18	0	1242
18	JA3LEZ	23	0	18	0	1242
19	JA1PUK	20	0	16	0	960
20	VK8AV	15	5	12	4	960
21	RW0UU	17	0	16	0	816
22	JM2RUV	17	0	16	0	816
23	OZ4O	13	3	11	3	672
24	JA6EFT	17	0	13	0	663
25	JR7LVK	12	0	12	0	432
26	JL8AQH	9	0	9	0	243
27	JH9VJW	7	0	7	0	147

Overseas Restricted

Pos	Call	21 QSO	28 QSO	21 Mult	28 Mult	Score
1 *	YZ1V	177	0	84	0	44352
(Op: YT1HA, 4N1FAN, YZ1ZV)						
2 *	5Z4IC	22	126	17	65	36408
3 *	LY2BET	143	0	72	0	30888
4 *	9H1DE	92	26	63	23	30444
5	EC7ABV	127	0	72	0	27432
6	UA3QJJ	121	1	65	1	22176
7	YO3CZW	90	1	60	1	16287
8	LZ2VP	91	0	57	0	15561
9	RU0SU	48	2	38	2	6000
10	TA1FA	60	0	28	0	5040
11	UU7JN	28	14	23	13	4536
12	LZ2FM	28	11	22	10	3744
13	RD3DK	37	3	28	3	3720
14	RK9XX	35	0	28	0	2940
15	RA9XU	32	0	25	0	2400
16	VE7NS	29	0	24	0	2088
17	LZ2UZ	25	3	19	3	1,848
18	UN8DG	28	0	22	0	1848
19	LY1DJ	26	0	22	0	1716
20	PA0MIR	17	9	14	8	1716
21	JR9NVB	25	0	21	0	1575
22	LZ1EP	25	0	20	0	1500
23	W9ROG	24	0	19	0	1368
24	JH1RDU	21	0	18	0	1134
25	JA2KKA	21	0	18	0	1134
26	JA1BPA	20	0	18	0	1080
27	RW4FX	21	0	17	0	1071
28	3XY1L	8	9	7	9	816
29	UY5TE	19	14	0	0	798
30	VA7MJR	18	0	14	0	756
31	EA7HE	18	0	13	0	702
32	VA3IX	20	0	11	0	660
33	EA4DBS	15	0	13	0	585
34	YL3DX	13	0	9	0	351
35	JE1COB	11	0	10	0	330
36	PY2DBU	8	3	7	3	330
37	EM1U	7	4	5	4	297
38	JA1XPU	8	0	7	0	168
39	LY3BY	4	0	3	0	36
40	VP8NO	3	0	2	0	18
41	JG1GCO	1	0	1	0	3

Overseas QRP

Pos	Call	21 QSO	28 QSO	21 Mult	28 Mult	Score
1 *	YO4AAC	29	1	20	1	1890
2	YB2OK	7	0	6	0	126

SWL

1	UA3-170-847109	1	0	67	1	21912

* = Certificates.

21/28MHz CW CONTEST, 2003

The 2003 contest saw some atrocious conditions, a pity considering the SSB event had just enjoyed better propagation, as did the CQ WW SSB contest just afterwards. The Worked All Germany contest coincided again this year and caused additional problems for some entrants. As a result, entries and scores are much reduced on the previous few years. The section leaders faced a very hard slog and are to be congratulated for not giving up, and maximising every possible chance for QSOs and multipliers.

Jan, G0IVZ, repeats his win in the Open section, although this score is less than 25% of last year's result. Alan, 5B4AHJ, takes top Overseas honours, largely due to finding some propagation on 28MHz. Congratulations also to the other section winners.

Lee Volante, G0MTN

UK Open Section

Pos	Callsign	21 QSO	21 Mult	28 QSO	28 Mult	Total QSO	Score
1 *	G0IVZ	123	46	49	31	172	39732
2 *	G3VHB	103	42	24	18	127	22860
3 * (M)	G5XV/P	81	38	16	10	97	13968
4	GW0GEI	44	25	9	8	53	5247
5	G3GLL	18	11	6	6	24	1224
6	G3PJT	21	15	1	1	22	1056
7 (M)	G3JRM	13	9	7	5	20	840
8	G4BJM	6	6	0	0	6	108

UK Restricted Section

Pos	Callsign	21 QSO	21 Mult	28 QSO	28 Mult	Total QSO	Score
1 *	MU0FAL	47	23	2	2	49	3675
2 *	G4ERW	36	22	4	4	40	3120
3 * (M)	G7UET/P	36	19	2	2	38	2394
4	G3RFH	11	10	5	4	16	672
5	G0RDO	11	10	0	0	11	330
6	G3GMM	12	7	1	1	13	312
7	G3GMS	6	6	1	1	7	147
8	G0IBN	7	4	6	5	13	351
9	G4EBK	5	4	0	0	5	60

UK QRP Section

Pos	Callsign	21 QSO	21 Mult	28 QSO	28 Mult	Total QSO	Score
1 *	G4EDG	14	10	3	3	17	663
2	G3KKQ	9	7	3	2	12	324

Overseas Open Section

Pos	Callsign	21 QSO	21 Mult	28 QSO	28 Mult	Total QSO	Score
1 *	5B4AHJ	44	38	34	26	78	14976
2 *	LZ2FM	22	21	0	0	22	1386
3	K3ZO	12	10	1	1	13	429
4	VK8AV	9	9	0	0	9	243
5	OK1CZ	6	6	0	0	6	108
6	OM7YC	5	5	0	0	5	75

Overseas Restricted Section

Pos	Callsign	21 QSO	21 Mult	28 QSO	28 Mult	Total QSO	Score
1 *	9A3VM	54	41	34	27	88	17952
2 *	EA8BIE	32	29	9	9	41	4674
3 *	HA1ZN	21	18	10	10	31	2604
4	LZ2UZ	29	29	0	0	29	2523
5	EA5/G3OLU	26	26	1	1	27	2187
6	UY5TE	20	19	0	0	20	1140
7	4Z4KX	8	9	2	2	10	330
8	OM8HG	5	5	1	1	6	108
9	WB2AA	3	3	0	0	3	27

Overseas QRP Section

Pos	Callsign	21 QSO	21 Mult	28 QSO	28 Mult	Total QSO	Score
1 *	LZ2RS	32	28	0	0	32	2688

The certificate and unusual contest prize awarded to Steve Cole, GW4BLE (see text).

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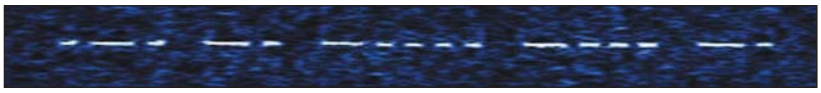
LF

This month, Dave, G3YXM, reports on using DCF39 as a propagation beacon, on RN6BN's success as a beacon, and on the considerable amount of trans-Atlantic activity. He also presents a receive preamplifier by M0BMU.



RN6BN as received by ZL4OL.

The German utility station DCF39, on 138.83kHz, is a useful beacon for judging propagation conditions on the 136kHz band. Last year it was regularly logged by KL1LX in Alaska and by others in the USA. In April this year, Mike, ZL4OL, became the first antipodean lowfer to see the familiar signature of steady carrier interrupted by data bursts. Later ZL2CA in Wellington also reported reception around the 'grey-line'. On the best mornings, the signal was of audible strength. DCF39 is about 40dB stronger than a 1W ERP amateur signal.

RN6BN BEACON

Spurred on by the DCF39 experiments, Sam, RN6BN decided to beacon around the same times in order to see if his signals would reach ZL. The results were impressive, with ZL4OL getting an 'O' copy on the first attempt, see picture. The distance is 16,464km, beating the previous one-way record of 15,645km between ZL6QH and VE1ZJ. It is also the first European amateur LF signal to be received in ZL. The next step is for Sam to attempt a QSO with ZM2E.

TRANS-ATLANTIC 136kHz ACTIVITY

Things are hotting up in the states where there are now 7 US 'Part 5' permit holders with access to 136kHz. I don't have information on all their plans but here is the news so far.

Laurence KL1X/5 has been waiting some time for WD2XDW to be re-issued at his new QTH but it's looking as if this should be done by the time you read this.

WD2XFX, operated by KD5UWL, is back on-air with a new aerial and is presently in full-time beacon mode with 100W on 137.7807kHz. 'XFX' is being sent in QRSS30. Eric is planning to build the amplifier described by Andy Talbot, G4JNT, in *QEX* magazine. Let's hope it doesn't set fire to the new aerial!

John Andrews, W1TAG, has been making improvements to his station WD2XES. Power is now up to 225W and the current in his 50 x 60ft loop is about 16A. Best DX is to listener Hartmut Wolff in JO52HO, a distance of almost 6000km.

WD2XGJ, owned by Warren Ziegler, K2ORS, will be located in eastern Massachusetts. Warren has some equipment ready, and has been working on an aerial.

Licences have also been issued to Mike Troy, W2AH (WC2XTC), and to Bob Bicking, W9RB (WD2XFE). Neither has reported any activity.

AND IN CANADA

Steve, VE7SL, in Maine Island, British Columbia, has now obtained permission to transmit on the band and intends to use a top-loaded wire vertical and a home-brew transmitter. He doesn't underestimate the challenge of getting a QSO as his nearest 'local' VE station is over 1000 miles away on the other side of the Rocky Mountains!

Mitch Powell, VE3OT, has shut down his 137.780kHz beacon for the season, but will start up again in the autumn. VO1NA continues to transmit on 137.777kHz on many, but not all evenings.

LF PREAMP

Jim, M0BMU, has sent details of a preamp/tuner which can be used with a long wire or loop aerial to improve receiver performance: see **Fig 1**.

The preamp is a compound follower using a JFET input and bipolar output to drive a 50Ω load with good linearity. The antenna is resonated by the input circuit, which is a high-*Q* peaked low-pass configuration. As well as providing voltage gain due to the impedance step-up, it gives substantial attenuation of MF broadcast signals (it works in Brookmans Park, so it can't be bad!). The 2.2mH inductors are the radial type wound on a small ferrite bobbin (RS 233-5308), and have a *Q* of about 80 at 136kHz.

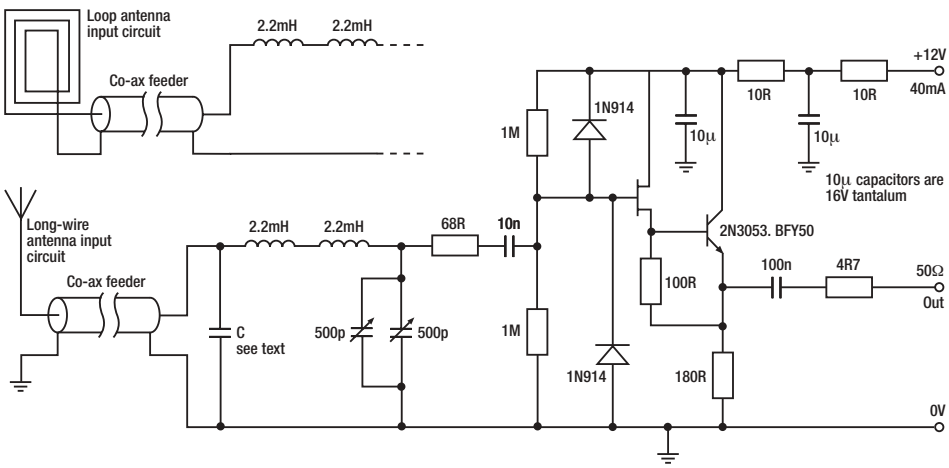
The antenna can be a wire or a loop, as shown on the circuit. The value of input capacitor, C, used in the case of a wire depends how big the wire is. For a short antenna, C should be about 1000pF (this was OK with a 6m vertical whip) For longer wires, 2000 - 4000pF is about right. More C will reduce the signal level, less will increase it - the minimum workable value is about 600pF. The antenna can be fed with coax cable, in which case the capacitance of the cable (about 100pF/m for 50Ω) makes up part or all of C.

For loop antennas, C is omitted. Satisfactory sensitivity was obtained using a 1m square loop with 10 turns of 1mm^2 insulated wire - also a bigger 10m^2 single turn wire loop worked well. Loop antennas can also be fed down quite long coax cables.

The gain of this circuit depends on what antenna is connected - it is of the order of 10dB with a wire antenna, and 30-40dB with a loop. I built the circuit mainly for use with my IC-718, which has about 20dB 'deafness' on 136kHz, which seems about typical. ♦

Circuit diagram of the M0BMU LF tuner and preamplifier for 136kHz.

FIG 1 © RADCOM 230



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QRP

G3ROO inducted into the ARCI QRP Hall of Fame ♦ Details of a QRP mobile station in a Campervan ♦ News of the G QRP Club Mini-Convention

Over the past 10 years, the American QRP ARCI has honoured those who have made a significant contribution to the world of QRP by inducting them into the 'QRP Hall of Fame'. Inductees are honoured at the Dayton Hamvention, with a plaque presented at the annual QRP Banquet. The banquet forms part of the 'Four Days in May' QRP event which is attached to the annual Dayton Hamvention in Ohio. This year, two members of the G QRP Club, Bill Kelsey, N8ET, and Ian Keyser, G3ROO, joined the QRP Hall of Fame.

Bill Kelsey has been the G QRP Club representative in the USA for almost 20 years and, in his spare time, has run Kanga US, which sells a range of kits originally based on the UK Kanga Kits and now including the innovative W7ZOI project kits. Ian Keyser is a well-known writer on antenna and QRP subjects for UK magazines. As his callsign, G3ROO, suggests, Ian was a joint founder of Kanga Products, the UK QRP kit company. John Leak, G0BXO, received a special QRP Quality Recognition Award for his many years of service as G QRP Club Membership Secretary.

G3ROO has recently published a new antenna book, *Practical and Tested Aerial Systems*. I found the new book to be a no-nonsense publication with sound technical information and lots of practical ideas for the 'non-professional' radio amateur. It is a book written for the 'usual' radio amateur, who has limited space and resources for antennas.

MORE QRP ON THE MOVE

I was intrigued by the mobile QRP exploits of Darren Warburton, GW7HOC / MW5HOC. While operating from his mobile-home near Birmingham, GW7HOC heard two North-American stations discussing a problem with *Outlook Express* on 17 metres. He knew the answer but only had 5W and a mobile antenna. Nevertheless, he broke in and was heard first time and gave them the answer to their problem. Then he mentioned the power he was running ... they were amazed! I asked Darren about his mobile set up and he kindly supplied me with lots of information. What follows is a paraphrase of his words,

"As I have a very small garden, with little room to put up a decent antenna, I decided that going mobile was my best option if I wanted to work the DX that is difficult from home. As I had a coach-built campervan, I decided to adapt the van to become a mobile shack. The van has a roof rail and a ladder. These were the obvious choices for attaching antennas.

"I use two right-angle brackets from a local DIY store mounted on the roof rail on either side of the van; one side for HF and the other for VHF and UHF. RG-58 cables lead to a duplexer, inside the van, the common port of which is connected to a change over switch allowing me to operate either at the front or back of the van. When I am driving, my FT-817 lives in a pocket just under the van's dash, and when we are on site the FT-817 can sit on a table in the rear of the van. At present the mobile antennas are a Watson W-770HB for 2m and 70cm and an ATX Driveabout (QRP version) for HF operation.

"Having a good mobile arrangement, I sought to improve my portable working and decided to fit a mast to the back of the van. The cost of pneumatic masts is enormous, so I telephoned Sandpiper Aerials Ltd which suggested a suitable mast. Sandpiper is only 30 minutes drive from me it was agreed that a visit to the factory was the best option. Sandpiper sells a mast with a 2in base section reducing in five stages to 1in. The maximum height of this mast is 33ft (just right to make λ/4 on 40m). A mast was bought and mounted with brackets to the ladder at the back of the van. The mast is stable and is very easy to put on and remove in less than five minutes.

"The larger, non-wire antennas, are mounted three-sections-up to a 1.5in pole, and the shorter mast is stable enough not to need guying in good weather. So I now have a very handy mobile shack, all self contained and ready to go at a moment's notice. The van being self-contained with water, food, gas, toilet, shower and mast, means that I can now operate from some of the prettiest operating locations in the country. Maybe it's time I got some MW5HOC/P QSL cards printed."

N8ET (left) and G3ROO are inducted into the ARCI 'QRP Hall of Fame'.

THE G QRP CLUB MINI-CONVENTION 2004

As usual, the G QRP Club will be holding their Mini-Convention in Rochdale. The date this year is Saturday 9th October and the venue is St Aidan's Church Hall, Manchester Road, Rochdale. The event begins at 10am with an admission charge of £1. As in previous years, the event is an 'old style' radio rally with components, junk and kit vendors. No expensive new equipment will be on sale and there will be a notable absence of computer equipment. The convention will also include a full programme of lectures throughout the day, plus the traditional 'Pie and Peas' lunch. Details can be had by sending me a stamped-addressed envelope to the address above or by sending an email request. ♦

WEB SEARCH

G3ROO book www.g3roo.org.uk
Sandpiper Aerials Ltd, Unit 5, Enterprise House, Cwmbach Industrial Estate, Cwmbach, Aberdare CF44 0AE www.sandpiperaerials.co.uk/

By Dave Lawley, G4BUO

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Dave Lawley offers a number of tips for improving your Morse code speed and warns that some of them can become addictive!

Improving your speed

Radio amateurs use the terms 'Morse' and 'CW' interchangeably. This may seem strange, since CW stands for Continuous Wave, whereas Morse code is anything but continuous. However, almost all amateur Morse is sent by on-off keying of a continuous carrier so it's OK to use CW as a synonym for Morse.

SPEED

A basic question is "how do you measure your Morse speed?" By convention, the standard word is 'PARIS'. If you send 12 of these in a minute, then you're sending at 12WPM. Some European countries use the term LPM (letters per minute) to specify Morse speed, and this is simply five times the speed in words per minute.

You won't hear much traffic on the bands at less than 12WPM. This was the old test speed, and represented a much more practical minimum starting speed than 5WPM. Of course you don't have to send a whole minute of PARISes to check your speed: for 12WPM, you should be able to send one PARIS in five seconds.

