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# SWM

March 2004  
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& Scanning Scene

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**AOR's SDU5600**  
**Spectrum Display**

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03 >

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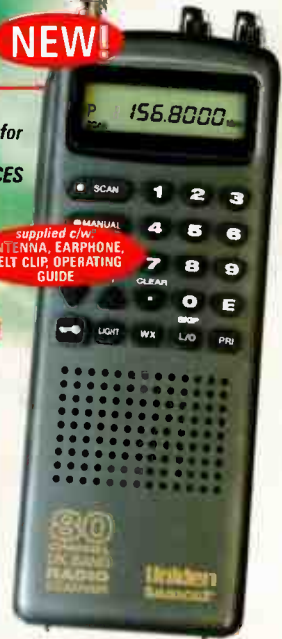


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## Features

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Kevin Nice takes a quick tour of the new AOR spectrum display unit. This development of the product line, features both a colour display and d.s.p. FFT processing.

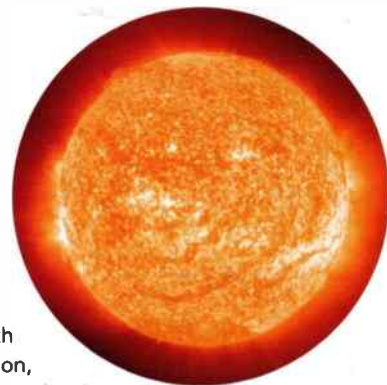


### 26 The 2004 SWM Listening Contest

Listen & Win! Following on from last year's successful event, the second SWM Listening Competition is to be held on Monday 3 May 2004. Turn to page 26 now to find out more.

### 27 Up, Up & Away!

Well-known ATV guru Giles Read G1MFG describes the construction and flights of two high-altitude balloon experiments carrying 2.4GHz TV transmitters up to the very edge of space.



### 36 Ol' Sol and Its Effect on Radio Propagation - Part 2

In the light of recent massive solar activity which had a very significant effect on radio propagation, here is a comprehensive run-down on the sun's mechanisms that effect radio communication here on planet earth. The late Joe Carr concludes his explanation.

### 42 The Dish

When a mere metre just isn't enough... Dave Cawley the Managing Director of Timestep Electronics Ltd. recounts his experience of arranging a 'large' dish to enable reliable reception of the new LRIT format transmissions.

### 45 Win An SGC ADSP<sup>2</sup> DSP Speaker Worth £119

Experience noise free listening with this very latest d.s.p. equipped external speaker, courtesy of Waters & Stanton and SWM.

### 71 SWM Club Listing

Are you alone with your radio interest? If you want to meet others with a passion for radio, then look no further. Use our comprehensive and most up-to-date guide to local clubs - now includes National and International Radio Clubs.



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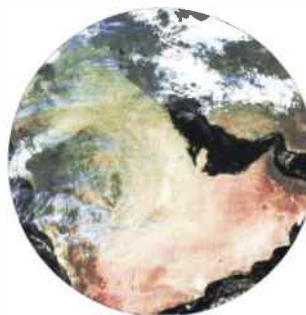
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cover subject: A very worthwhile successor in the line of Spectrum Display Units from AOR. Free MFJ catalogue courtesy of Waters & Stanton.



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Join in with the on-line action on the SWM Readers' E-mail Forum - send an E-mail to [swm\\_readers-subscribe@yahoogroups.com](mailto:swm_readers-subscribe@yahoogroups.com) to subscribe - don't miss the on-line action!

Share your thoughts

## Coming Up Next Month

*in SWM April 2004*

- PLT - When Technologies Collide!
- AOR's latest receiver - the AROne - Reviewed
- Project - The Acorn One Valve Receiver - Expanded
- Keep on top of the world of monitoring with SWM
- and much more...

\*contents subject to change

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# QSL

THE BEST LETTER WILL RECEIVE A £20 VOUCHER TO SPEND ON ANY SWM SERVICE.

**Is there something you want to get off your chest? Do you have a problem fellow readers can solve? If so then drop a line to the Editor at QSL, Short Wave Magazine, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.**

## Dear Sir

I'm writing to you in the hope you can give me some advice on an apparent fault I've got with a Yupiter MVT-5000 scanner. The radio has been in store for many years, though I recently dug it out to check a friend's wireless alarm system.