The basic unit in Morse code is a dit (dot) length. A dah is the length of three dits. The spacing between dits and dahs within a letter is one dit. The spacing between letters of a word is three dits, and the spacing between words is seven dits. Each PARIS word will therefore be separated by a pause of seven dit lengths, and this must be included when making precise measurements of speed. [A Morse code speed calibrator using a programmed PIC is described by Jonathan Gudgeon, G4MDU, on page 83 this month - *Ed.*]

Having said all that, it is completely wrong for the beginner to start slowly and count dit lengths. The best way of learning is the Koch method [see 'Morse', *RadCom* May 2004] but whatever method you choose, forget all about counting dits, dahs and spaces and simply learn to recognise letters instinctively. The rhythm is everything, so it is important to learn from a reliable source that sends good Morse. In the old days that meant a local amateur giving classes, and this method is still perfectly acceptable. More recently the Datong Morse Tutor and now the ubiquitous home computer make self-study easy.

PHOTOGRAPH BY NORMAN BURNS, GM4DIN

Tristan Thorne, MM0TJR (left), and Gerald Bartram, GM1JNS, concentrating hard during a Morse Proficiency test at the Marconi centenary celebrations in Fraserburgh on 24 April, organised by James MacKinnon, GM4EKC.

IMPROVE YOUR SPEED

G4FON's Koch program which I described last time contains everything that you need in order to learn Morse code, and once you have learned all the characters it has valuable features which can help you get your speed up. You can load text files which give plenty of opportunity for practice. If you're worried that you might memorise some of the text while choosing what to load, get a friend or family member to load it for you.

My recommendation is that once all the characters have been learned, you should dispense with Farnsworth spacing and set the overall speed to be equal to the character speed. Only when this is done will the code acquire its correct rhythm, as it is being sent with the correct inter-letter and inter-word gaps of three and seven dits respectively.

HANDWRITING

Many people who start learning Morse write the characters down as capital letters. This has no practical value these days, and can act as a limit on how fast you can copy. Chester, G4VUF, told me of a trainee Morse operator in the army who hit a brick wall at about 10WPM. So Chester stopped sending, and used a stopwatch to time the trainee simply printing the letters A - Z. He couldn't write them at more than 10WPM because of the way he went over each character! There is no reason why you should not start from day one writing the letters in lower case, joined up, and this will mean that handwriting is unlikely to be a limiting factor until you are well over 20WPM.

You may notice that experienced CW users don't write down anything at all. At faster speeds it is common to copy in your head, but when working to improve your speed it is best to write down what you hear, always in lower case. Of course if you can touch type, you can copy the Morse directly on to typewriter or computer. However, one advantage of writing Morse down on paper is that you can leave a gap for missing characters and easily go back and fill them in afterwards.

SWLING

I recommend spending lots of time with reliable sources of Morse code before you start practising by listening on the bands, but sooner or later the urge to copy 'real' CW is going to be irresistible. Tune the bands and learn to copy callsigns - they frequently appear after the characters 'CQ'. Listen to a DX pile-up and see how many callsigns you can pick out. It sometimes happens that you are able to copy callsigns more clearly than the DX station, but remember he has to contend with the QRM from tens or hundreds of stations all beaming in his direction.

SOFTWARE

For serious pile-up practice G4ZFE has written a pile-up simulator which can send up to nine callsigns simultaneously. An apparently simpler Morse trainer called *RUFZ* sends one at a time, but with a twist in the tail. You can set the initial speed but for each callsign that you copy correctly, the program speeds up a little. When (not if!) you get a callsign wrong, it slows down again. After a complete run of 50 callsigns, one after another, it gives a score and a figure for the highest speed at which a call was copied correctly. Beware, this can be highly addictive! There is even a high-score table published on the Internet.

Unfortunately *RUFZ* does not work under *Windows XP*, and you have to use DOS mode in *W95/98* but it makes an ideal use for an old PC or laptop. ♦

WEB SEARCH	
G4ZFE Pile-up program	www.g4zfe.com/pileup95.html
RUFZ	www.sk3bg.se/contest/rufz.htm

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Web Site: www.kenwood-electronics.co.uk

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A detective story – the tracking of a source interfering with the Bolsover repeater

Interference problems on GB3RB

Recently, users of GB3RB (Bolsover repeater 433.200/434.800MHz) began to notice a regular noise on the repeater output. The sound was present for one in five seconds and sounded very much like data at a few hundred bits per second. Several local users of the repeater confirmed the signal was present on the repeater input, at times at very high signal strength, but strangely sometimes so weak that it was failing to open the repeater mute.

On one particular evening, the signal became particularly strong, to the point that even locals were unable to use the repeater. At about midnight, the signal rapidly dropped in strength over the space of five minutes to the point that it was only occasionally breaking the repeater mute. The following morning it was still clearly audible, though weaker than the previous evening. The Repeater Keeper, Richard Drabble, G1SLE, armed himself with an eight-element yagi and 70cm portable and set out on foot to find what he thought was a 10mW 'low power device' that had drifted above its 434.790MHz maximum upper frequency.

At the repeater site, the signal was there but not very strong, GB3RB is located on the top of Bolsover hill, which rapidly falls away to the west. This was the direction from which the signal was emanating. Richard remembering the golden rule of DF hunting '(follow the gear – don't guess!'), walked on for about three-quarters of a mile right down the hill. By now the signal was getting much stronger and even with 30dB of attenuation he was getting an end-stopping signal. Briefly discarding the golden rule, he began to suspect the local primary school; in the time he wasted he got soaked in a heavy shower!

Returning to following what the gear was telling him, he eventually found an end-stopping signal next to three parked cars. Having noted the registration numbers, he left the area. Monitoring the signal during the following day, it seemed to get weaker but, at about 7pm during the space of 3 - 4 minutes, it rapidly went back to the strength of the previous night. Setting out on the hunt again, and assuming that the offending car had moved, he was hoping to identify which of the three cars was causing the problem. This time the task was easy. Parked around 100 metres in line of sight from the repeater antennas was the car that he had most suspected.

This time Richard was lucky. During a discussion amongst the local radio club members, one thought he might know the owner. The club member set off to have a 'quiet word', and a few minutes later the signal abruptly stopped!

The cause of the problem was a RCM3000 remote car monitor. Some Internet searches reveal that this unit is imported from the USA. It gives a display of the car 'status' on a remote pager unit with LCD. It also gives a continuous display of signal strength from the car, hence the constant 'beacons'. The manufacturers claim a range of up to half a mile, which is pretty good if it really is intended to be a low power device operating at 10mW ERP. This range would have been even better if the paging receiver had been tuned to the repeater output!

Fortunately, the user of the equipment was very reasonable and agreed to stop using the unit immediately and take it back to the supplier. He also commented that he had been going to get one for a friend, but would now cancel that idea. This unit appears to be illegal in the UK for several reasons. Firstly, it operates outside the allowed 433.050MHz to 434.790MHz range by about 5 kHz ± modulation. Secondly, systems that continually transmit or operate as beacons are not allowed. Thirdly, given the range over which the unit was detectable, it is highly likely that it was transmitting using more than 10mW ERP allowed.

POSSIBILITY OF GOOD NEWS FOR 70cm

During a recent Repeater Management Committee (RMC) meeting, the Committee heard that the 70cm new repeater application moratorium is under reconsideration. The RMC understands that a limit will be set on the total number of 70cm repeaters in the UK. The limit has yet to be defined, but there will not be any enforced closedowns of existing repeaters. To this end, it is likely that new applications will be permitted on a 'one out, one in' basis. The RMC will be carrying out a review of the 70cm network in order to identify areas where it thinks that coverage is required on the band. Repeater groups and individuals wishing to suggest areas or sites are asked to contact the RMC zone manager, details of whom can be found on the RMC website or by contacting RSGB HQ.

RCM3000 remote car monitor.

REPEATER PROPOSAL STATUS AS OF 5 JULY 2004

The latest clearance status can be obtained from the RMC website. Please note that, even though an application may have cleared, it is beyond the control of the RMC as to when the keeper will bring the repeater into service. ♦

LATEST CLEARED REPEATERS

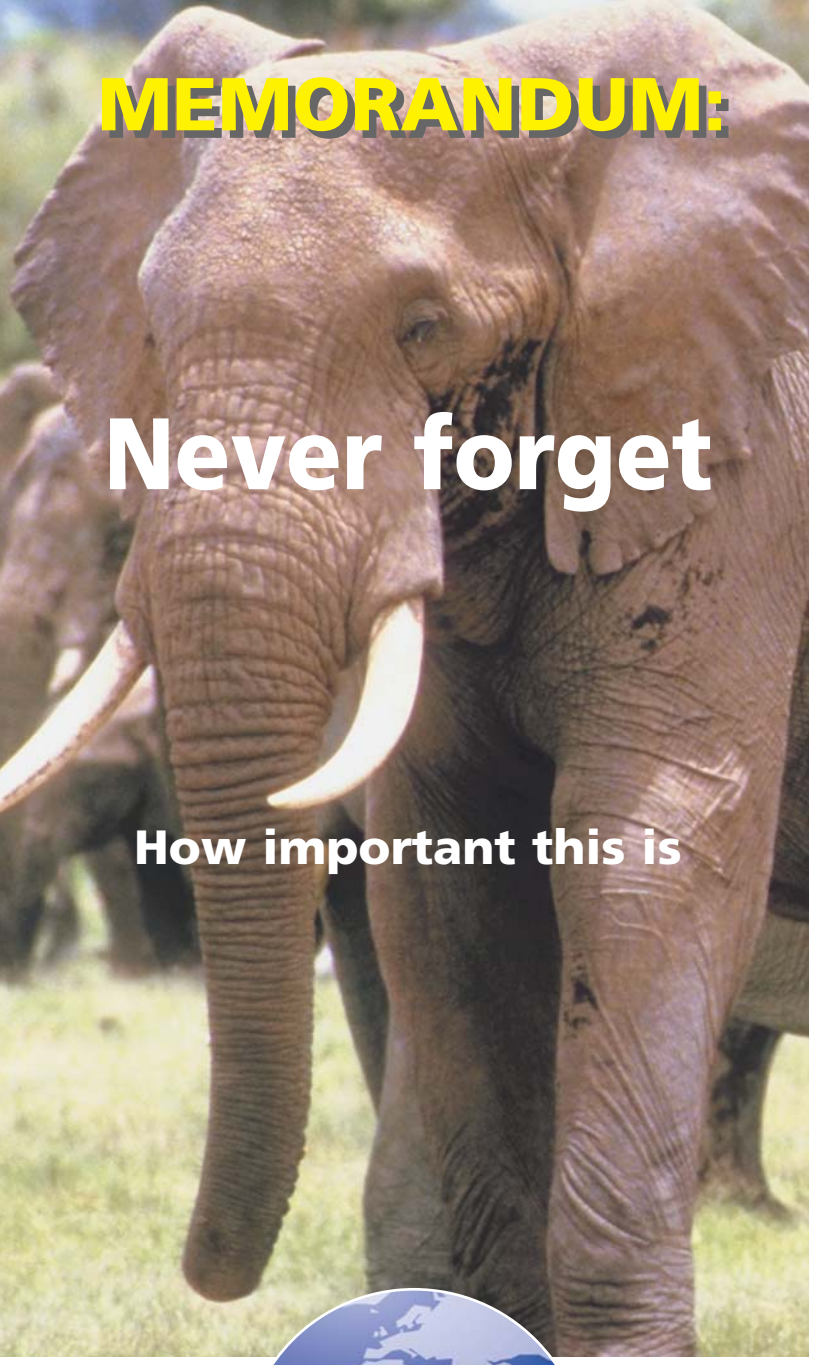
Callsign	Type	Channel/Frequency	Keeper
GB3FF	New 2m, Lochgelly, Fife	RV48 Input 145.000MHz Output 145.600MHz	MM0EEY
GB3AI	New 2m, Amersham	RV55 Input 145.0875MHz Output 145.6875MHz	G0RDI
GB3GO	New 2m, Llandudno	RV63 Input 145.1875MHz Output 145.7875MHz	MW1DSB
GB3JF	New 2m, Lincolnshire	RV55 Input 145.0875MHz Output 145.6875MHz	G8LXI
GB3KD	New 2m, Kidderminster	RV63 Input 145.1875MHz Output 145.7875MHz	G8PZT
GB3LG	New 2m, Lochgilphead, Argyll	RV54 Input 145.075MHz Output 145.675MHz	MM1FEO
GB3SH	2m site change, Southampton	RV53 Input 145.0625MHz Output 145.6625MHz	M1AFM
GB3WE	New 2m, Backwell, North Somerset	RV55 Input 145.0875MHz Output 145.6875MHz	G4SZM

OUTSTANDING VOICE REPEATER PROPOSALS SUBMITTED FOR LICENSING ARE:

Callsign	Type	Process Stage	Proposed Keeper
GB3AA	New 23cm, Alveston, North of Bristol	PU	G4CJZ
GB3BF	2m Freq Ch, Bedford	NFAP	G8MGP
GB3BW	New 23cm, Weston-super-Mare	PU	G4SZM
GB3CD	New 2m, Co Durham	Ofcom	M1FDI
GB3CN	New 23cm, Northampton	PU	G6NYH
GB3DU	New 2m, Borders	Ofcom	GM7LUN
GB3FH	New 6m, Somerset	RIS	G4RKY
GB3FK	New 2m, Folkestone	NFAP	M1CMN
GB3KI	New 2m, Herne Bay	RIS	G4TKR
GB3LP	New 6m, Liverpool	NFAP	M1SWB
GB3MI	New 2m, Manchester	NFAP	G0TOG
GB3OK	New 2m, Orpington	NFAP	G1HIG
GB3RF	New 2m, Accrington	NFAP	G0BMH
GB3TO	New 2m, Northampton	NFAP	G6NYH
GB3TW	New 2m, Co Durham	NFAP	G8YWK
GB3TY	New 6m, Carrickfergus	PU	GI6IXD
GB3VM	New 2m, Woofferton	NFAP	G4AIJ

WEB SEARCH

RMC	www.coldal.org.uk/rmc



TRANSMISSION 2004

25–26 SEPTEMBER

FOR AN OFFICIAL SPONSORSHIP FORM
Ring: 01634 832501, Fax: 01634 817485
E-mail: janet@blind.org.uk
Download from: www.blind.org.uk
or write to 'Transmission 2004' at the address below

TRANSMISSION is a national fund-raising event open to all Amateur Radio Clubs and individuals to aid the work of **BRITISH WIRELESS FOR THE BLIND FUND**

BWBF

REG. CHARITY No: 1078287

Gabriel House, 34 New Rd, Chatham, Kent ME4 4QR
www.blind.org.uk

ALL ABOUT TRANSMISSION 2004

'Transmission' is the annual amateur radio fund-raising event for the British Wireless for the Blind Fund (registered charity number 1078287). This year, 'Transmission 2004' takes place over the weekend of 25 – 26 September.

All radio amateurs are encouraged to take part in order to raise funds for this very worthwhile charity. The idea is that you ask your friends, family, workmates - anyone in fact - to sponsor you for contacts made during the weekend of 25 – 26 September.

This year is slightly different as trophies will be awarded to the individuals and clubs/groups who make the most contacts or raise the greatest amount of money for the charity. Certificates will be sent to all individuals and groups/clubs who either raise more than £10 for BWBF or who make a donation of at least £10 to BWBF. In order to qualify for one of the trophies you must be a current member of the RSGB and resident in the UK. However, overseas amateurs and non-members of the Society are also invited to join in the fun and raise funds for BWBF (they simply do not qualify for the trophies, although they are eligible for the certificates).

Rules:

1. Obtain an official sponsorship form from: 'Transmission 2004', British Wireless for the Blind Fund, Gabriel House, 34 New Road, Chatham, Kent ME4 4QR; tel: 01634 832501; fax: 01634 817485; e-mail: janet@blind.org.uk; or download one from the BWBF website at www.blind.org.uk

2. Ask as many people as you know – family, friends, workmates, other radio amateurs – to sponsor you for contacts made during 'Transmission 2004' on 25 –26 September. Sponsorship can be for either a certain amount per contact or for a single sum, irrespective of the number of contacts made.

3. Sponsored contacts can be made at any time between 0000UTC on Saturday 25 September and 2400UTC on Sunday 26 September.

4. The definition of a "contact" for the purposes of 'Transmission' is a two-way exchange of callsign and signal report. Each station may only be contacted once per frequency band per day. In other words, every station contacted on 25 September may be contacted again, on the same frequency band(s), on 26 September and that second contact may also be counted towards the overall number of contacts made.

5. This is not an amateur radio contest, so sponsored contacts can be made on any band for which you are licensed, including 10, 18 and 24MHz.

6. Sponsored contacts may be made with your own callsign, a club callsign or a GB special event callsign. (Applications for GB special event callsigns must be made in the normal way at least 28 days prior to the event. Full details from AR Dept, RSGB, Lambda House, Cranborne Road, Potters Bar EN6 3JE; tel: 0870 904 7373 or e-mail: ar.dept@rsgb.org.uk).

7. Trophies will be presented to:

(a) the individual raising the most funds for BWBF;

(b) the group or club raising the most funds for BWBF;

(c) the individual making the greatest number of contacts during 'Transmission 2004';
and

(d) the group or club making the greatest number of contacts during 'Transmission 2004'.

Certificates will be awarded to all stations raising at least £10, or making a donation of £10 or more to BWBF. Please send cheques made payable to 'British Wireless for the Blind Fund' to the address in 1. above.

All donations are gratefully received, no matter how small, but the minimum amount to be raised to qualify for any trophy is £50. The minimum number of contacts to qualify for an award in category (c) or (d) is 50 contacts.

8. An "individual" is when only one person operates a station callsign, whether that callsign is a personal callsign, club call or GB special event station. The definition of a group or club is any operation of a callsign by more than one individual. Groups and clubs are invited to operate on more than one frequency band simultaneously.

9. To qualify for the trophies, you must return the sponsorship form and a cheque for the amount raised, made payable to 'British Wireless for the Blind Fund', to arrive not later than Friday 15 October 2004.