After much puzzling as to why we couldn't detect a signal, it turned out that the radio wasn't working. On powering up, the word 'Clear' appears briefly on the l.c.d. and a frequency of '144.0000' is then displayed (possibly what I was listening to all those years ago).

However, I'm now finding that despite being able to change the frequency, the receiver doesn't

pick up any signals at all. The Search & Scan functions appear to work, but just continuously scan, never locking onto anything. The entire display is also constantly flashing on and off, about once a second, which it never used to.

I get the feeling that a back-up battery has gone flat and having had a look inside, I did find a 0.22µF Goldcap capacitor, which I thought might be the cause, but replacing it has made no difference. Unfortunately, reading through the manual hasn't given me any clues either.

I wondered if this is a common problem with the scanner or just this particular model? Is there anything that can be done with it? I'd be very

## Dear Sir

As a long standing subscriber to *Short Wave Magazine*, I was very disturbed to read the letter from Ronald Evans in February's issue of *SWM*.

My immediate reaction (and indeed my girlfriend's first reaction and she is not even a radio buff), was that if Mr Evans is only interested in receiving his audio via the Internet and not by any sort of radio receiver, he is quite patently reading the wrong magazine and should buy a computer magazine instead!

I enjoy every single copy of *SWM* enormously and appreciate the vast array of topics covered from simple a.m. through utilities, n.b.f.m., digital and computer related material. I may be (only?) 38 years of age, but I always especially appreciate the historical aspects of broadcasting that are covered by your publications. There is nothing more interesting than reading about the personalities, characters, equipment, transmitters and stations of the dim and distant decades past.

I believe that it is important to learn of the history of radio so that we can better appreciate how the industry and technology developed to the point it is at today and what further developments may lead to. In this respect I think that it is a big mistake for your correspondent to ignore the historical aspects of a vast subject that is broadcasting and short wave radio.

Certainly the broadcasting world

is changing and I am sad that some of the international short wave broadcasters have disappeared. For me short wave radio has been a real education and the loss of some of these broadcasters leaves us all deprived of a rich source of information and entertainment.

Mr Evans may argue that much information is available on the Internet and perhaps many facts are, but reading some pages on the Internet can never be as involving nor entertaining as listening to (to take only one example) a fascinating programme broadcast on The Voice Of Turkey about coffee shops. The international broadcasters the world over have transmitted many thousands of typically fascinating programmes over the years and I still derive much entertainment from such programmes of social history.

Mr Evans also mentions that programming can be streamed on the Internet. Certainly it can and I have listened to such streams on my PC, however I am loathed to, and frankly it would be impossible to, relocate my PC from the office upstairs down into the kitchen to listen to these programme streams while involved in cooking or some other activity. I suppose I could buy a laptop and install a wireless network, but why spend £1500 when I can easily hear the short wave broadcasts on an inexpensive portable radio?

As for general domestic broadcasting at home, while I do not

grateful for any advice you can give.

**Bruce Phipps  
Evesham  
Worcs**

*Many thanks for your letter Bruce. I'm sorry to learn that your MVT-5000 is no longer working. I suggest you contact the importer of Yupiter radios - Nevada - as I'm sure they'll be able to help. I would be most interested in hearing from other readers if they have had similar problems with radios and what solution they found. - Ed.*

## Dear Sir

In your article on page 42 of *Short Wave Magazine*, October 2003, about coaxial plugs, you stated that PL-259 plugs were not very good above 100MHz, where a mismatch can be a problem, yet in sister magazine, *Radio Active*, August 2003, page 24 states that

PL-259 plugs are ok up to 500MHz with very little mismatch.

I have noticed in advertisements in magazines that antennas work up to 2000MHz are fitted with SO-239 sockets. Could you give a definitive answer to the use of PL-259 plugs and perhaps at the same time give a list of suitable coaxial cables with their parameters that can be used.

**M. Shornson  
Ayrshire  
Scotland**

*My research, which includes Amphenol's own data, indicates that what I stated in *SWM* October is the correct situation. As for coaxial cables, I'll look at them in the near future in 'Ed's Shack'. - Ed.*

## Dear Sir

Just a few words about your terrible logo. I could not find your

have the Digital Terrestrial TV receiver that Mr Evans mentions, I do have Digital Satellite TV and I know that many domestic radio stations are available via DSAT, however I never use DSAT for listening to radio due to those same portability issues that effect radio listening via a PC. I certainly cannot carry the DSAT receiver into the kitchen or bathroom and I don't want to either.