To qualify for the trophies for the greatest number of contacts you must state how many contacts were made during 'Transmission 2004' and enclose a copy of the log. Either a photocopy of a hand-written log or a hard-copy print-out of a computerised log is acceptable. Please do not send the original of hand-written logs as they cannot be returned, and do not send computerised logs on disk. The minimum information required is the date, time, frequency band, and callsign of station contacted. The log should be signed by the licence-holder (or NoV-holder in the case of GB special event callsigns) as follows: "I certify that this is a true copy of the log-book entry for (callsign) during the period 25 – 26 September 2004. (signature)." Sponsorship forms and cheques returned without log copies will only qualify for the trophies for raising the most funds for BWBF.

To qualify for any trophy you must be a current member of the RSGB on 25 September 2004 and be resident in the UK. (However, special certificates will be sent to all stations raising more than £10.)

10. The trophies will be presented at the RSGB HF and IOTA Convention which this year takes place at the Europa Hotel, Gatwick, Sussex over the weekend of 22 – 24 October 2004. The trophies may be taken home by the winners but must be returned as arranged with BWBF for presentation to the winners of 'Transmission' next year.

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VHF/UHF

With the return of Sporadic E propagation to the VHF bands there are more activity reports this month, as Norman Fitch reports…

In the 30 days to 15 June the average daily radio flux at 10.7cm was 96.9, a tad down on last month's value. The maximum of 111 occurred on 17 May and the minimum was 83 on 10 June. The highest SESC sunspot number of 147 was also on 17 May while the minimum count was just 28 on 12 June. 19 new regions were recorded. There was a little more geomagnetic activity than last month when the A-index at Fredericksburg was in double figures on nine days. Even so, the maximum was only 14 on 1, 4 and 9 June so it's not surprising that no auroral activity has been reported.

PUBLICATIONS

The Summer edition of the quarterly magazine *VHF Communications* begins with the description by Bernd Kaa, DG4RBF, of a synthesised signal generator with an impressive specification covering 10-1800MHz in one continuous band. The article is profusely illustrated with diagrams, photographs, PCB layouts and performance graphs, plus a complete parts list. Next is an article 'A Modern 50/28MHz Converter' by Henning-Christof Weddig, DK5LV, which also has an impressive specification. It is well illustrated with diagrams and graphs. Gunthard Kraus, DG8GB, rounds off this issue with his 'Internet Treasure Trove' piece and notes the N4UJW Antenna Design Lab website - see the list.

Issue 2/2004 of the quarterly *Dubus* magazine starts with a 28-page article in English by Leif Asbrink, SM5BSZ, entitled 'Trans-mitter Testing' in which he looks at the performances of several well-known HF and VHF transceivers; quite revealing. There are the regular EME, tropo, Es, MS, 6m and auroral reports and the results of this year's European EME contest. Roger Blackwell, G4PMK (QTHR), is the UK agent for *Dubus* and his e-mail address is dubus@marsport.demon.co.uk

THE ANNUAL TABLE

A couple of readers have suggested that the apparent lack of enthusiasm for the Annual Table could be down to the district count. Phil Catterall, G4OBK, makes the valid point that portable stations in remote locations might not know the postcode and in any case he considers it unfair to ask for this information when it's not part of a contest exchange. Colin Fallaize, MU0FAL, agrees. They suggest a straw poll among readers to ascertain if the table would be of more interest if locator grids, such as IO91 and JO30, replaced the district codes, since everyone knows their grid. Let me have some feedback and if it's positive I'll introduce it next year.

METEOR SCATTER

One of the major meteor showers of the year is the Perseids and the OH5IY *MSSOFT* program predicts it should peak at 1110 on 12 August ±3 hours. Reflections should be over 50% of the maximum for about two days and the ZHR is 105. This shower is available all day and at the predicted maximum the NE/SW path is best and the NW/SE one worst.

Members of the Lothians Radio Society, GM3HAM, were out portable for the RSGB UHF contest on 1/2 May. This is their 70cm station. The antenna array is a pair of 28-ele loop Yagis.

PHOTO BY PETE DICK, GM4DTH

MOONBOUNCE

First some technical notes from the June *432 and above EME News* edited by Al Katz, K2UYH, regarding JT65. Joe Taylor, K1JT, has released a new version of JT65 with improved signal tracking and several additional improvements, but most importantly it runs Spectran simultaneously with JT65. (Joe worked with I2PHD to produce versions of Spectran and WSJT that work co-operatively, but this feature is not available with JT44). For 23cm Joe recommends JT65C not JT65B. The W parameter is the measured width of the sync tone in Hz and if the number is greater than about 5Hz the sensitivity of JT65B will be degraded. In 23cm samples he has been sent none were less than 5Hz, most being in the 6-10Hz range indicating that JT65C should be used.

Peter Blair, G3LTF (IO91), is the only British station mentioned in the activity section and on 1 May he completed with DK7IJ and HB9JAW on SSB and IK2MMB and G4DZU on CW on 23cm. Next day he worked OH6NVQ on 13cm, the culmination of six months of trying. Regarding the low activity during activity weekends, he suggests that it might be better to choose weekends that have the most 'sociable hours' rather than those closer to perigee.

According to the Lunar Weekend Calendar the next AW is 7/8 August, the weekend of the EME Conference in New Jersey. London latitude stations will have about 29.6 hours of Moon time and the declination varies from +12.96° to +21.81°, while the 144/432MHz sky temperature range is 357/27K to 424/29K. The signal degradation referred to perigee varies from -1.46dB to -1.75dB and the Sun offset at Saturday midnight is -89°.

BAND REPORTS

50MHz

At last the 6m band has come to life with plenty of Es and a transatlantic opening but first, how about this? On 27 May Clive O'Hennessy, GM4VVX (IO78TA), was beaming east at 1600. He writes, "Scanning the beacon band I got a strong burst on 50.0315MHz, the JR0YEE beacon. Oh good, thought I, an opening to the North Atlantic. Checked the maps for JR, around JW and JX, but nothing there so went back to the frequency to get the locator, PM97. No, that can't be right! Checked again and yes, it *is* right but by now fading slightly. Where is PM97 on the world map? (Expletive deleted) It's *Japan!* Lots of desperate CQs but nothing. Beacon lasted over 10 minutes with very slow, steady QSB." Has anyone any ideas about the possible propagation mode? The QRB is about 8860km and the QTE 29°.

Bryn Llewellyn, G4DEZ (JO03), is now up to 51 countries this year and on 12 May copied beacon OD5SIX (KM74) for an hour around 0900. On

11 June he worked CT3FT (IM13), three Ukrainian stations, lots of SPs and HB0/DH3IAJ/P. On the 14th he worked into EH8 and TF and next morning into T7 (San Marino).

Welcome to Mike Pugh, G4VPD (IO92), who enters the All-time Squares Table. His ODX of the month was CT1DYX (IN51) on 15 May while out /P with his new FT-817 running 3W to its rubber duck antenna.

From 15 May Ted Collins, G4UPS (IO81), reports Es propagation on eight of the remaining days of the month. On the morning of the 15th he worked HF/SP, SM, ES, OZ, OK and LY stations until complete fade-out by 1115. Between 1714 and 1945 there was an opening to Scandinavia and the Baltic countries with stations worked in OH, LA, ES and SP. There was a brief opening to SP, OK, DL and SM from 1104 on the 17th. The morning of the 23rd brought contacts with LY, SM, OH and ES stations and an evening event brought QSOs with EH5 and EH7 stations till fade-out at 1935.

In the evening of the 26th Ted had QSOs with 9A, S5, OK and YU stations till fade-out at 1910. He worked three Is on the morning of the 27th till fade-out at 1048.

LOCATOR SQUARES TABLE

Starting date: 1-1-1979

Callsign	50MHz	70MHz	144MHz	430MHz	1296MHz	Total
G3XDY	-	34	261	179	130	604
G3IMV	846	20	619	125	53	1663
G4DEZ	668	32	198	87	42	1027
G8VHI	-	-	217	76	40	333
G1SWH	448	42	242	81	30	843
G8TOK	420	39	145	58	32	694
G6TTL	405	-	140	94	28	667
G3FIJ	278	29	108	51	23	489
G0FYD	717	9	294	48	17	1067
G4YTL	11	56	560	141	14	782
M5MUF	155	23	70	-	6	254
G4FUJ	111	20	28	6	5	170
GW3LEW	420	-	220	42	4	686
MU0FAL	540	-	49	9	4	602
G0JHC	1040	26	48	4	-	1118
GW7SMV	675	-	250	-	-	925
GW3HWR	478	31	187	34	-	730
G4VPD	457	14	231	16	-	718
M5BXB	423	15	177	57	-	672
G8HGN	346	-	206	74	-	626
G4OBK	469	28	79	11	-	587
M3CLY	262	-	285	20	-	567
GM4VVX	357	22	170	2	-	551
G7KHF	510	-	18	-	-	528
G4ZHI	107	17	280	33	-	437
G0ISW	231	6	100	22	-	359
M1DUD	272	1	50	9	-	332
GW3EJR	313	-	-	-	-	313
M3CVN	249	-	46	5	-	300
G4APJ	185	-	61	31	-	277
G3FPK	30	-	246	-	-	276
EA7IT	69	-	108	-	-	177
M0XLT	120	-	6	2	-	128
G8RWG	-	-	120	-	-	120
MM1FEO	59	-	26	1	-	86
M3GUA	12	-	16	12	-	40

No satellite, repeater or packet radio QSOs.

If no updates received for a year entries will be deleted. Band of the month 1296MHz. Next deadline is 10 August.

Propagation started again around 1407 bringing further Italian QSOs. Also worked were YO6DZ* (JN92), ZA/PE1LWT (JN91), 9A2ZH* (JN73), S51WX* (JN75), CT1BQH* (IM59) and OM3ID (JN88).

The best day was the 29th, the morning session bringing QSOs with stations in IS0, LA plus assorted Italians till it went quiet around 1145. There were some short-skip contacts with mainland British stations. He completed lots of contacts with Scandinavian stations from 1628 including LA7XK (JO59) on Halvard Island (EU-061 for IOTA fans), YL2LN (KO26), ES4EQ (KO39) and OJ0SM* (JP90, QSL via SM5HJZ).

Kevin Jackson, M0XLT (IO83), reports Es activity on 19 days between 14 May and 15 June. To pick out the highlights in May, on the 14th he copied the SV1SIX beacon at 1028. Next morning he worked into Poland (JO91, KN09 and KO11) and OH1LT (KP00). The 17th brought QSOs with several Italians and YU7AV (KN05) in the morning and with LY1DL (KO24) and LY1CX (KO25) in the late afternoon and next morning he worked YO2MDD (KN06). The TF3SIX beacon was heard at 0932 on the 26th after which lots of Italians were contacted plus ZA/PE1LWT/P, SV1CEI (KM18) and T99C (JN93). In a long opening on the 29th from 0942 to 1419 he worked many stations in Iberia and southern France and in the afternoon from 1619 mainly Scandinavian countries plus LY2004A (KO14) and ES2RW (KO29).

Coming to June, on the 5th IH9/I2AND went into the log. An evening opening on the 14th yielded EH6XQ (JM19) and EH8BPX (IL18), both new countries and next morning T77EB (JN63) was another new one. Not a bad haul, yet Kevin reckons it was a poor month for Es.

Pete Weller, GM3XOQ (IO87), worked around Europe in a good evening Es opening on 15 June and, when he turned his 2-ele beam to the west, he contacted VE1YX and K1TOL* and heard VE1ACB. MU0FAL's (IN89) first big Es event of the year was in the afternoon of 10 May when Colin worked into I, YU, GM, OY, EH, F and 9A. The opening was notable for some very strong short-skip stations, one example being M0XLT at 501km with whom RS59 reports were exchanged.

GM4VVX reports only odd, short distance Es. Nevertheless Clive did work into CT3 for a new country on 11 May. The morning of the 15th brought QSOs with stations in SP, LY, S5, HF and LZ1CY (KN21) for a new grid. In the good opening on the 29th from 0700 he worked a pile-up of I and S5 stations, then lots of HB9, DL and F folk. The openings swung about quite a lot and he completed 147 QSOs that day.

70MHz

G4DEZ called CQ on what seemed to be a dead band on 11 June and promptly worked into IO76. In the evening he worked 9A2SB (JN95), who was only running 4W, exchanging RS52/57 reports. Bryn was running 100W to an 8-ele wide-spaced Yagi at 17m AGL. G4OBK also worked 9A2SB that evening and 9A2EY (JN85) on CW and SSB. These and GI4SNA (IO64) on the 3rd brought Phil three new grids.

On 17 May Derek, G8TOK (JO01), worked OH2MFE (KP20) who is looking for cross-band contacts on 50.185MHz; he listens on 70.185MHz. On the 23rd there was a very short-skip Es opening when he worked OZ1DJJ (JO65) at 1157. He says that the OZs seem increasingly to be using 70.110MHz as a calling frequency as they don't have access to 70.200MHz. GM4VVX only had one QSO with G3JYP (IO84) in the 9 May contest. On the 25th he at last got an answer from S51DI after the beacons had been S7 for two hours. On the 29th the S5, SM and OZ beacons were S5 for three hours but nobody answered Clive's CQ calls.

144MHz

Paulo Gomes, CT1FOH (IN50), reports very good tropo on the night of 2 June with the following paths open: CT/EA8, CT/EI, EA1/EA8 and EA8/G. He heard lots of MS bursts from G4LOH copying the full call several times. EA8BPX worked EI5FK and other EIs and Gs. RW1FC/MM and RW1FM/MM were QRV from IL29, IM20 and IM21.

Geoff Grayer, G3NAQ (IO91), made his first Es contacts of the season on 27 May with YZ1EW and YZ1VV (JN94) but had heard nothing further up to 13 June. The beacons were strong on the 19th on tropo with HB9HB up to S6 in the morning. On the 24th he worked F1TJF/P (JN28), on the 27th F5DLJ/P (JN15) and on the 29th TM9GS (JN06), a special event station commemorating 200 years since the birth of the writer Georges Sand, QSL via F8KKV. In conditions no better than normal - nothing further south than JN06 - he was QRV in the REF contest on 5 June and worked 28 Fs and an ON. ODX was F8KCF/P (JN25) at 813km, operated by OM3CGN who is active on HF from 4U1ITU. D-Day commemoration stations TM6J and TM6JDD (IN99) are also in Geoff's log, also TM6BMC (JN09).

Ken Punshon, G4APJ (IO83), has been doing a lot of listening on 14.370MHz for MS activity and lists 24 stations copied including RU1AA, RW1ZC/MM and OH0JFB. He was out portable from a new site on 8 June for the UK Activity Contest.

Bob Harrison, G8HGN (JO01), has been busy with contests and in the UKAC on 1 June completed 33 valid QSOs with stations in 14 grids worth 462 points in flat conditions with

deep QSB to the east. ODX was DK7BY (JO33) at 514km. In the 5/6 June weekend, which was HF Field Day on the Continent, he made 11 QSOs with stations in 11 grids for a total of 5401 points. ODX was EA2AAZ/P (IN93) at 948km.

Colin Smith, GM0CLN was out portable in IO84AT for the six-hour 'Others' section of the RSGB contest on 16 May. In almost five hours of operation from a battery-powered IC-746 and 8-ele Yagi at 10ft AGL he completed 92 QSOs with stations in six countries and 55 postcodes for a claimed score of 1,423,496 points. Conditions seemed good although no continental European stations were heard. ODX was G4CQR/P (JO00) at 536km. It was Colin's first contest operation since June last year. GM4VVX was also QRV in this event working right down to the south coast of England several times and asks, "So where was everybody in between?" On 10 May the Bergen aurora beacon on 144.437MHz was audible via tropo at S4 for three hours but his CQs weren't answered. There was a weak aurora on the 19th but no activity. MU0FAL logged 14 English stations in the 14/15 May contest in a 'part time' effort. Colin reckons that conditions were good.

430MHz AND UP

CT1FOH reports that the good tropo on 2 June extended to 70cm and that EA8BPX worked EI5FK. Paulo made an easy contact with EA8BPX, too. During the European HF Field Day weekend G8HGN found it a bit of a struggle to find stations so only worked F8KCF/P (JN25 and ODX at 746km), F5OAU/P (JN27), F8KTH/P (JN18) and F5KAR/P (JN09). QSB was deep but he concluded that the French stations didn't have serious gear since, although there were very strong on 2m, on 70cm they weren't readable. Bob was QRV in the UKAC on 8 June making 30 QSOs with stations in 14 grids. Countries worked were F, G, ON and PA for a claimed score of 69,902 points. ODX was PA0VBR (JO22) at 334km. His station comprised an FT-847 at 50W to two 21-ele Yagis 13m AGL.

Pete Bales, GM4BYF, sent a report on the Lothian's Radio Society's effort in the UHF Contest over the 1/2 May weekend when there was little evidence of good tropo. The 70cm station was a proven entity and worked well with few hitches - see the photograph. The 23cm station was the same one that was used some years ago when it was part of the VHF NFD winning group from the Mull of Galloway. They estimated that they might work 20 station so were well pleased with the 30 QSOs achieved. But he wishes that some of the continental stations would beam at them early on in the event rather than waiting till the last hour. Although there were some gotaways, he reckons that some operators would benefit from a little more persistence and give long calls so that they can be peaked on a very sharp antenna system. So the GM3HAM group enjoyed the weekend and Pete promises, "We *will* return."

FINAL NOTES

Thanks to Neil Clarke, G0CAS, for the April issue of *SunMag* and to an amusing e-mail from Geoff Weale, GW3LEW (IO71); glad to have you in the All-time Table. The copy deadline for October is **10 August** and for November it's **7 September**. My telephone answering and fax machine is on 020 8763 9457 and my CompuServe ID is g3fpk ♦

WEB SEARCH	
Antenna design lab	www.hamuniverse.com

HELPLINES

♦ Dick, G0DIC, has a problem. Can anyone advise him of the best way to strap C-type NiCads together in a battery pack. G0DIC, e-mail: rafixter@lineone.net

♦ Jim, G3UZB, would like a circuit diagram for the Yaesu FL-2100Z linear amplifier. G3UZB, QTHR. Tel: 01642 470 623, or e-mail: jim.shewan@ntlworld.com

♦ Ed, G3BIK, needs a copy of the user handbook for the Yaesu FT-840 HF transceiver, and also for the Icom IC-271E 144MHz transceiver. G3BIK, QTHR. E-mail: chick@chickene.freeserve.co.uk

♦ Dennis, G3LLZ, needs a circuit for a constant-output amplifier, the output to be around 1V RMS over the frequency range 0.1MHz to 50MHz, for an input varying between 10mV and 500mV. G3LLZ, QTHR. E-mail: dennis.goacher@rweinnogy.com

♦ Ted, G8HLJ, requires a service manual or circuit diagram for the Plessey PR1551. He will fully reimburse all expenses. G8HLJ, QTHR. Tel: 0151 632 0614.