While the television is on and being watched in the lounge, I can listen to a portable radio in any other room. Additionally, I find the trouble of having to turn on the television to scroll through the DSAT menus to find and select a radio station and turn on a hi-fi amplifier to hear the audio, then turn off the television again to be an inconvenient performance not worth bothering with when all I want to do is hear the sports commentary or 'phone-in programme. I can quickly switch on and tune in a £20 'tranny' for all that - which is far more practical and sensible!

So we come to DAB. Now that the long wave, medium wave and v.h.f./m. bands are effectively full and can accommodate no further stations, DAB is the ideal way to expand future domestic radio broadcasting. It is eminently portable, quicker and far easier to use than any other type of radio delivery system and offers very good sound quality, much better than a.m. and free of the hiss and crackles and pops that

can effect f.m. reception.

Mr Evans mentions that the sound quality is not as good as Band II v.h.f. f.m. broadcasting and I have to admit that that can be the case when comparing a 128kb/s stereo DAB station with a good broadcast on f.m. via a high quality hi-fi tuner. However, given the good bit rates (160 - 192kb/s) offered by Classic FM, Virgin Radio and Radio Three, the sound quality is more than acceptable through a hi-fi system and has the additional advantage of significantly lower audio compression, such as the awful Optimod so heavily used on f.m. I use an Evoke 2 for portable use and this offers truly amazing audio from its built-in ported hi-fi speakers even on the lower bit-rate local radio stations - I am still amazed that a portable radio can sound so good every time I switch it on!

DAB seems to me to be an ideal portable digital radio medium, but I think it should be used to expand choice, rather than to simply replace the existing a.m. and f.m. bands and certainly 'squashing' too many stations into each DAB multiplex will have a very detrimental effect on sound quality due to lower bit-rates that would then have to be employed.

The downside of DAB is that the listener will really only hear those stations that the authorities, (the government and Ofcom), deem that they want you, the listener, to hear. Since each block of frequencies is re-

magazine and neither could the shop assistant, then I saw a logo I thought said *SWM*, but it was a swimming magazine. All magazines have large logos, telling you what they are selling, i.e. *What Camera*, *Record Collection*, etc. You are not going to get new readers interested in radio if they go to WH Smiths and see your 'swimming' magazine.

**G.S. Davill  
Hull**

#### Dear Sir

With reference to the Top QSL in the February edition of *SWM* where Ronald Evans brings up a few points in his well written letter, may I please scratch a few lines in reply.

Firstly, as one who regularly passes Rampisham, I had never looked at the antenna farm as a thing of beauty before. I now look at it in a new light! I also looked at the article referred to as a light hearted read amongst technical reviews and satisfactory frequency listings, etc. Quite a lot of these are of interest to me, but for a broad

coverage magazine I wouldn't expect everyone would want to read every article.

When I come home from work, feed the dogs, feed myself, sort out problems and whatever, the last thing I really want to do is mess about with computers. I was browbeaten after Christmas by my fellow Radio Club chums to get connected to the Internet, but so far, having being installed, I've not mustered enough enthusiasm to explore with it. My main interests are s.w.l., scanning and h.f. comms. I have an Optocom scanner connected to the computer, an Icom IC-718 and an IC-2725E dual-band f.m. transceiver in the shack and downstairs (next to the fire) a Bearcat 9000XLT for local interest and, perhaps, most loved of all, a Drake SW8 h.f. receiver.

With a glass or two of Nelsons Blood in one hand and *SWM* opened at 'LM&S' on my lap, the dial of this set probably gets more rotating than all the others. There is still a lot out there to listen to, although sadly I agree, many broadcasters have cut down. There is still a lot of life in h.f.

and that includes the unexpected. Getting an insight into propagation problems which hamper signals coming in is another thing I like about s.w.l. Daft as it may seem, a hard won DX signal gives me as much fun as a digital one received over cable or Internet would.

No, I am not a dinosaur, although I have reached the age when I wouldn't want an *SWM* T-shirt as there would be no pocket to store the glasses in. Each to their own I say, but with quill to parchment, could I put in a request for a *SWM* Numbers Special. Not a reiterated list of who did what in the Cold War, but an update of recently received frequencies (in the 'LM&S' format perhaps) and who is likely to be sending them.