♦ Alan, ZS1FG, represents the Southern African Antique Wireless Association, and has taken delivery of a Wireless Set No II, made by Aeronautical & General Instruments Ltd in 1940. The radio is generally in good condition

(see the photograph), although all the power plugs are missing. He would like to restore this radio to full working order. A partial circuit diagram from the bottom panel has been recovered, as well as a component list, but Alan has no information on the two power supplies and the DC input voltage. He would appreciate any hints or tips with respect to restoration. ZX1FG, e-mail: zs1fg@telkomsa.net

♦ Gerry, M3GMU, needs the user instructions for the AEA Morse Machine/Sender, model MM3. Expenses will be refunded. M3GMU, tel: 01704 879 909.

♦ Peter, G0DRT, is looking for an IF transformer for a WWII Wireless Set 19, plus some valve screening covers, to help him finish refurbishing it and get it back on the air. He is also willing to purchase a scrap radio for the same purpose. He will cover all costs involved.. G0DRT, QTHR. Tel: 01795 876 277, or e-mail: peter@g0drt.fsnet.co.uk

♦ Bill, GM0KMG, requires a manual or photocopy thereof for the Solartron 7150 Plus digital multimeter. He also needs a manual or photocopy of same for the Open University 'Generatorscope II'. All expenses will be met. GM0KMG, QTHR. Tel: 0141 562 4571.

♦ Alan, G3WXI, has a piece of very old equipment containing a pair of valves that look very much like 813's but bear the type number Mullard HPQ-400. The equipment appears to be a self-excited oscillator and he estimates the frequency to be around 28MHz, possibly a diathermy generator or some other form of RF heating equipment. Can anyone shed any light on the valve characteristics? G3XWI, e-mail: a_strong@btopenworld.com

♦ Harry, G3LLL, is contemplating the replacement of the 6JSC6 output valves of the Yaesu FT-101 with 6146s. The original 101 has lower voltages in the PA stage than the later 101ZD, and so would be expected to give lower output if used with the same valves. Has anyone attempted this replacement and had acceptable results? G3LLL, e-mail: g3lll@onetel.net.uk

♦ Keith, G0OZK, would like to correspond with anyone having servicing experience of the Tektronix oscilloscope model T922 with a power supply problem. He would also like to acquire an owner's manual with setup instructions for a Bruel & Kjaer bandpass filter, model 1615, serial numbers 285XXX upwards. Also, he would like to hear from anyone with experience of repairing the Marantz linear tracking turntable, model TT520. G0OZK, tel: 07974 953 018 after 6pm.

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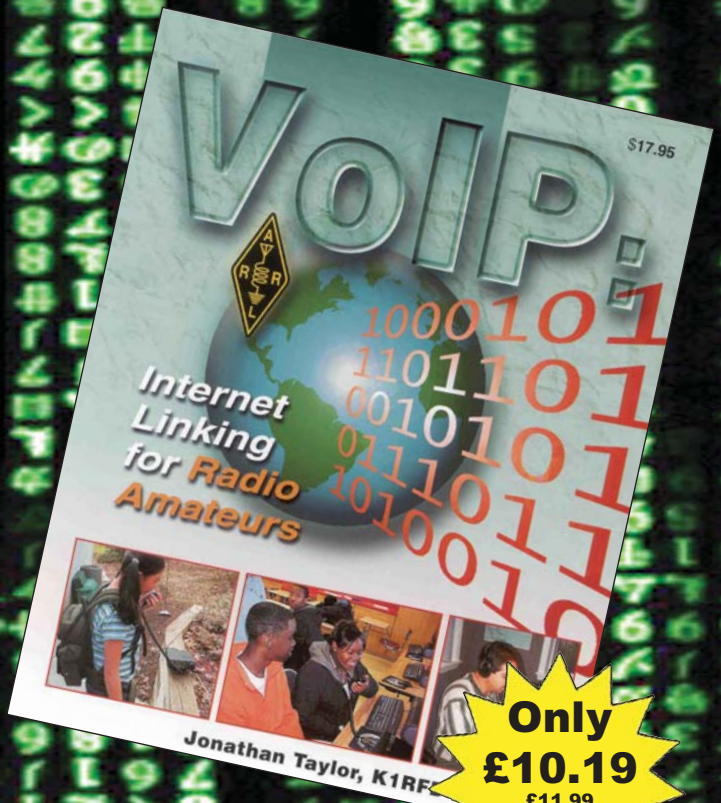

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VoIP: Internet Linking for Radio Amateurs by Jonathan Taylor, K1RFD

This may be the first book ever written about ham radio applications of VoIP! Growing numbers of hams are using VoIP, or Voice Over Internet Protocol, in combination with their radios for long-distance communication spanning hundreds or thousands of miles. They're using the Internet as the relay between their base stations, handhelds and mobile transceivers.

This is a guide to the four primary VoIP systems used by hams: EchoLink, IRLP, eQSO and WIRES-II. The book is designed for beginners who need information on how to set up and use these systems, but it also provides plenty of technical "meat" for those who want to dig deeper and explore how the systems actually work. Author Jonathan Taylor, K1RFD, is the creator of EchoLink and one of the top experts in Amateur Radio Voice Over Internet Protocol.

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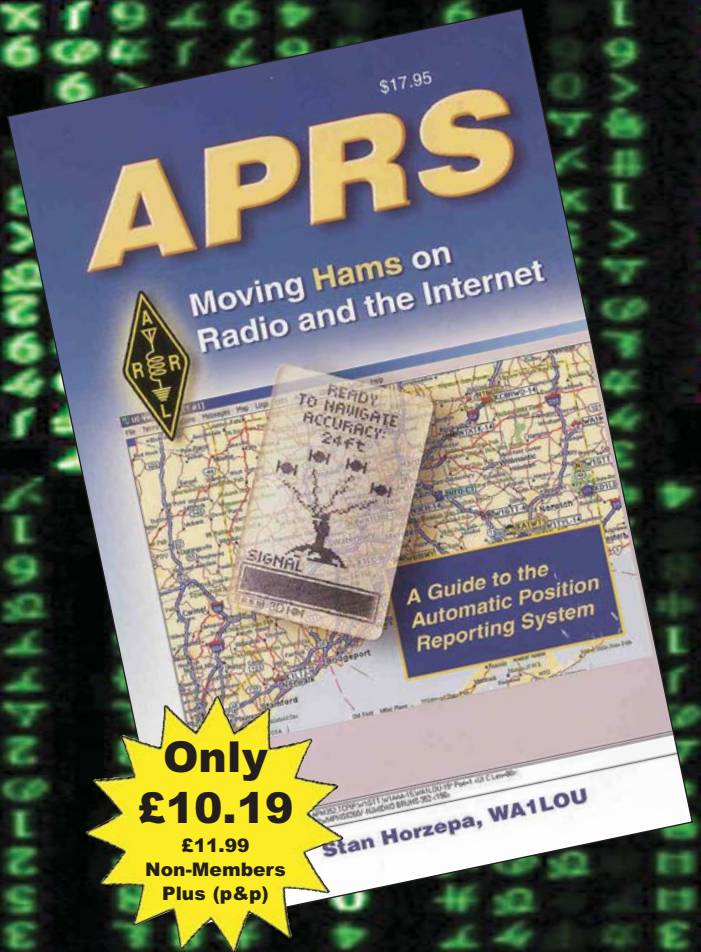

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By Jonathan Gudgeon, G4MDU

Shillingsworth Cottage, Leckhampstead Road, Wicken, Milton Keynes MK19 6BY.

E-mail: g4mdu@thersgb.net

Have you ever wondered exactly what your Morse sending speed actually is? Here, G4MDU presents a little weekend project that will answer your question, at minimal expense. All the components are readily available, and he offers a fully-programmed PIC chip for those without programming facilities.

A Morse code speed calibrator

It's a simple question – how do you measure Morse code speed directly in words per minute? One solution is to use an oscilloscope to measure the speed, another is to use a frequency counter, but both of these methods tell you the Morse code element length and not the speed as a quickly-identifiable measurement unit.

This article looks at the unit of measurement used in Morse code and details the construction of a handy gadget that reads the speed of Morse code directly in words per minute.

WHAT IS A WORD?

Before speed in words per minute can be measured it is necessary first to appreciate the length of the word. A 'word' could contain as little as two letters or as many as 28 with the popular usage of the word 'antidisestablishmentarianism'. What we need is an average word – a word that we can accept as having a mean length in the English language.

A great deal of work has been carried out in this field as it is a significant detail when dealing with the mathematics of cryptology. From pattern analysis [1] of the English language it is assumed that the average word contains two syllables and has an average character length of 4.5.

A more readily-verifiable everyday calculation of an average word has been carried out by analysing 58 articles from the British *Independent* newspaper. Counting every word from articles written by several different journalists produced a mean character length of 5.084 letters per word.

Take, for example, Morse code. Listening to an average amateur Morse contact, we might hear the following: 'NAME IS JON QTH IS WICKEN UR RST 599 WX HR GD CU AGN TNX FER QSO 73 de G4MDU'.

With so many abbreviations, it could be argued that the average Morse code word length contains only three letters!

If we then consider the average word length used in young children's books or an international arms treaty or even worse, language used in the medical world with words such as 'pneumonoultramicroscopicsilicovolcanokoniosis', we realise that an average word is hard to specify and very much dependent upon the context and function of the language.

Since we are interested in the use of the English language when used for communications purposes, it is reasonable to suppose that our average word is probably nearer that used in newspaper reports and is made with five letters.

MORSE CODE – THE BASICS

It is necessary to understand the Morse code basic timing relationship. The critical element that determines the speed of the code is the length of a dot (see **Fig 1**). From the length of a dot all other elements are derived.

From Fig 1, it can be seen that, if the length of a single dot or dash can be measured, it is possible to establish the speed of the Morse code.

For typical communications speeds, the dot length varies in length from 240ms at 5WPM to 20ms for 60WPM (see **Fig 2**).

My Morse teacher, a Diplomatic Wireless Service radio operator from Hanslope Park, taught me that the standard word used for Morse code speed testing was 'PARIS'. Since we have already established that it is reasonable to assume that an average word comprises five letters, the use of the word PARIS is very appropriate.

To send at 10WPM the word PARIS must be sent 10 times in one minute. Breaking PARIS down into its individual Morse code elements would require 43 individual elements plus elements for word spacing, as shown in **Fig 3**.

At 10WPM this would equate to 10 x 43 elements = 430 elements. Plus spaces between words 10 x 7

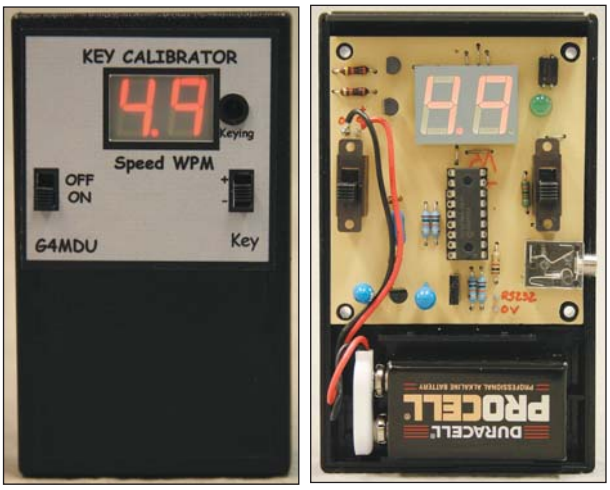


Fig 1
Timing relationship between dots, dashes and spacing.

Fig 2
Dot length against words per minute.

Fig 3
Timing elements of the word 'PARIS'.

FIG 1 © RADCOM 215

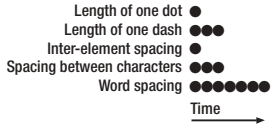


FIG 2 © RADCOM 216

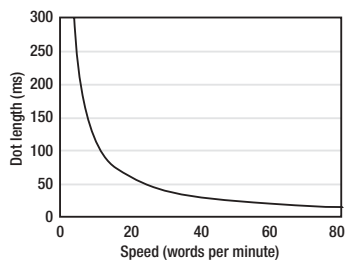


FIG 3 © RADCOM 217

FIG 4 © RADCOM 218

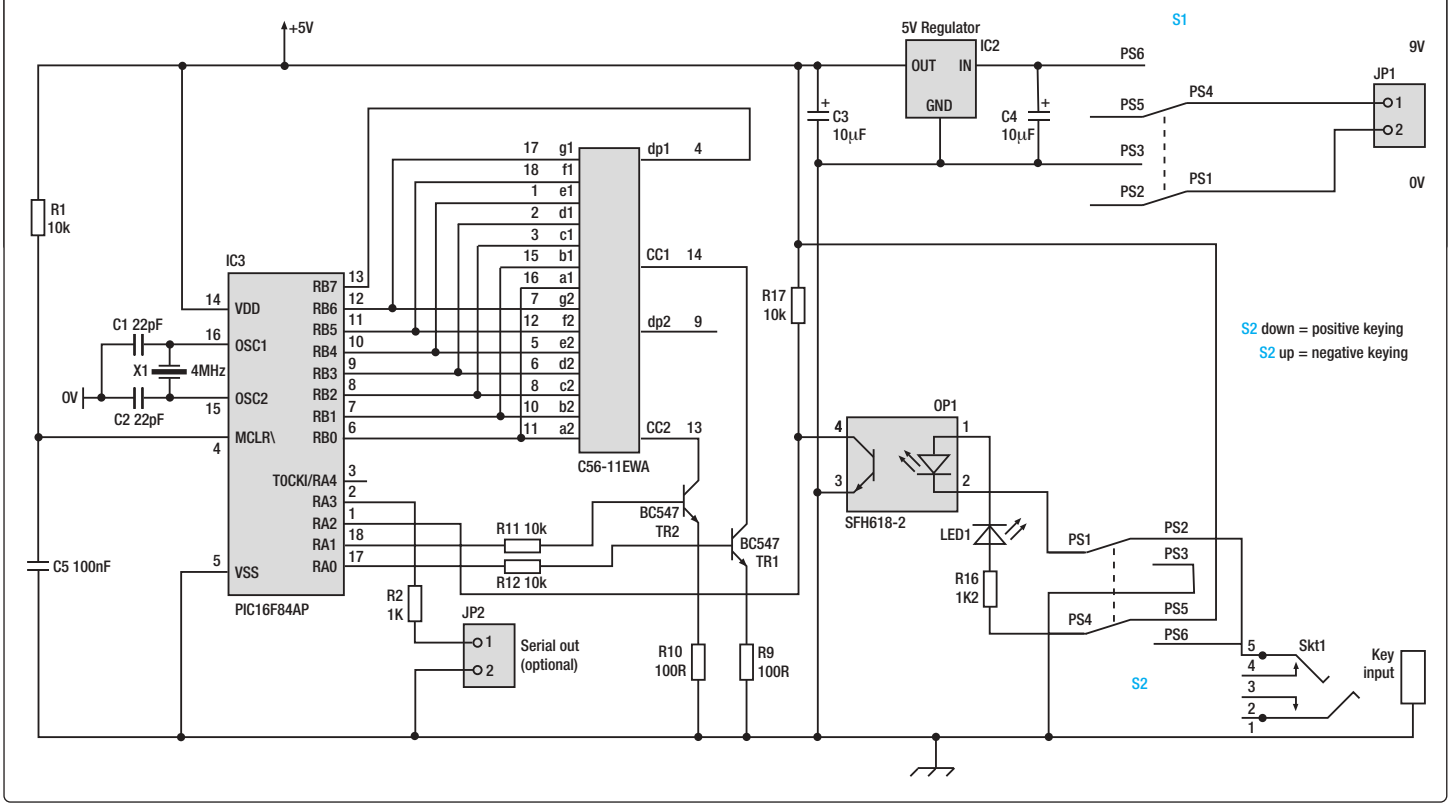


FIG 5 © RADCOM 219

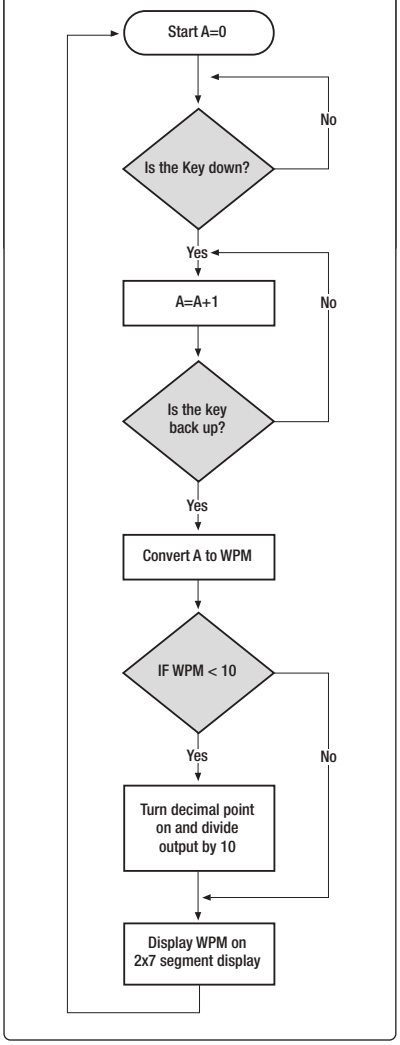


Fig 4
Circuit diagram of the Morse code speed calibrator.

Fig 5
Software flow chart for the Morse code speed calibrator.

elements = 70 elements, making a total of 430 + 70 = 500 timing elements in one minute.

One minute divided by 500 timing elements ≡ 120ms per element (or dot).

This is very close indeed to the value in Fig 2 of 120ms for the length of a dot at 10WPM. PARIS, as a standard word, is therefore an appropriate choice.

PIC FREQUENCY COUNTER

Theory is fine, but who wants to send the word PARIS and use a stop watch at the same time? A very simple solution to this problem is a PIC microcontroller frequency counter programmed to display speed directly in words per minute. Send a single dot to the counter and the display will indicate the speed up to 99WPM.