Thanks for a great magazine and when G3SWM is reactivated, I hope to catch you then.

**Rodney Wild  
Portland**

*We'll be back on-air with G3SWM later this year. See page 26 for details. Hope to talk then Rodney. - Ed.*

used over and over again the possibilities of DXing other services and stations is very limited since the chances are that a distant multiplex will be blocked by a more local one using the same frequency block. It's not the same as a.m. or f.m. DXing whereby a listener can 'weedle out' a distant station from in-between two more local transmitters by careful tuning and adjustments. So we are in danger of becoming far too regulated and restricted in this respect. Where I am located I listen to Alan Beswick on BBC GMR many many miles away on f.m. by careful tuning and a strategically placed dipole, I have no chance on DAB however so that avenue of enjoyment would be cut off if f.m. did not exist.

DAB offers excellent expansion opportunities and reception quality and a good choice of new stations, but it should not be at the expense of current a.m. and f.m. bands. Since DAB is still in its infancy we cannot tell how the authorities will treat the development of this new medium or, indeed, the future development of domestic radio in general.

Moving back to short wave, I still derive enormous pleasure from tuning into stations the world over, I use a Sony ICF-7600G for general portable use

and this provides a remarkable number of stations, while in the 'shack' I use an excellent Lowe HF-150 fed by a 10m random wire antenna via a home-built a.t.u. with a home-built signal meter and the excellent *Short Wave Magazine* tunable low-pass, notch and peak filter - again home-built.

Let us not forget that short wave is not only about the international broadcasters, there are still some domestic short wave broadcasts that can be DXed along with many pirate radio stations that are always interesting to listen to, fascinating amateur radio operators and utility stations.

Long live *Short Wave Magazine* and all contained between its front and back covers! Keep up the excellent work and any more pages about the history of radio and visits to transmitter sites new and old will always make a welcome and enjoyable read.

Can I also take this opportunity to ask for some help from your readers? I am building a little website that includes some pages devoted to radio and a section about the late lamented Lowe range of h.f. communications receivers. I use a Lowe HF-150, which I bought when it was first released after seeing the adverts and the review

in *SWM*.

Does anyone have some information about what radios Lowe built and/or sold before the HF-125 in 1987 and can anyone tell me when production of the HF range ceased? I think manufacturing may have stopped around 1999, but I am not sure. I also thought that another company (such as Nevada or Waters & Stanton) were going to continue to produce the HF-150, I don't know if that ever happened and if it did for how long it continued to be produced.

I would be very grateful if anyone could enlighten me with some more Lowe facts. If you are interested, my site is called MDS975 and the radio page is at [www.arar93.dsl.pipex.com/mds975/Content/radm.html](http://www.arar93.dsl.pipex.com/mds975/Content/radm.html) Thank you for your time and for a great magazine.

**MD Smith  
Perton  
Staffordshire**

*Many thanks for sharing your views. Mr Evans has indeed started something interesting! The Lowe range of receivers was started with the HF-125 as far as I know. But there must be a fascinating tale to be told regarding that and the following models. The production rights were sold to SMC as reported in *SWM* at the time. - Ed.*

# top qsl

#### Dear Sir

Hi, my name is Ian and I just thought I'd drop you a line or two. I've been listening to h.f. broadcasts since the late 1980s, when my parents got me a Vega radio via an advert in *The Daily Mirror*.

When the Vega 'died' I got a cheap little pocket radio. A couple of years ago I bought a Sangean ATS-818 and my listening time increased greatly, not least because for the first time I could listen to s.s.b. traffic.

Last year I got the vintage bug and bought an old Eddystone 888A which I played with all last summer, it was good fun too! Well, that went up in flames eventually and is now being nursed back to health by The Eddystone User Group, to whom I donated it.

At last summer's *NVCF* in Brum, I got a cute little Eddystone EB37 transistor set. It was made around 1972 and is a.m. only, but I love it. I'm one of those annoying people who prefer the analogue tuning, especially for general band scanning.

For a while I got quite deep into the s.w. hobby, I wrote to stations and got QSL cards and had my mail read out on HCJB, VoR and Radio Taiwan and sent regular logs to LM&S too.

Work and domestic circumstances mean that I am now back in my old ways. I do not listen to any particular station on a regular basis, I just tune around on a Saturday or Sunday until I find some nice music. I like Foni Tis Helladas, Voice of Turkey, Radio Jordan, Radio Sawa, Sudweststrandfunk, etc.

There is something exciting in this kind of random listening, as you never know what's going to turn up. I got the February *SWM* yesterday. I haven't had a good look at it yet, but Ronald Evans' letter in 'QSL' caught my attention. What's his childhood trauma? There's loads of high-tech stuff in *SWM* these days and I liked the features on Rampisham, etc., even though I'm clueless when it comes to the technical side of things.

I love stories from the Golden Age of radio. I have several books on vintage sets and two BBC handbooks, one from 1925 and the other from 1932. I love to look through them with the 'Eddy' playing in the background. The static crashes, fading and whistles on h.f. are all part of its magic atmosphere and it will be a very sad day for me when the last a.m. station goes QRT.

I like the sound of the T-shirt and I'd buy one if they become available, some stickers with other catchy s.w. slogans on them would also be nice if that were at all possible.

When my subscription expires this year, I'll go back to buying *SWM* from the local newsagents. There are always plenty available and the walk gives me some much needed fresh air and exercise!

Sorry about the writing, I'm awaiting delivery of a manual typewriter, the new electric one I got last year packed up. I hope you and all the *SWM* staff have a good new year and spend some quality time on the radio hobby, be it via valves, transistors or micro-chips!

**Ian Evans  
Ebbw Vale  
Gwent**

### BASE VERTICALS

#### SUPERSCAN STICKS I & II

These two superb external antennas will receive on all frequencies unlike a mono base antennas. Both have capacitor loaded coils, (4 in the SuperScan Stick and 8 in the SuperScan Stick II) inside the vertical element to give maximum sensitivity to even the weakest of signals. Also the SuperScan Stick II has 3dB gain over standard SuperScan Stick !!  
(Perfect for every scanner, from the beginner starting out to the more experienced listener).

#### SUPERSCAN STICK

Freq: 0-2000 Mhz Length:1000mm Socket: SO239

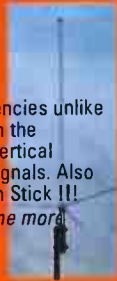
**Our Price £29.95** PLUS £6.00 P+P.

#### SUPERSCAN STICK II

Freq: 0-2000 Mhz Length:1500mm Gain: 3.00dB

Socket: SO239. **Our Price £39.95** PLUS £6.00 P+P.

(Both these antennas come complete with 3 ground plane radials 12" stub mast, v-bolts & clamps) ★ Also Available !!! Base Scan Sticks (as above) with Tx Capabilities !!! (for use with transceivers only) ★



### DISCONE ANTENNAS

#### STANDARD DISCONE

Freq: 25-1300 Mhz Length:1000mm

Socket:SO239

This antenna comes with heavy duty centre cone with 16 sturdy aluminium radials, no capacitor coils just pure elements, complete with mounting pole, clamps & v-bolts to mount up to a 2" mast. (The discone has been around for over 25 years and is generally recognised as the original and probably the best all round scanner antenna).

**Our Price Just £29.95** plus £6.00 P+P.



#### SUPER DISCONE

Freq: 25-2000 Mhz Length: 1380mm Gain: 3.0dB

Socket: SO239

The super discone has enhanced the original discone design with a vertical wire trapped fibreglass vertical element. Comes complete with mounting pole, clamps & v-bolts to mount up to a 2" mast. (Experience increase range and up to 3dB gain over standard conventional discone !!! Get more with the Super Discone !!!)

**Our Price £39.95** plus £6.00 P+P.



### AR-AIR BAND ANTENNAS

These dedicated civil & military fibreglass antennas are made pre-tuned & dual band trapped for both Air Band frequencies. Easy connection with an SO239 socket (With these antennas you can obtain high dual band gain which is not available on wideband antennas. Just don't miss take off !!!)

#### AR-30

Freq:Civil & Military Gain:3.0/6.0 dB

Length:1000mm. **Our Price £39.95** PLUS £6.00 P+P.



#### AR 50

Freq:Civil & Military Gain:4.5/7.0 dB Length:1500mm.