This PIC frequency counter uses the very popular 16F84 microchip PIC and directly drives a double 7-segment display (**Fig 4**). Speeds below 10WPM are displayed with greater accuracy and a decimal point is used. Above this speed, we lose the decimal point and the speed will be indicated to the nearest word per minute.

The Morse code input is interfaced to the PIC via an opto-isolator. This isolator provides the ability to be used with keyers that key to ground

COMPONENTS LIST

COMPONENT	VALUE	Maplin
R1, R11, R12, R17	10k	G10K
R2,	1k	G1K
R9, R10	100Ω	G100R
R16	1k2	G1K2
C1, C2	22pF ceramic	WX48C
C3, C4	10µF at 16V	AT98G
C5	100nF poly film	DT98G
OP1	SFH618-2	CY94C
IC2	LM78L05 100mA	QL26D
IC3	16F84-04/P 4MHz PIC	VS87U
	Download software from www.g4mdu.thersgb.net	
IC3 Ready Programmed PIC	A ready-programmed PIC is available from the author for £10	
X1	4MHz ceramic resonator	DJ32K
TR1, TR2	BC547	QQ14Q
7-segment display	14mm common-cathode double-digit numeric display	BY68Y
S1, S2	DPDT slide switch	FH35Q
LED1	5mm LED	WL27E
Skt1	3.5mm PCB mounting	FK20W
JP1	9V PP3 battery connector	HF28F
Case	Any suitable small case with a battery compartment	

or key with a voltage between 3.6 and 13.8V. S2 is provided to switch between the required keying (positive or negative) and LED1 illuminates when the key is down to provide feedback to the user. The output of the opto-isolator is taken to input RA2 of the PIC. Port B of the PIC is connected directly to the 7-segment display with display segments from both individual displays commoned together. The common cathodes of digits 1 and 2 are connected to controlling transistors TR1 and TR2, which are then controlled by PIC pins RA0 and RA1, with their function to turn each digit on at such a rate that both digits appear to be on at the same time.

S1 switches a 9V battery supply into a 5V voltage regulator. X1 is a 4MHz ceramic resonator to clock the PIC micro-controller.

R2 provided a serial output to a computer which was used for initial variable calibration of the prototype and may be deleted from the circuit and PCB as it is unused in the final version.

SOFTWARE

The software for flashing into the PIC microcontroller was written in *PicBasic Pro*. **Fig 5** provides an overview of the function of the software. The program contains a variable 'A' that required calibration during program development. The calibration is in accordance with the speed in words per minute as in Fig 2.

As my Iambic keyer was limited to 25WPM, a signal generator set to produce square-wave pulses was used for calibrating the higher speeds. Monitoring the pulse length with an oscilloscope, speeds up to 99WPM should be more than adequate for normal Morse code operation.

CONSTRUCTION

No special components have been used and all are readily available from Maplin Electronics. All components fit on a single-sided PCB (see **Fig 6**) which has been made to fit within a small case that contains an internal battery compartment. The PCB is not strictly required and the circuit could just as easily have been built on Veroboard.

The main difficulty with a PCB design was related to the 7-segment display. The old problem of trying to supply gas, water and electricity to three houses without any trench crossing comes to mind. A double-sided PCB would have solved this problem, but at the cost of increased complexity for the amateur PCB builder. Eight wire links are necessary with the single-sided design – not ideal, but easier than a double-sided PCB. Be careful with some of the solder pads around the display area which are quite close to each other. A fine soldering iron and a steady hand will be required. Component layout can be seen in **Fig 7**.

FIG 6 © RADCOM 220

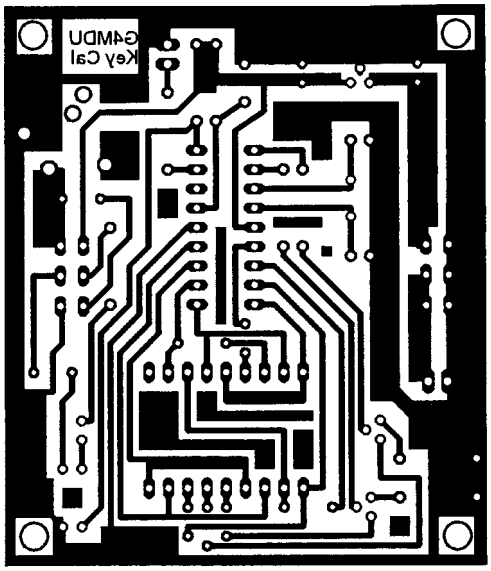
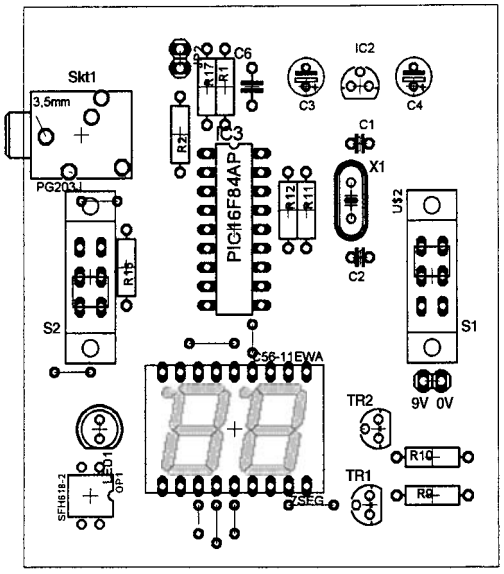


FIG 7 © RADCOM 221



Make sure you double-check the orientation of both the PIC and the double 7-segment display. To discover you have incorrectly soldered the display will be most annoying... Looking at Fig 7, the display is placed upside-down, which is the right way up when mounted within the plastic case.

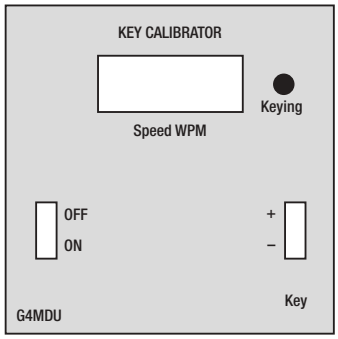
Components have been selected to ensure that their profiles are such that they will all fit onto the PCB with the switches protruding through the case lid. Using a template such as **Fig 8**, scaled to size, holes were cut in the plastic case for the switches, 7-segment display and LED indicator. The template was printed on to paper and a window cut out for the display. Laminating the paper template produced a window for the display. Holes for the two switches and LED were then cut and the front panel stuck in place to hide

Fig 6
PCB layout.

Fig 7
Component layout.

Fig 8
Front panel template.

FIG 8 © RADCOM 222



my (not terribly accurate) hole-cutting in the plastic case.

The PIC microcontroller must be programmed with software. The software may be downloaded from the author's home page [2]. The 16F84 chip is one of the most commonly used PICs and programmers are widely available and simple to build yourself. Searching with *Google* for '16F84 PIC Programmer' will produce plenty of help for those who require it. If you really can't program the chip then a pre-programmed chip is available from the author for a small cost.

IN USE

Operation of the Morse calibrator is very straightforward. Apply power to the unit and, after a small delay, the digit zero is displayed. Select the correct polarity with the keying switch. '+' indicates that the calibrator expects to see a positive voltage between 3.6 and 13.8V keying on the tip of the 3.5mm socket, while '-' indicates that the calibrator expects to see a ground connection on the tip of the 3.5mm socket. Send a single dot and the display will change to display the speed in words per minute. Repeatedly sending dots will repeatedly display the new speed.

The calibrator has been tested and calibrated for use from 3-99WPM which should suit almost all practical applications.

Sending faster than 99WPM will result in the display rolling over to '00' with 01 and 02 indicating 101 and 102 respectively. While the PIC software is capable of counting considerably faster than 99WPM, there really is little point in doing so. How many readers can cope with 50 WPM let alone speeds much greater than this?

It is, of course, possible to send dashes to the unit and since a dash is three times longer than a dot the speed displayed must be multiplied by three.

And finally, this article has, according to my word processor, an average word length of 4.6 letters! ♦

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Pattern analysis	www.nku.edu/~christensen/0203patterns.doc
Author's website	www.g4mdu.thersgb.net

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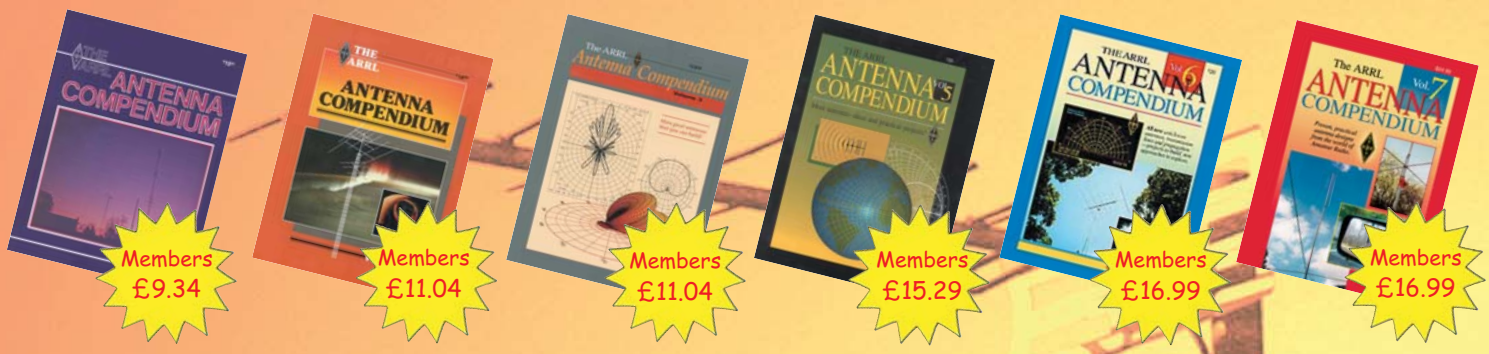

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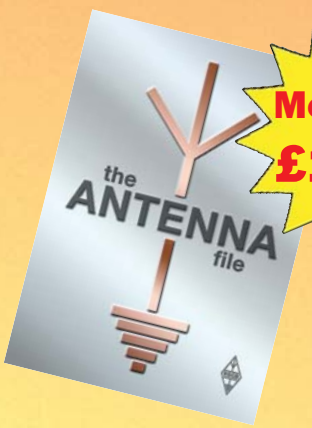

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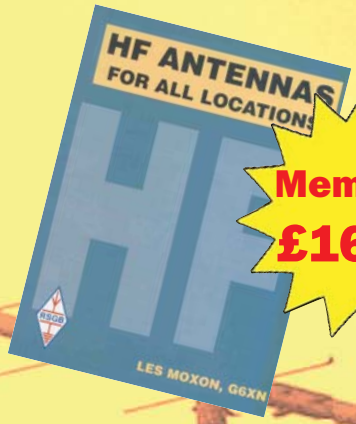

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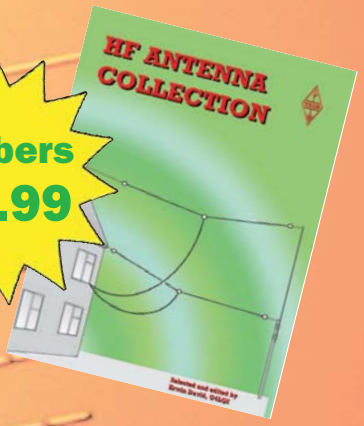

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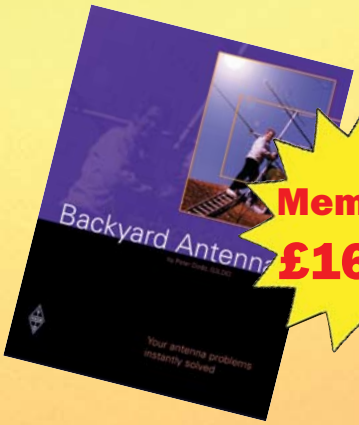

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E-mail: keith@khollow.freeserve.co.uk

KENWOOD TS-790E 2m/70cm m-mode base station, mint cond, hardly used, boxed, man, £550. G0WKA, QTHR, 01302 538 544.

KENWOOD TS-870S DSP, £800. Illness forces QRT sale. Kenwood Ispkr with filters, £70. Ranger 811A linear, 800W, £800. MFJ-267 SWR meter 3kW and dummy load 300W, £70. All above under warranty and ono. KW dummy load 1kW, £30. KW EZ Match, £55. KW low-pass filter, £30. KW 3-way coax switch, £25. Revex SWR power meter 200W, £40. Icom desk mike SM-20, £70. Solartron Digital Lab Precision multimeter, £200 ono. Icom Ispkr type SP-20, £75. Heil mic classic with broadcast and DX inserts. Kenwood mic interface cable, £150. Collect or pay half-price carriage. G3ACB, 01279 731 070 (nr Harlow).

MFJ ATU 949-E 1.8-30MHz, 300W dummy load, boxed, man, warranty, £75. Collectors item Air Ministry publication AP-1093 Radio Communication, £25. Carriage at cost. 01279 731 070 (nr Harlow).

MIRAGE KP2 144MHz pre-amp, £50. Samlex 10A PSU, £50. Small ext loudspeaker (Realistic), £10. Sennheiser HD-545 Hi-Fi phones incl. Creek headphone amp, £50. *Admiralty Handbook of Wireless Telegraphy* 1938, Vols 1 & 2, offers please? All p&p extra. M5AEO, 020 7536 0466 (London).

OPTIBEAM 5 bands OPG new, in box, never assembled, £500. John, 01522 789 959, 07973 462 268 (Lincoln).

PAKRATT 232, £180. Trio R-1000, £75. Alinco DR-130, £125. AVO sig gen, £25. LCR bridge, £20. *RadCom*s, £20. All above available from 7 June. 023 9279 2512 (Fareham). E-mail: rodg3aff@tiscali.co.uk

PARABOLIC dish, over 4ft diameter, solid 16SWG aluminium, with fully rolled edge. Manufactured in USA by Magnavox Corp to highest standard, true parabola – ideal for serious microwave/moon-bounce enthusiast. Sensible offers. John, G4FSD, QTHR, 01254 679 058 (Blackburn).
E-mail: jcr@blackpool.ac.uk

PSUs for 4CX250 tetrodes. EHT unit 2.3kV 800mA continuous with soft start. Screen/grid/heater PSU, built using G3SEK boards, fully metered and interlocked. No expense spared, well built using all new components. EHT unit weighs 30kg, hence buyer to inspect & collect. These PSUs are a bargain, £325 ono. G4FAB, QTHR, 01949 831 558 (Bingham, Notts).
E-mail: sjfox2@onetel.net.uk

SILENT Key G4JFZ formerly G8BZG. Kenwood TS-870S, £800. Yaesu FT-2800M boxed, new, plus 5/8 mag-mount, £100. Receipts for both units. Zurich 30A PSU, £50.Yaesu FC-902 ATU, £125. AVO8 MkII, £40. Vintage Bowthorpe electric insulation testmeter, offers? Pye RFL1A VHF reflectometer, £10. Pye 9669062 test set, £10. Sensible offers on any item considered. G4JBE, 01844 344 259 eves, (Aylesbury). E-mail: lacbq8@supanet.com

SILENT KEYS

We regret to record the passing of the following radio amateurs:

AG4S	Mr S J Stansfield	03/02/04
G0IIL	Mr J L Iceton	01/06/04
G0WLY	Mrs S Craig	07/06/04
G1HOH	Mr B Dickinson	29/06/04
G3BZS	Mr C J Whistlecroft	05/04
G4AHI	Mr A Newton	22/05/04
G4JFZ	Mr G A Lacey	05/06/04
G6RJS	Mr A C Miles	17/04/04
G7JXZ	Mr O J Chivers	
G8FKZ	Mr D J Russell	09/06/04
G8HYZ	Mr R Hunter	01/12/03
G8SC	Mr C Collins	11/09/04
GM6AYW	Mr B W Robson	04
GW3RTZ	Mr A W Bennett	12/03
GW7FLA	Mr R J Swan	18/05/04
M3BSY	Mr D Mahoney	02/06/04
MW0RRP	Mr R R Pasotti	06/06/04
RS190345	Mr O Crammond	02/04
RS48030	Mr E C Needs	12/03
RS88885	Mr M Callaby	12/04/04

CONGRATULATIONS

to the following, whom our records show as having reached 60 years' continuous RSGB membership this month:

50 years

G3JTG	Mr E G Gibbins
G3NDO	Mr P Sorab
G4IUH	Mr R J Pye
RS 20323	Mr L Foster

60 years

G3YLR	Mr F R Blake
RS558	Mr R D Thomas

SILENT KEY sale KW-1000 linear, £250. Yaesu ATU FC-902 500W, £100. Station monitor Heathkit 610, £60. Datong speech processor ASP, £50. Nevada ATU TN-1000, £100. Rotator AR-300XL, £35. G3MJK, QTHR, 01256 389 439 (Basingstoke).

SONY ICF-SW7600G PLL synthesised rcvr. FM stereo/LW/MW/SW 1.6 to 30MHz: USB/LSB/CW in leather case c/w SW antenna and earphones. Fully portable, ideal for holidays abroad, £70 delivered. G0MDZ, 01636 830 005 (Nottingham). E-mail: gzeroumdz@thersgb.net

TRIO/Kenwood TR-751E 2m m-mode mobile, mic, man, gc, £180. Yaesu FT-690RII with 10W clip-on amplifier, new NiMH rechargeables, man, boxed, £180. BNOS 12V 6A PSU, £35. MML 144/100S linear + preamp, gc, £90. All plus postage. G4OXD. 01462 435 248 (Hitchin).

TWO pneumatic Clark masts type QTZ/HP, 9.2m. One with QT tripod stand, extras, £200 the pair. Two good Robot 400 SSTV units, £100 the pair. New 2-ele -/P Hexbeam for 20 & 15m, £300. All with mans. G3LYD, QTHR, 01983 840 588 (Godshill, Isle of Wight). E-mail: **g3lyd@thersgb.net**

WAVEMETER WA-3 1.8-92MHz, £25. Wavemeter WA-1 120-450MHz, £15. Kent Morse key, straight brass, £30. MFJ-418 pocket Morse tutor, £25. Diamond SX-600 SWR meter, £70. MFJ-949E 300W tuner with dummy load, £90. Watson WM-308 desktop mic, £40. Super Hunter, £75.

GB CALLS

These callsigns are valid for use from the date given, but the period of operation may vary from 1 – 28 days before or after the event date. Operating details are provided in an abbreviated form as follows: T = 160m; L = 80 or 40m; H = HF bands (30 – 10m); V = 6 and/or 4m; 2 = 2m; 7 = 70cm; S = satellite and P = packet. Please send operational details of your special event station to the RadCom office at least five weeks before publication. The only QSL Bureau sub-manager for special event station callsigns is as follows: GBxAAA-MZZ – Mike Evans, 322 Heol Gwyrosydd, Penlan, Swansea SA5 7BR, e-mail mw0cna@ntl world.com. Will organisers of special event stations please ensure that they lodge plenty of envelopes with their sub-manager?

1 Aug	GB0MFD: Marconi Festival Day. L2 (MI0MSR)
4 Aug	GB6LOG: Liberation Of Guam. LHV2 (G0BXV)
6 Aug	GB0PL: Paul Lighthouse. LH2 (G4VHM)
7 Aug	GB0RAF: Royal Air Force ARS. Lake Windermere. H2 (G0TAK)
	GB0RRR: Rugby Radio Rally. V27 (G0OLS)
	GB2BHG: Bassetlaw Hospice Gala. LH2 (G7MQW)
11 Aug	GB6LOG: Liberation of Guam. LHV2 (M0BTY)
14 Aug	GB0KF: Kite Festival. LH27 (GW3CR)
	GB2PF: Peter Fidler. LH2 (G0THF)
	GB2TS: Tollerton Show. Tollerton York. LHV27 (G3WVO)
	GB3PLH: Pakefield LightHouse. Pontins Holiday Camp. LH (G3KIJ)
	GB4WTA: Wireless Telegraphy Act. 6 Miles West of Oakham. L (G7AIR)
15 Aug	GB2RRL: Rubha Reigh Lighthouse. LH (GM4CHX)
	GB4SC: For Second Chance. LH2 (MM0MUL)
16 Aug	GB0MR: Marhamchurch Revel. LH (G4NCJ)
	GB2PSL: Plovers Scar Light. Plovers Scar. L2 (G3UCA)
17 Aug	GB2GGS: CANCELLED. (G0ENW)
	GB2GSS: Gillingham & Shaftesbury Show. LH2 (G0ENW)
20 Aug	GB2GOL: Great Orme Lighthouse. LH2 (MW0IDX)
21 Aug	GB0BLL: Burnham Lower Lighthouse. N:51.15 W:03.00. LHV (G3TJE)
	GB0BPL: Burry Port Lighthouse. Burry Port. LHV2 (G3CEN)
	GB0CNL: Clyth Ness Lighthouse. LHV (MM5AJW)
	GB0PBL: Portland Breakwater Lighthouse. LH27P (M5MKW)
	GB0REL: Rathlin East Lighthouse. Lat N55:18:01 Lon W:06:10:02. (GI0PGC)
	GB0RF: Romaldkirk Fair. LH (M0SSF)
	GB1PLL: Point Lynas Light. LH2 (GW1AKT)
	GB1SCA: Scarborough Lighthouse. LH2 (G4SSH)
	GB2ELH: Eshaness Lighthouse. (MM5PSL)
	GB2GNL: GirdleNess Lighthouse. N58:08:3 W02:02:8. LH2 (GM4JLZ)
	GB2KAY: Kay (Kendall, Actress). LHV2 (M5EXY)
	GB2LBN: Lighthouse Barns Ness. Barns Ness. (GM4UYZ)
	GB2LLH: Longstone LightHouse. Farne Islands. LH2 (M0BMJ)
	GB2LT: Lighthouse Turnberry. LH2 (GM4SUC)
	GB2RFS: Ruthin Flower Show. LHV2 (GW4WSU)
	GB2RL: Roker Lighthouse. TLHV27 (M0AYI)
	GB2SFL: South Foreland lighthouse. LH27 (G4GAN)
	GB2SHL: Stoer Head Lighthouse. TLH2 (GM8UPI)
	GB2TCL: Thorngumbald Clough Lighthouse. TLHV27 (G0SGB)
	GB4BPL: Burry Port Lighthouse. LHV2 (G3CEN)
	GB4HCL: Hurst Castle Lighthouse. LH2P (M0AUI)
	GB4LL: Leasowe Lighthouse. LHV (G4OAR)
22 Aug	GB4RFC: Roliston Forestry Centre. LH2 (G4CRT)
25 Aug	GB4YOU: Youlbury. TLH27 (G0RJX)
	GB4YOU: Youlbury. TLH27 (G0REL)
	GB6LOP: Liberation Of Paris. LHV2 (G0SWY)
26 Aug	GB0HSR: Haven Street Railway. LH2 (M5PDL)
27 Aug	GB0PC: Peterlee Carnival. TLHV27PS (G0NSK)
28 Aug	GB0DFS: Denbigh Flower Show. LH2 (GW1AKT)
	GB4GUZ: GUZ=Naval Slang for Devonport. TLHV27 (G6BJJ)
	GB4TCF: Town and Country Festival. TLHV27PS (G4GHJ)

MFJ-702 low-pass filter, £10. Icom SP-7 spkr, £15. CX-201 2-way coax switch, £10. All postage at cost. M0IWC, QTHR, 01964 530 464 or 07960 634 672 (Hornsea, East Yorkshire). E-mail: msaunders113@hotmail.com

YAESU FL-2025 clip-on linear for FT-290 MkII, £50. Yaesu FC-902 HF ATU, £125. MML-144-100W linear, £60. MML-432-30W linear, £45. FT-290MkII, £180. Trio monitor scope CO-1303D, £35. Collectors items: 2m 6-channel Pye Cambridge fully crystalled (mod to FM) inc man, £75; Pye Cambridge, 4m AM, 70.26MHz, £50; 4m Cossor Commando AM solid-state, £50. MFJ-784B tunable (DSP) filter, £65. Yaesu FT-480R, slight fault, hence £125. Trio 9130, slight display fault, hence £125. US Robotics 56K modem with leads, £25. 6m HL-66V, linear, GaAsFET preamp in orig box, £75. 4m x 2 h/h including charger, £100. Oscilloscope 60MHz, £250. All prices ono, buyer inspects and collects or pays carriage at cost. G8TSE, 0151 639 2553 (Cheshire).

YAESU FT-1000MP dual VFO tcvr. Boxed, man, vgc, bargain, £1,000. Chris, G3NHL, QTHR, 01326 377 233. E-mail: g3nhl@tiscali.co.uk

YAESU FT-1000MP MkV, unused, with manufacturer's instructions, £1200. Mrs J Westmoreland, 01572 821 708.

YAESU FT-1000MP. Choice of two. Hy-Gain TX-2 rotator. SB-220 & HL-2200 linear. Millen 92200 Transmatch, as new. Trio SP-940 spkr, new, boxed. D-104 mics. Racal freq meter. Heil mic stand. SX-100 power meter, new, boxed, offers please? No time wasters. 01386 41951 (Evesham, Worcs).

YAESU FT-290RII, FM SSB/CW, Nicads, mic, man, orig box, etc, £190. Geoff, G4FAS, QTHR, 0161 437 7784 (Stockport). E-mail: geoff.royle@lineone.net

WANTED

ALL spy/clandestine/special forces radio sets from WWII and, since wanted by collector, your price paid for interesting items. Also incomplete units and accessories wanted for spares. Bill, 020 8505 0838 (London).

AVO meter model 8 Mk6 to replace a now defunct model. Dave Morton, G4LQT, 01785 662 884 (Stafford). E-mail: dfm@supanet.com

BIRD elements 2-30MHz, 100W 100H, 250W 250H. Only good cond please, not repaired. TS-130S service man. G3GYE, QTHR, (Penzance). E-mail: ninapitts@sagainternet.co.uk

DRAKE TR7(A) with accessories. FT-101ZD MkII with accessories. G4GZS, 01788 334 471 (Rugby). E-mail: keith@jpl.co.uk

ELECTRONIC Keyer. Have you a redundant DAIWA DK-210 or similar or WHY? Rob, 01372 450 848 (Surrey).

ICOM IC-202 tcvr, 4CX250B tubes + bases, 2m beams + Heliax. Auto trans 210-220-230-240-250V (15/20A). Vacuum caps 0-500pF 10kV, 0-2000pF 5kV, variable. GH3UCI, QTHR, 01555 770 914.

MORSE keys wanted please. Early brass keys, especially by Marconi, GPO etc, but all considered. John, G0RDO, 01626 206 090 (Newton Abbot). E-mail: john@morsemad.com

URGENTLY require four mounting insulators for Mosley Mustang driven element. Please contact GW3JSV, 01686 640 388 (Welshpool). E-mail: GW3JSV@btinternet.com

VINTAGE Ham Radio gear: Codar, Collins, Drake, Eddystone, Heathkit. KW, Yaesu etc from the 1950s, 60s and 70s. Especially looking for KW-4B VFO, KW-160, Eddystone ext S-meter and spkrs. Please let me know what you can help me with. Paul, G4CCZ, 01932 342 927 (Woodham, Surrey). E-mail: g4ccz@6metres.com

WWII American radio equipment and/or accessories, or any type of aircraft radio communication equipment, any cond. To be donated to RAF Burtonwood Heritage Centre. Maurice, M0CMJ, 01925 604 245.

RALLIES

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; **MA** – Foundation Morse Assessments; **LB** – Licensed Bar; **C** – Catering; **DF** – Disabled Facilities; **WIN** – prize draw, raffle; **LEC** – LECtures/ seminars; **FAM** – FAMily attractions; **CS** – Camp Site.

1 AUGUST 2004

LORN ARS Radio & Computer Rally – ***** New venue ***** – Crianlarich Village Hall, 12 miles N of Loch Lomond at jn A82 & A85. £1. TI, TS, B&B. Shirley, GM0ERV, 01631 566 518, or John, GM8MLH, 01838 200 304.

7 AUGUST 2004

RUGBY ATS Rally – Stanford Hall, Lutterworth, Leics (follow the signs for Stanford Hall from M1 jn 20). OT 10am, TI on 145.550MHz. Please note that this is a Saturday event! Tony, G0OLS, 01455 552 519, thumph3426@aol.com

8 AUGUST 2004

FLIGHT REFUELLING ARS Hamfest – Cobham Sports and Social Club Sportsground, Merley, Wimborne, off A31 (signposted). OT 10am, £3 - correct money please. TS, CBS, LB, C, TI on 145.550MHz. Overnight camping on Saturday, but caravans require booking. Mike, M0MJS, 01202 883 479, or hamfest@frars.org.uk [www.frars.org.uk]

13 AUGUST 2004

COCKENZIE & PORT SETON ARC 11th Annual Junk Night – Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton. OT 6.30pm, £1. Tables

free – first come, first served, WIN, C, DF. Bob, GM4UYZ, 01875 811 723, gm4uyz@btinternet.com

29 AUGUST 2004

TORBAY ARS Communications Fair – Churston Ferrers Grammar School, Churston, Brixham. OT 10am, £2. CP free, TS, C, DF, WIN, No B&B, but private sale noticeboard. Anna, M3LMG, 01803 812 117, rally@tars.org.uk

30 AUGUST 2004

HUNTINGDONSHIRE ARS Rally – Ernulf Community School, St Neots (nr Tesco superstore on A428). OT 10am, £1.50. CBS on hard standing, indoor hall, C, TI on 145.550MHz. Peter, M5ABN, 01480 457 347 (6 - 10pm), peteherbert@aol.com

5 SEPTEMBER 2004

ANDOVER RAC Wildhern Autumn Boot Sale - Tangley Village Hall playing field, Wildhern, on A343 N of Wildhern (maps available on www.arac.co.uk). OT 10am, £1. C, TI via G0ARC on 145.550MHz. Terry, G8ALR, 01980 629 346, g8alr@ukgateway.net

Telford Rally – RAF Cosford Aerospace Museum, on A41, one mile south of jn 3, M54. OT 09.30 / 10am. Admission free, CP free, TI on 145.550MHz. Bob, M0RJS, telford-rally@somervilleroberts.co.uk

11 / 12 SEPTEMBER 2004

49th Weinheim VHF Convention – Karl Kübel Schule, Bensheim. LEC, FM, TS, CP, CBS. [www.ukwtagung.de]

12 SEPTEMBER 2004

Vintage Valve Technology Fair – Haydock Park racecourse, nr Wigan, on A49, 5 minutes from jn23, M6. OT 9.30am, £2. CP free. Up to 200 stalls selling vintage comms, domestic, military receivers, Hi-Fi, gramophones, telephones, valves, vinyl. Trevor, 01274 824 816. [www.myciunka.supanet.com/VVTF2003 (case-sensitive)]

19 SEPTEMBER 2004

LINCOLN SWC Hamfest – Newark Showground, at jn of A46, A1 and A17 at Newark. OT 10am, £2. All rally favourites, plus craft, classic cars, fly-in by WWII Auster V reconnaissance plane, FAM. Baz, 01636 612 440, m3dmv@btopenworld.com [www.hamfest2004.secretbunker.org.uk]

1 / 2 OCTOBER 2004

LEICESTER Amateur Radio Show – Donington International Centre, Castle Donington, Leics. Geoff, G4AFJ, 01455 823 344, fax 01455 828 273 or g4afj@argonet.co.uk

1 – 3 OCTOBER 2004

WACRAL 2004 Conference – Slavanka Christian Conference Centre, Southbourne, Dorset. Geoff & Jan Grundy, 01323 721 352, g4yjw@wacral.org

3 OCTOBER 2004

BELGIUM Amateur Radio & Computer Rally – Hall 'La Louvière Expo', La Louvière, access direct from motorway 50km S of Brussels. OT 9am. FM, TS from UK, Holland, Germany & France. Michel, ON7FI, 0032 64 849 596.

9 OCTOBER 2004

G QRP CLUB Mini-Convention 2004 – St Aidan's Church Hall, Manchester Road, Rochdale. OT 10am, £1. Traditional-style rally, components, junk & kit vendors – no new equipment or computers! LEC, 'Pie & Peas' lunch. g3rjv@gqrp.co.uk

10 OCTOBER 2004

GREAT LUMLEY AR & ES Rally – Great Lumley Community Centre, Front Street, Great Lumley, nr Chester-le-Street, Co Durham, just off the A1. OT 10.30, £2 (accompanied under-14s free). Radio, hobbies, model club, electronics, computers, satellites and component stalls. CP free, C, B&B, TI. Nancy, 0191 477 0036 or 07990 760 920, nancybone2001@yahoo.co.uk

17 OCTOBER 2004

BLACKWOOD & DARS Rally – Newport Centre, Newport, 1 mile from jn 25A, M4 (jn 26 travelling W to E). OT 10.30 / 10.45am, £1.50. CP free, TI, TS, SIG, LB, C, DF, WIN, B&B. George, 2W1JLK, 01495 724 942, or Dave, GW4HBK, 01495 228 516.

HORNSEA ARC Annual Rally – Floral Hall, Hornsea. OT 10am. B&B, etc. Richard, G4YTV, 01964 562 498, g4ytv@aol.com

22 - 24 OCTOBER 2004

RSGB International HF & IOTA Convention (HFC2004) – Europa Hotel, Gatwick. LEC, 136kHz – 50MHz, IOTA 40th Anniversary, demonstrations. John, G3WKL, hfc2004@rsgb.org.uk [www.rsgb.org.uk/hfc]

24 OCTOBER 2004

GALASHIELS & DARS Annual Rally – The Volunteer Hall, St John's Street, Galashiels. OT 11am. TS, B&B, C. Jim, GM7LUN, 01896 850 245.

6 / 7 NOVEMBER 2004

18th North Wales Radio, Electronics & Computer Show – [www.nwrrcw.org.uk]

7 NOVEMBER 2004

24th North Devon Radio Rally – G8XMI, 01409 241 202.

14 NOVEMBER 2004

Kempton Park Rally – Paul, M0CJX. [m0cjx@ntlworld.com]

SOUTH YORKSHIRE REPEATER GROUP Great Northern Hamfest – Ernie, G4LUE, 01226 716 339 or 07984 191 873.

4 DECEMBER 2004

ROCHDALE & DARS Traditional Radio Rally – John, G7OAI, 01706 376 204 (eve), radars@mbc.co.uk [www.mbc.co.uk/radars]

5 DECEMBER 2004

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

21 - 23 JANUARY 2005

CONTEST CLUB FINLAND 10th Anniversary – [www.qsl.net/ccf/]

6 FEBRUARY 2005

SOUTH ESSEX ARS Radio Rally – Brian, G7IIO, 01268 756 331 or briang7iio@yahoo.com [www.southessex.ars.btinternet.co.uk]

15 MAY 2005

MIDLAND ARS Drayton Manor Radio & Computer Rally – Norman, G8BHE, 0121 422 9787 or 07808 078 003, nlgutteridge@aol.co.uk [www.midamradio.co.uk]

5 JUNE 2005

SPALDING & DARS Annual Rally – Ambrose, M0DJA, 07989 636 520, or John, 07946 302 815. [www.sdars.org.uk]

RSGB MEMBERS' ADVERTISEMENTS

RSGB Members wishing to place an advertisement in this section should use the official form printed in *RadCom* each 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 callsigns and QTHR, provided their addresses in the current edition of the RSGB Yearbook are correct. RS members will have to provide their names and addresses or telephone numbers. Please include your town and phone number in the free boxes provided to assist readers. Advertisements will be placed in the first available edition. Please do not send members' advertisements to Manning Publishing Ltd (advertising agents). The closing date for copy is the first day of the month prior to publication, eg the deadline for the May issue is 1 April.

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. Members' Ads also appear on the members-only website: www.rsgb.org/membersonly/membersads***

The Member's Ads order form is published below. If members do not wish to cut the form out of the magazine, photocopies will be accepted, as will recent copies of the form from previous months, or recent copies of the carrier sheet. As a last resort, members may also send in their advertisements on seperate sheets of paper, but if you choose to do this, you must supply an accurate word count–and, of course the correct fee in the normal manner.

RSGB MEMBERS' ADS ORDER FORM

Application form for one For Sale, Exchange or Wanted advertisement. Do not mix classifications on this form; seperate applications must be made.