**Our Price £59.95** PLUS £6.00 P+P.

(Both these antennas come complete with 3 ground plane radials 12" stub mast, v-bolts & clamps).

### X1-HF VERTICAL

Freq:1-50 Mhz Length: 2005mm

Socket: SO239

The X1 incorporates loaded helical traps, similar to that of a horizontal di-pole, encapsulated in a heavy duty high impact plastic tube, with a top tapered stainless steel whip. (The answer for those enthusiasts looking for short-wave reception but haven't the space for a long wire). **Our Price £49.95** PLUS £6.00 P+P.



### HF DISCONE

Freq:0.05-2000 Mhz Length:1840mm

Socket: SO239

The HF Discone has the same spec as the Super Discone, but includes a 3ft heavily wire trapped vertical section, encapsulated in fibreglass, Thus enables to obtain a massive receive spectrum within the discone design. Come complete with mounting pole, clamps & v-bolts to mount up to a 2" mast. (Get the best of both worlds, use the HF discone for both scanner and HF receiver)

**Our Price £49.95** plus £6.00 P+P.



### ROYAL DISCONE 2000 (Stainless Steel)

Freq: RX 25-2000 Mhz TX: 50-52/144-146/430-

430/900-986/1240-1325Mhz Length: 1550mm

Socket: N-type

The ultimate discone antenna !!! Highly polished centre cone, with 16 Stainless steel elements, loaded top coil & whip. Complete with mounting pole, clamps & v-bolts to mount up to a 2" mast. (With a WHOPPING 4.5dB Gain over standard discone, this highly sensitive, perfectly matched receiving and transmitting discone is the best there is !!!)

**Our Price £49.95** plus £6.00 P+P.

★ Remember Discones can be placed in the loft with surprising results !!! ★



### GETTING RIGGED UP

#### 5' SWAGED POLES

Heavy Duty Alu (1.2mm wall)

SINGLE 1 1/4"	£7.00
SET OF FOUR 1 1/4"	£24.95
SINGLE 1 1/2"	£10.00
SET OF FOUR 1 1/2"	£34.95
SINGLE 2"	£15.00
SET OF FOUR 2"	£49.95

#### CONNECTORS

PL259/9	£0.75 each
PL259/6	£0.75 each
PL259/7 for mini 8	£1.00 each
BNC (Screw Type)	£1.00 each
BNC (Solder Type)	£1.00 each
N TYPE for RG58	£2.50 each
N TYPE for RG213	£2.50 each
SO239 to BNC	£1.50 each
PL259 to BNC	£2.00 each
N TYPE to SO239	£3.00 each

#### HI-SPEC COAX CABLE

RG58	6mm standard	£0.35 per mtr	RG213	9mm mil spec	£0.85 per mtr
RG58	6mm mil spec	£0.60 per mtr	RH200	9mm mil spec	£1.10 per mtr
RF mini 8	7mm mil spec	£0.85 per mtr			(Phone for 100 mtr discount price)

### BE DEDICATED

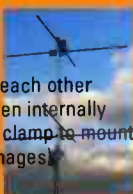
#### TURNSTILE 137

Freq:137.5 Length: 1000mm

This weather satellite antenna has two di-poles adjacent to each other mounted on a 1mtr fibreglass section. Both di-poles have been internally connected, for easy use. Complete with mounting section & clamp to mount up to a 2" mast. (Beam skyward and reach those weather images)

**Our Price £39.95** plus £6.00 P+P.

★ For dedicated Air Band Antennas see AR-Air Band Antennas ★



### BEAM ANTENNAS

#### MUP32

Freq:100-1300 TX&RX

Gain:11-13 dB

Length:1400mm

Con: N-Type

**Our Price £99.95**

plus £6.00 P+P

These two professional quality antennas, come with aluminium booms, aluminium and stainless radial & stainless bolts & fittings. (Don't strain to hear those long distance signals, with near perfect matching of 2:1 SWR across the whole frequency spectrum, make your scanner come to life with the ultimate receiving antenna !!! Sold mainly to our commercial and military customers, you know your getting the best !!!)

AR300XL Rotator for above beams

**£49.95** plus £6.00 P+P.

#### MUP62

Freq:50-1300 Mhz

Gain:10-12 dB

Length:3000mm

Con: N-Type

**Our Price £169.95**

plus £6.00 P&P.