Please ensure you read and understand the conditions of acceptance of these subsidised Members' Advertisements, printed at the top of the Members' Ads page of Radcom

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Copy to: Chris Danby, Danby Advertising, 299 Reepham Road, Hellesdon, Norwich, NR6 5AD
Tel: 0870 904 7377 Fax: 0870 904 7378 E-mail: adsales@rsgb.org.uk

Payment to: RSGB, Lambda House, Cranbourne Road, Potters Bar, Herts, EN6 3EP

FOR SALE

ISOLATED INTERFACES For PSK-SSTV-RTTY-WSJT-CW. Suitable for SOUNDBOARD PROGRAMS. INTERCHANGEABLE LEAD MODELS AVAILABLE. Also NEW CW model. Registered with PAYPAL. See www.g3liv.co.uk
johnny@melvin.com
Tel 0191 2843028

YAESU FT-897 Multimode 100W HF-UHF Portable / Base Rig including LDG897 Auto ATU and 2 No internal Nicads / charger and High Sierra Side Kick Magmount HF motorised Antenna. £900.
Tel: 0151 677 7757 (Wirral).

KENWOOD TS930S Org, Box, Service manual. Ex condition, £500 FT290R with MM144/30 linear amp £100 Tel 01484 654650

FIBREGLASS TUBE High strength tube, square box, rod, and other sections all from stock in 6m lengths. Engineered Compositions, Chester. Tel: 01244 676000
e. barbara@engineered-composites.co.uk
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The last word

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Be proud of your M call

From: David Barlow, G3PLE

For many years there has been a form of apartheid and animosity between holders of various classes of licence. At one time it was Class A versus Class B, now it seems that the M3 operator is being picked on. The history of callsigns should put matters into perspective. Until 1909 stations had two-letter callsigns, eg Lizard was LD. When the Post Office took over the control of wireless coast stations in 1909 three-letter callsigns came in and Lizard became GLD, but the Marconi stations had the prefix M and Poldhu was MPD and the *Titanic* MGY. Government stations had the prefix B (Whitehall radio was BVG) and a typical amateur callsign would be 6WY; later the letter G was appended to the front of the callsign.

The allocation of callsign prefixes in the UK is either G or M as a result of this history. One hopes that M callsign holders are proud of the fact that the M stands for Marconi and, regardless of the number that follows the prefix, we need to remember that we all had to learn the basics of our hobby and it is up to the more experienced to offer help and guidance.

While looking at QSL cards and callsigns dating from the 1920s I noticed that some use "73" and others "73's", so that discussion has probably been going on for over 73 years! Perhaps this is another area where a little tolerance is required?

Packet still surviving

From: Keith Burrows, G0OZK

The article 'Packet Radio - Still Surviving' ('WWW', *RadCom* June) attracted my attention partly because I still use packet radio to keep in touch with a friend who is rarely in the shack at the same time I am, but mainly because I would very much like to see the BBS system back to how it used to be, probably something over five years ago. How time flies!

I believe packet radio does have a niche and it is the BBS system in a more fundamental form. I really liked being able to send out help bulletins, for example, and be fairly sure someone around the country would reply with the answer or point me in the right direction. Sadly, in this area at least that wonderful and very helpful niche is a thing of the past.

Certainly, more recent attempts (about a year ago) to see if help could be obtained via the cluster BBSs brought no answers to help bulletins at all. So, can the various network organisers be shamed, by way of these columns, into linking all the AX25 BBSs together - via real nodes if need be, not via Internet links? If so - and assuming there are large chunks of the old BBS network left in different parts of the country - then packet radio might really survive and even thrive once again.

Look forwards, not back

From: Tim Beaumont, M3SDE

Thanks for an excellent issue of *RadCom* in July! The DXpedition stories from Rodrigues Island, 3B9C; Åland Islands, OH0; Malawi, 7Q7MM; Banaba Island, T33C; GX4NOK/P on Farne Islands and the Summits on the Air were all excellent articles, well written and showed the real spirit of the radio hobby today! Please, if these type of articles come in, I for one want to read them in *RadCom*. Please remember not all radio hams are into building VFOs, tuners and crystal sets: I am not knocking those that do, but there is more to 'self training' in radio than 'Technical Topics'. The article from the North Wakefield Radio Club was a great example of this, with their learning of actual radio operation, logging and behind the scenes work. Certainly in the earlier days of radio, learning how to build a radio set was all-important as equipment was not as affordable as it is today or as widely available to the consumer.

There is far too much looking back to the old days and at a time when I am reading articles on 'how can we attract new blood into the hobby?' I see that we are missing the perfect opportunity to encourage the public to join our hobby. We need to shift from the technical and mathematical side of the exams to more on air-training and the practical side.

These are not only my thoughts but the thoughts of many of my friends I speak to who would dearly love to be into amateur radio but who have no desire to build circuits and learn mathematics. We live in a changing world and amateur radio has just taken a big jump from being 40 years plus behind the times, but has a long way to go to really join the 21st century.

Above and beyond

From: Ian Tough, G0IHK

Whilst I do not normally single out a trader for praise, I have to relate my recent experience with Strikalite in Burntwood, Staffs. On Monday last at 1600, I sent a dead battery pack from my ageing 2m handheld to Strikalite. At 1000 on Tuesday, a gentleman rang me with a very reasonable quote for replacement of the cells and, if agreed, requested approval to proceed. Having given the necessary approval, you can imagine my surprise when the new battery pack arrived in the post at 0815 on Thursday of the same week. This means that the whole process only took three and a half days, including postal time. 'Hats off' to Strikalite (and the Post Office!) for a remarkable service.

From: Douglas Maxwell, GM0ELP

After being given many bad 'on air' reports from my Yaesu MD-100 base microphone, I contacted Yaesu technical support via their website link asking what the problem could be and where I could purchase a replacement element, if this was found to be faulty. I was contacted within a day and asked for my postal address and offered a new microphone stick free of charge. Three days after the initial contact e-mail, I was in possession of the replacement part and have since been given many unsolicited complimentary audio reports. Well done Yaesu!

Coherent CW

From: Peter Lumb, G3IRM

Coherent CW is an excellent method giving almost perfect copy under very poor conditions and deserves to be more widely used. Ever since the late Ray Petit, W7GHM, wrote his article in 1975 describing a better way to use CW, I have been interested and have tried on many occasions to get other amateurs to use this method of communicating but, I must confess, with little success. A new computer program to send and receive CCW as well as CW has been introduced by Mike Masterson,

WN2A. It adheres closely to the original Petit system and can, in fact, receive code sent by the original hardware. I know because I have tried it.

To run the program (at least) a 166MHz Pentium computer is needed with 32MB RAM and 14MB HDD. The usual sound card and a parallel port are also needed. I would be interested to hear from anyone who is prepared to give the new program a try. The software is called CWLab02 and can be downloaded from www.qsl.net/wn2a/cwlab02.htm As the program is rather large I can supply it as a CR-ROM on request (Peter Lumb, G3IRM, 2 Briarwood Avenue, Bury St Edmunds, Suffolk IP33 3QF; plumb@clara.net).

Unusable radios

From: Paul Godolphin, G4XTA

I strongly concur with the comments of G8MOB ('The last word' June 2004) regarding the unwelcome complexity and 'user-UNfriendliness' of currently available radios, especially those of the major Japanese manufacturers. I am currently involved in the fruitless search for a couple of basic 2m / 70cm dual-band mobile sets for my car and shack. Having tried the offerings on the market today I am humiliated to admit that I am unable to operate any of them. And yet I have been in the telecommunications business for 20 years, and in my career as a radio officer have programmed, fitted and operated many complex multi-mode multi-role sets, in addition to the set-up and operation of substantial comms computer systems.

Today's sets have no intuitive functions, and the operation of their sparse multi-function and menu-driven controls is totally impossible whilst on the move, and painfully difficult even when sitting in the comfort of the shack armed with the 80-page manual supplied. After two days and over 20 hours spent with one model, I had to admit defeat and return it to the store, the 'radio' part having almost been added as an afterthought to what was otherwise a box of 'computer games'.

So while the connectors and cables in my shack and car hang empty, my money remains in the bank, and I become more frustrated. Sure, there's plenty of old radios to be had on the secondhand market, but I want new ones. Letters like this are appearing more and more often - why aren't the manufacturers listening? There's a market out here waiting to be satisfied!

D-Day memories

From: Dave Ramsden, G4YPV

Henk, F/PA0HFT/P, was recently working one heck of a pile-up on 40m from Juno Beach. Of course there was the usual ungentlemanly conduct especially from an EA3 who couldn't count when Henk asked for the 'Number 1 only', but all in all Henk did a fantastic job and did his best to work everyone. He was about to close the station when he managed to pull G0KTF out of the noise. It turned out that G0KTF had actually landed on Juno beach some 60 years before. They had a good 'ragchew' and Henk eventually signed, saying he would send his QSL card direct. What a way to finish off a hard day of working the pile-up. I think both stations should be congratulated for what they had done, albeit some 60 years apart.

From: John Allison, G0LYY

I found Pat Hawker's memories of D-Day (*RadCom* June 2004) fascinating, compared with mine. Our Engineer Leader on 101 Squadron had made himself unpopular by suggesting that we in Bomber Command were having an easy war. On D-Day he was right. Our job was to patrol over the Pas de Calais (not Normandy) at maximum height, jamming all German VHF with our ABC equipment. My job was to keep switching from Base to HQ Bomber Command (A7Z) at short intervals, passing on any coded messages received from the latter to Monty, our Special Operator, who was doing all the jamming, sat in front of a CRT trace and three bulky transmitters.

It was a long night, and an uncomfortable one as we were flying above great piles of cumulus, and the up draughts tossed us about like corks. In the photo of our Ops Board for that night in 'Bomber Squadron at War' I was amused to see noted for one of the other aircraft "W/Op sick". He wasn't the only one! But no flak, no fighters, no searchlights! Immediately afterwards, having completed 20-odd trips, we were sent on leave. Yes, for us it was an easy war on 6 June 1944. Not so afterwards, but that's another story.

Kenyan school club

From: John Michino,
Starehe Boys' Centre, Kenya

I was very grateful for the *RadCom* magazine you sent me. I received it very punctually; to be precise it was just three days after my request. The magazine is a very valuable asset for our club. It enables us to know the latest developments in the radio transmitting field. I take this chance to congratulate you for your help to members and also for making sure that every month there is something worthy to see. How I wish in Kenya we had such facilities. I wish the company all the best in its endeavours.

The club is gaining members at a higher rate since more students are being encouraged to join. Always be sure that we are very interested and appreciate the work that you are doing.

Take a bow, Frank!

From: Keith Wells, M0WAC

Through the pages of *RadCom* I would like to request that Frank Whitehead, G4MLL, who devotes hours to training prospective people in our hobby, not only in the distant past but also in the present day, receives recognition for his work. Frank has been responsible for hundreds of new faces being trained into our super hobby. He has taught in the local technical colleges during the evenings (I was one of his pupils) and now he freely gives his precious spare time in our local club, the Nunsfield House Amateur Radio Group, in Derby to teach the Foundation, Intermediate and Advanced courses to all who wish to take part in our hobby. His success rate over the years must be very high but Frank is a modest man and never brags about such things. Never in all the years have I ever heard him 'talk down' to anyone or make them feel small. This is a super outlook on life.

If anyone deserves a mention 'in despatches' Frank certainly does. So please do just that for me and also say many thanks from my wife Mavis, who has recently received her brand new Intermediate callsign, 2E0WHO. Thank you Frank!

Free licence anomaly

From: Richard S Gibson, G3JAX

Could the RSGB or Ofcom explain why someone aged 75 should have a free licence? A person could get a licence after passing the exam at, say, the age of 71 and four years later not pay anything further. I do not understand the logic behind this offer. I have been licensed since 1953 so have paid up for 51 years, so if anyone deserves a free licence surely it is those amateurs that have been paying for 50 years plus?

Perhaps Ofcom could do something about this anomaly?

[It is government policy that all over-75s receive free licences. The amateur radio licence simply falls in line with the TV licence - *Ed.*]

Another warning

From: Trev Harris, G2KF

Yes, it's me again with yet another word of warning to everyone about releasing equipment without allowing time for the cheque to clear. Don't.

Also, about trusting the word of anyone, including amateurs. I recently had a conversation with a PA2 who assured me he would purchase some equipment from me and, true to my word, I sent it to the main dealer to check and confirm its condition, at my expense, on the understanding the Dutch operator would then buy the equipment. The bottom line is he did not, as agreed, keep his word - so buyer and seller, be on your guard.

Haggling

From: G Mack, M0CUS

I recently attended the local Drayton Manor radio rally. I was not looking for anything in particular but one or two things did catch my eye. Never one to miss a bargain, I love haggling and bartering with the traders, most of whom take no offence whatsoever when you ask for a discount. But I was surprised at the attitude of one small stall holder who was selling a 10-year old Fluke 77 multimeter which was uncalibrated and untested. When it was put to him that I would offer £50 instead of the asking price of £65 instead of a friendly "no thanks" I get a very rude rebuff and told the unit was worth £400. I checked the RS catalogue and they stock them at £163 (that's brand new). I dare say with a bit of shopping around I could have got it cheaper.

So should you haggle at rallies? Well, I certainly will and I will also point out the attitude of that small stall holder to everyone I talk to and as this hobby is about communications it ain't difficult to get a bad name. Next time remember a friendly "no thanks" would have done. I might have even paid the £65.

EXCC?

From: Ray Howes, G4OWY

Just an observation: will we be making E-100 certificates for making e-mail contact with 100 countries soon?

Signal reports

From: Walter Blanchard, G3JKV

Isn't it about time we relegated RST reports to where they belong - the dustbin? 'T' is irrelevant now we all use synthesised transceivers, 'S' depends on how clever we are with our aerial tuner and whether we've activated the preamp to 'out', 'Stage 1' or 'Stage 2', and 'R' is so subjective as to be meaningless. The other Sunday morning I was listening at the high end of 80m to a number of Gs attempting to work ZL and W7. Quite a few of them needed four, five or even six repeats before they got everything right but nonetheless they were handing out '5 and 9' all round. '5 and 9', for those who have forgotten, means "perfectly readable with extremely strong signals". The report I would have given would have been "barely readable, occasional words distinguishable, very weak signals". In other words '2 and 2'. I heard somebody some time ago trying to justify it by claiming they *were* "extremely strong signals" *for a ZL*, but, frankly, come off it, chaps! Contest logging programs don't help very much by automatically inserting '599' unless you change it, nor do those contests actually requiring the entry of '599' regardless.

What's the point of it? Surely we should drop the 'S' and 'T' nonsense entirely and just give an honest 'R'? On a new simplified scale of course. "No trouble" = R3; "Having a bit of a problem" = R2; "Only getting the occasional word" = Rl. If the contesters want something more, then they should adopt a random number exchange system. The RSGB could make a start by banning the exchange of anything except 'R' in all its contests.

Don't confuse spec for product

From: A Malcolm, G8DEC

Why oh why do so many fall into the trap of confusing a specification for the actual product? I see all manner of 'things' called PL259 which could hardly be called 'UHF' compatible. The spec was early American military for a version of the UHF plug part of the series designed by Quakenbush in the 1930s. I certainly wouldn't use any of the bright shiny objects available at rallies for under a pound! Some can even be picked up with a magnet! A more satisfactory UHF plug is the silver plated brass variety with the appropriate sized pressure sleeve braid clamp (Greepar).

Similarly the description of all series data connectors as RS232. The vast majority come nowhere even close to this recommendation. Even at the most basic level it is not RS232 unless it is a 25-pin 'D' connector. This apart, the average PC's serial port would be quickly 'killed' meeting the many parts of the recommendation.

Finally Ian White's "Good Enough" connections may be good enough for him but this is not a race, we don't have a target to meet and our labour comes free. Carefully sleeving all wires with particular attention to strain relief should be of prime importance. The ability to solder cleanly without any suspect joints comes only with a great deal of practice and good tools.

As an old GPO (telephone) engineer I was using a gas heated iron, cutters and '81s' to terminate more wires on blocks than I care to mention and, as a 'youth', anything less than perfect had to be done again! Nowadays the trusty Weller TCP iron for most purposes can hardly be bettered. ('81s': the name goes way back in GPO history for a pair of fine, long nosed box jointed pliers.)

Rainwater gutter antenna

From: Paul Winfield, G0WRT

I have recently replaced my old PVC rain water gutter with the seamless aluminium type. Having read Jack's, WM0G, article in *QST* regarding his success with tuning his gutter, I thought that this would be an ideal opportunity to have a go myself. The gutter would form a 168ft horizontal loop, the new fall pipes were PVC so they would not affect the new loop. I asked the installers to leave a 1.5in gap in the gutter in the middle of one length, fitting cap ends to stop the water leaking out. (They were slightly amused why I would want to pay for a continuous gutter system and then ask for a break in the middle!) I connected my SG-237 autotuner with two short lengths of flexiweave to the internal gutter brackets, either side of the gap, via self tapping screws and - hey presto! - the 237 tuned the loop on all HF bands. The 40m band is the most impressive, producing 59+20 daytime reports from all four corners of the British Isles, using only 30W! It certainly provides a great conversation point when in QSO.

Log book tip

From: Tony Ward, M3TOE

Don't know if this will be of interest, but it is a cheap handy tip that I use and thought I would pass on. When I'm out mobile or portable and even at home I use a road atlas of the UK and Europe for a log book - as well as my official one of course. The maps that I use are found in the pound shops for, well, a pound!

When I contact a station I write their call directly on the relevant page - on their location - and the day, date, signal strength, time, comments, just like in the official log, but with 'contours'. The next time I speak to that station, it's a little easier for me to recall them having the map to jog my memory.

Try it, it works. It's a handy help and an interesting lesson in geography too.

The ballad of negative frequency

From: Stewart Rolfe, GW0ETF

While engrossed in a book on DSP
I discovered a concept quite new to me.
I was asked to believe there could actually be
Such a thing called Negative Frequency.

Just like the grin on the Cheshire Cat,
The root of minus one and things like that,
I struggled for hours deep in thought
To imagine those signals on the wrong side of nought.

Revisit the sine wave I decided to do,
to dispense of old ideas and begin anew.
Then to my delight and in a flash of blue
I realised a carrier was not one signal but two!

A sine wave is a projection on the 'Axis of Reals'
of two spinning phasors rotating like wheels.
The one anti-clockwise is the positive tone
Normally accompanied by its opposite clone.

Spinning backwards through time at identical rate,
It's a cause of confusion and figure of hate.
Seemingly superfluous, a theorist's dream
But its place is crucial in the sinusoid scheme.

It explains modulation and the relative phase
of quadrature signals in the DSP maze.
It explains two sidebands from a single tone
And Single Sideband from phasing alone.

So next time you cough then press PTT
Think hard and long and you won't fail to see,
That the RF you're squirting from that G5RV
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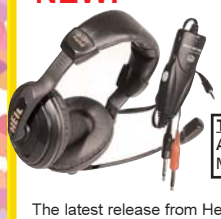
PRO-SET-4	Large H/phones with HC-4 element	£109.95	B
PRO-SET-5	Large H/phones with HC-5 element	£109.95	B
PRO-SET-IC	Large H/phones with ICOM element	£124.95	B

QUIET PHONE HEADSET £189.95 B

NEW!



Pro Set Quiet Phones

* HC-4, HC-5 or Icom elements.
* Noise cancelling on/off
* PTT button
* Phase reversal switch

Transceiver interfaces: (8-pin)
AD-1 Yaesu, Kenwood or Icom **£16.95**
Modular types **AD-1M £16.95**

The latest release from Heil, a traditional boom-mic headset with headphone acoustic noise cancelling to exclude outside noises and phase reversal to improve the received image heard between head pieces.
PSQP-4 (DX) mic capsule **£189.95**. **PSQP-5** (normal)capsule **£189.95 PSQP-IC** (Icom) **£199.95**

SM-1 SHOCK MOUNT £44.95 B

This shock mount decouples the microphone from the boom and prevents vibration noises. The mic is suspended in an 8-point nylon band and comes with the standard 5/8in - 17mm fitting.

HEIL GOLDLINE HAND MICS

PRICES DOWN

Goldline professional quality dynamic microphone. Three versions available, GM-4 with Studio & HC-4 elements, GM-5 with Studio & HC-4 elements and GM-V Vintage Goldline with Vintage Studio high impedance element, for older valve rigs such as Drake & Collins. Includes stand threaded holder.
Requires CC-1 adaptor £29.95 A.

GM-4	Goldline HC-4 hand mic	£109.95	B
GM-5	Goldline HC-5 hand mic	£109.95	B
GM-V	Goldline Vintage Hi-z hand mic	£129.95	B

TB-1 MATCHING DESK STAND

£23.95 A

This smart desk stand perfectly matches the HM stick series of microphones. Base diameter is approx 120mm and total height of stand is approx 110mm.

HEIL CLASSIC DESK MICS

PRICES DOWN

The Heil Classic studio quality microphone, exact replica of the 1930's RCA 74B type of broadcast microphone. Inside it has the benefit of modern technology. Two inserts are provided, one for broadcast studio quality and a choice of one other Heil insert. Includes base stand, soft-touch PTT back panel switch and cover for microphone. Requires CC1 adaptor.

HCL5	Classic retro-look HC-5 desk mic	£199.95	B
HCL4	Classic retro-look HC-4 desk mic	£199.95	B
HCLic	Classic retro-look IC desk mic	£199.95	B

CB-1(H) MATCHING DESK STAND

This desk stand has been designed specifically for the Heil Classic & Heritage microphones.

PRICE DOWN £49.95 A

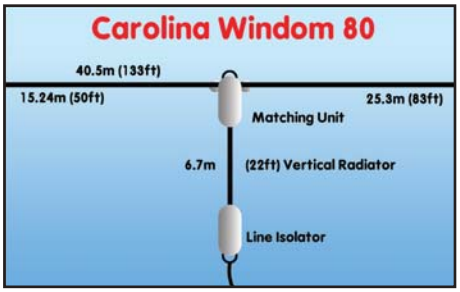
FS-2 PTT FOOT SWITCH

Ergonomically designed to require less effort to operate. The hinge is under your heel instead of away from your foot. It can control two devices from a single operation.

£39.95 B

RADIOWORKS CAROLINA WINDOMS

CW-160	160-10m 76.8m long	£129.95	C
CWS-160	160-10m 40.5m long	£119.95	C
CW-80	80-10m 40.5m long	£89.95	C



CWS-80	80-10m 20.1m long	£109.95	C
CW-40	40-10m 20.1m long	£84.95	C
CW-20	20-10m 10.36m long	£89.95	C
CW-620	20-6m 9.7m (32ft) long	£89.95	C
G5RV PLUS	80-10m with balun 31m (102ft) long	£59.95	B
Baluns and Isolators			
T-4 Plus	Line Isolator1.8 - 54MHz 4kW	£39.95	B
T-4-500	Line Isolator1.8 - 30MHz 500W	£32.95	B
T-4G Plus	Line Isolator 1.8-54MHz + gnd4kW	£39.95	B
REM-BAL	Ladder line 4:1 balun 1.8-30MHz	£45.95	B
B1-2K Plus	1:1 current balun - for inverted V 's	£28.95	B
B4-2K	4:1 voltage balun loops/folded dipoles	£39.95	B
Y1.5K Plus	1:1 current Yagi balun 1.8- 54MHz	£39.95	B
Sundries			
KEVLAR	200ft 400lb strain guy line	£22.95	A
LADDER	450 Ohm ladder line - per metre	£0.90	A

SOTA-3 PORTABLE 2M BEAM & MAST

With the summer coming, here is the ideal portable Yagi for trekking. Weighing just 200g you get a complete package for "Summits on the Air" operation.

144 - 146MHz
9dBd gain
F/B 12dBd
Weight 200g

V. or horizontal
Fibre glass mast
5m coax
No bolts to drop!

bhi NES10-2 DSP SPEAKER £99.95 B

Combined speaker and programmable DSP unit. Offers dramatic noise reduction, even reduces annoying hetrodynes. 8 Ohms, 8 filter settings, 3.5mm plug, 12-24V DC

bhi NES-5 DSP SPEAKER £79.95 B

Combined speaker and fixed setting DSP unit. Offers same dramatic noise and hetrodyne reduction. (Formally NESCB) 8 Ohms, 3.5mm jack plug, 12-24V DC 500mA

WATSON HP-100 HEADPHONES £19.95 B

Excellent lightweight communication headphones with tailored response ideal for the modern tranceiver or receiver.
**8 Ohms 200-9,000Hz *Adjustable headband *3.5mm stereo plug *1/4" stereo adaptor.*

WATSON HP-200 HEADPHONES £22.95 B

Superb headphones with tailored response for radio comms. Excellent sound proofing, can pull in the weak DX.
**Mono 8 Ohm 200-10,000Hz*
**Padded Ear pieces *3.5mm stereo plug *1/4" stereo adaptor.*

SGC SPECIAL OFFER

Buy an SG-2020 or SG-2020ADSP transceiver with any SGC Coupler (except SG-239) and receive a *FREE* SGC Multimeter (worth £19.99) *PLUS* £30 (inc Vat) *OFF* the price of the pair.

SG-2020 £499.95 C
1.8-30 MHz 1W-20W

SG-2020ADSP £589.95 C
1.8-30 MHz 1W-20W + DSP

PRICES DOWN!

SG-237 Auto ATU

1.8 - 60MHz. 3 - 100W pep (40W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 300mA.

£299.95 c

SG-231 Auto ATU

1 - 60MHz. 3 - 100W pep (50W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 900mA.

£349.95 c

SG-230 Auto ATU

1.6 - 30MHz. 3 - 200W pep (80W CW). Min wire length, 7m. 50 Ohm feed. Needs 12V at approx 500mA.

£339.95 c

High Sierra "Sidekick" from USA

As featured in Radcom by G3LDO

New 80m-6m Hi-Q variable tune Mobile antenna.

Mounts on 3-way magnetic mount Handles 200 Watts

Supplied with cables and switch box - can run from cigar lighter.

£239.95 C

This fabulous mobile antenna is superbly constructed and offers extremely high efficiency. It will tune all bands from 80m to 6m, and being variable means the VSWR is always low. Designed to be mounted on our Watson **W-300T** 3-way mag mount (£39.95 B), you simply run the DC cable back to cigar socket and control tuning with the supplied switch. Approx tuning can be achieved by listening to received signals peak, and fine tuning is achieved by minimum VSWR. Works great with QRP as well! Typical VSWR 1.5:1. max height approx 1.37m.

WEB ORDERING
www.wsplc.com

PRICE MATCH

THE ONLY THING WE CUSTOMER SERVICE WON'T DISCOUNT

WATSON W-10AM PSU £59.95 C

One of our best selling power supplies due to its versatile spec.
**Output 0-15V DC, 10A*
**Over current protected*
**Dual meters *3 sets of terminals *Front panel fuse*
**Supply 230V AC 50Hz.*

WATSON W-25SM PSU £79.95 B

Very popular budget switch mode power supply. **Output voltage 13.8V DC *Output current of 22A (25A peak) *Front panel output terminals *Over current & voltage protection *Quiet operation*

WATSON W-25AM PSU £89.95 C

DC power supply for the shack & esp. for use with 100W transceivers. Separate voltage and current meters. **Output voltage 0-15V DC *Output current of 25A (30A peak). *3 sets of output terminals *10A cigar socket. *Over current protection*

WATSON W-5A PSU £29.95 B

DC power supply for the shack and low power QRP transceivers. **Output voltage 13.8V DC *Output current of 5A (7A peak) *Front panel output terminals *Over current protection*

MANSON EP-925 PSU £99.95 C

A general purpose 3-15V DC, 25A (30A peak) power supply able to provide the needs of the modern 100W HF transceiver. *Dual analogue meters *Over current protection *Large power terminals for rigs *Quick snap connectors for ancillaries

AVAIR VSWR Meters PRICEMATCH

AV-200 £49.95 B

Ideal for HF and VHF operation. It features high power handling up to 400W * 1.8-180MHz * 5W, 20W, 200W, 400W * Av or PEP

AV-400 £49.95 B

Ideal for VHF and UHF operation. It features high power handling up to 400W * 140-525MHz * 5W, 20W, 200W, 400W * Av or PEP

AV-600 £69.95 B

Two sensors used for HF and VHF/UHF operation. * 1.8-160MHz, 140-525MHz * 5W, 20W, 200W, 400W * Av or PEP

NEW SGC Master Antenna Controller

MAC-200 £339.95 C

* Automatic ATU
* 1.8-60MHz
* 5-Way Selector
* Coax or Balanced
* Long Wire

The MAC-200 will work with any HF transceiver up to 200W output. It has 3 outputs for coax and one each for wire and balanced - all switch selected. 168 revolving memory bins lets it remember for quick QSY. With an impedance range from 2 - 5000 Ohms, and built-in VSWR and power metering, it is all you are ever likely to need! Requires 12V DC.

WEST MOUNTAIN RIGBLASTERS

RIGblaster pro	Data interface 8-pin/mod, Cd & cables	£209.95	B
RIGblaster Plus	Data interface 8-pin/mod, Cd & cables	£119.95	B
RIGblaster M8	Data interface 8-pin, software & cables	£109.95	B
4T8-KIT NEW	Conversion Kit from M8 or Plus to 4pin	£19.95	A
RIGblaster nomic8P	Data interface 8-pin, software & cables	£59.95	B
RIGblaster nomicRJ	Data interface RJ, software & cables	£59.95	B
FT100-CBL	Adapts all units to FT100 input	£12.95	A
RB-CD	Standard RIGblaster program CD	£9.95	A

FREQUENCY COUNTERS

WATSON

The **FC-130** is an ideal frequency counter for the shack, mobile or portable use. Supplied complete with Ni-Cads, charger and telescopic whip.

Super Searcher	RF finder & freq. cnter 10MHz-3GHz	£99.95	B
Super Hunter	Frequency counter 10Hz-3GHz	£149.95	B
Hunter	Frequency counter 10MHz-3GHz	£49.95	B
FC-130	Frequency counter 1MHz-3GHz	£59.95	B

OPTOELECTRONICS

Top-of-the-range product from Optoelectronics, the **X-Sweeper** is a fully featured nearfield receiver that displays frequencies analogue signals in spectrum format on a 64x128 graphical display. It has 20 memory banks storing 100 freqs in each.

X-Sweeper NEW	Nearfield Receiver 30MHz-3GHz	£1399.95	C
Xplorer	Freq. cnter / CTCSS/DTMF decode	£659.95	B
Digital-Scout	Digital Freq. counter 60MHz-2.6GHz	£429.95	C
Scout	Freq. finder 10MHz-1.4GHz	£299.95	B
M1	Freq. cntr 50Hz - 40MHz	£229.95	B
M1-TCX0	M1 + temp controlled crystal oscillator	£249.95	B
Cub	Mini counter 1-2.8GHz	£129.95	B

Coax Switches

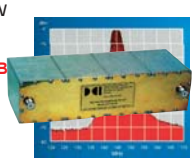
CS-600 2-way coax switch rated over 1kw (HF) and up to 600MHz @100W. Fitted SO-239 sockets. **£12.95 A**

MFJ-1704 4-way coax switch rated over 1kw (HF) and up to 600MHz @100W. Fitted SO-239 sockets. **£69.95 A**

DCI High Performance Bandpass Filters

Razor sharp VHF & UHF filters

Simply place in antenna feed and clear up reception problems related to strong out of band signals. These are commercial grade filters with up to 68dB rejection.



DCI-145 2M Band Pass Filter. 200W handling. -68dB @ 136MHz, -55dB @ 155MHz. SO-239 **£99.95 B**
DCI-145-2HN "N" sockets **£109.95 B**

DCI-435 70cm Band Pass Filter. 200W. -47dB @ 415MHz, -50dB @ 455MHz. "N" sockets. **£119.95 B**

W2IHY 8-Band Graphic Equaliser NEW

The W2IHY is an 8-band graphic equaliser, plus noise gate specifically designed with radio communications in mind. The graphic equaliser covers 8-bands between 50Hz and 3200Hz - the typical range for SSB. This enables you to finely adjust the audio response to improve your mic and match your radio.

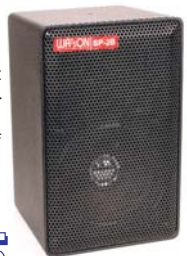
8-Band Graphic Equaliser (Bands below)
59/100/200/400/800/1600/2400/3200Hz
Noise Gate (adjustable level/delay)
Mic input impedance 200/600 Ohms or High
Headphone monitor
LED level indicators
Input: 8-pin, phono or XLR
Straight through options
Supply: 12V DC
DC cable included
Size 207 x 70rear/40front x 130mm
Weight 750g

Output leads for Yaesu, Kenwood or Icom £19.95

£229.95 C

NEW New Tailored Audio Base-Station Speaker

Designed for radio communications and speech. This heavy duty unit is built into a black cast alloy case and has a tailored frequency response which is ideal for SSB. It matches the colour of branded HF transceivers and is supplied with 3.5mm lead.
Size 12W x 18H x 11D cm.
Weight 0.85kg.



SP-2B **£29.95 C**

New Graphic Equaliser & Mixer UB-802a

Dual Mic graphic equaliser with dual **variable 60dB preamps** plus 2 x mon/stereo line inputs.Configure to adjust adust both tx & rx audio and monitor both through phones. Professional quality features low-mid-hi, tape in/out, 1/4" jack and XLR sockets, 48V for condenser mics etc. **Plus FREE AC adaptor.**

£54.95 C

In/out adaptor sets for 8-pin mics: K-802, Y-802, I802 £16.95

WATSON NEW W-25XM £99.95

Carriage £10

New compact, variable voltage, switch-mode power supply. About the size of an IC-706, this hunky low-noise supply will power any 100 Watt transceiver. Weighing just 1.65kg it operates from either 230V or 115V AC.

**9.7 - 17V DC (13.8v notch)*
**Input 230V or 115 AC*
**25 Amps peak*
**22 Amps continuous*
**Fan cooled*
**Dual output terminals*
**Dual metering volts & current*
**Over voltage & current protect*
**Removable AC lead*
**Illuminated metering*
**Protection warning light*
**1.65kg 170w x 180d x 65h mm*

HF EXCITEMENT

INTRODUCING YAESU'S ALL NEW HF MOBILE

Blending leading-edge technologies developed on the FT-897 and MARK-V FT1000MP transceivers, the FT-857 is the world's smallest HF/VHF/UHF Multimode Transceiver, and it's available now!

FT-857 DESIGN HIGHLIGHTS

The FT-857 is a high-performance, ultra-compact transceiver operating on the 160-10 meter HF bands, plus the 50, 144, and 430 MHz VHF/UHF bands. Providing 100 Watts of power on HF/6 meters, 50 Watts on 2 meters, and 20 Watts on 70 cm, the FT-857 is ideal for mobile, vacation, DX-pedition, or home use when space is at a premium.

Utilising the renowned receiver performance of the FT-897 and MARK-VFT-1000MP, the FT-857 features wide dynamic range, optional Digital Signal Processing, and outstanding audio. (*DSP supplied as standard in the UK)

The wide array of convenience features includes a 32-colour display; Spectrum Scope; built-in keyer with memory and beacon mode; U.S. Weather Band reception; 200 memories with Alpha-Numeric labels; AM Aircraft reception; detachable front panel (optional YSK-857 required); and much, much more.

You've asked for it, and it's here today: the FT-857 New Mobile. . .from the engineers at Yaesu!

New Remote Control DTMF Microphone MH-59ABJ (Option)

The optional MH-59A8J Remote Microphone provides control of the major functions of the FT-857 from the microphone's keypad. The MH-59A8J includes a rotary control knob for adjusting the operating frequency and the receiver volume level.

HF EXCITEMENT

Actual Size

FT-857

ULTRA-COMPACT HF/VHF/UHF 100 W ALL-MODE TRANSCEIVER (HF/6m 100W, 2m 50W, 70cm 20W)

YAESU
Choice of the world's top DX'ers

YAESU UK Ltd, Unit 12, Sun Valley Business Park Winnall Close, Winchester, Hampshire, SO23 0LB, U.K.

For the latest Yaesu news, visit us on the Internet: http://www.yaesu.co.uk

Specifications subject to change without notice. Some accessories and or options may be standard in certain areas. Frequency coverage may differ in some countries. Check with your local Yaesu Dealer for specific details.