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## SWM Services

### Subscriptions

Subscriptions are available at £36 per annum to UK addresses, £44 Europe, £54 Rest of the World. Joint subscriptions to both *Short Wave Magazine* and *Practical Wireless* are available at £61 (UK) £75 (Europe) and £92 Rest of the World.

### Components For SWM Projects

In general all components used in constructing SWM projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article.

### Photocopies & Back Issues

We have a selection of back issues, covering the past three years of SWM. If you are looking for an article or review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. Back issues for SWM are £3.75 inc P&P each and photocopies are £3.00 per article inc P&P.

Binders are also available (each binder takes one volume) for £6.50 plus £1.50 P&P for one binder, £2.75 P&P for two or more, see Book Store for overseas rates. Prices include VAT where appropriate.

A complete review listing for SWM/PW is also available from the Editorial Offices for £2 inc P&P.

### Placing An Order

Orders for back numbers, binders and items from our Book Store should be sent to: **PW Publishing Ltd., Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW**, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone **0870 224 7830**. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Broadstone **0870 224 7850**.

The E-mail address is [bookstore@pwpublishing.ltd.uk](mailto:bookstore@pwpublishing.ltd.uk)

### Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by SWM, then please write to the Editorial Offices, we will do our best to help and reply by mail.

# ED's



## comments

**P**ure sensationalism! Utter fabrication and incorrect nonsense. I'm referring of course to the UK tabloids. Pick any specialist subject covered by the tabloid newspapers and you'll find a total lack of good reporting. This topic is a regular stimulus for extended 'discussion' here at the SWM Editorial Offices.

The latest example to come to my notice, is a 'report' from the 14 January, Scottish edition of the *Daily Express*. They clearly had a lack of celebrities to gossip about and so decided to target radio enthusiasts once more.

Let's face it, any reference to misuse or scandal involving radio always involve the nominal "radio ham". A phrase which in the context of the ill informed reporter, can mean anything from a professional radio engineer to a burglary 'lookout' with a scanner listening for the 'boys in blue' coming to make an arrest and anything in-between - seldom though, a radio amateur.

The latest example of this appalling treatment of our subject, is in the shape of a half page article, penned by reporter **Ken Adams**. The un-credited story is based around the author of the rather excellent *Xcorder*, who'd had a visit from Mr Adams prior to the publication of the issue containing the 'account'. The headline of this farcical item was "Hebreds tune in for Bin Laden" with the strap line, "Island radio ham reckons he can succeed where US spooks failed". The scribbles then go on to explain how using "a £1000 garden aerial and some sound recording software (*Xcorder*)" it would be possible to intercept Osama Bin Laden using a hand-held v.h.f./u.h.f. transceiver, half way around the planet. The item is riddled with what are claimed to be quotes from *Xcorder's* author. These are, in fact, just plain nonsense and typical of the type of material thrown together by those with not even a sprinkling of understanding of radio. If we are to believe Ken Adams, then it is possible to receive a low powered hand-held transceiver operating between 100 and 500MHz from the middle east here in the UK. All without even using a radio receiver - truly amazing!

It really is about time that technical subjects are either given appropriate coverage by journalists with sufficient knowledge, or left to the technical press for accurate coverage.

I suspect that radio is not the only victim of such, cheap swipe journalism, the problem must extend to all speciality subjects. The guilty newspapers really can't care a jot for accuracy.

## Feedback

And so, from *Xcorder* to X-Sweeper. Last month, **Martin Peters** reviewed this OptoElectronics wideband spectrum display-come monitor receiver. As is our custom, we passed a copy of the review on to the supplier of the review equipment for any comment which in this case was **W&S**. Unfortunately, due to holidays, the copy wasn't seen until we'd printed February's SWM. **Jeff Stanton** at W&S PLC has since

passed on the review to **Kevin Cox** at the manufacturers OptoElectronics, who had some comments to make regarding points that Martin highlighted about the X-Sweeper device.

We are always happy to receive feedback and I'm keen that readers should share these responses.

Kevin Cox had the following comments to make regarding some comments in the review that could be construed as being negative.

It seems that Martin misunderstood the text of the manual and it is unnecessary to remove the unit's battery when using an external supply.

The X-Sweeper manual states that a mono headphone socket is fitted to the unit.

Kevin Cox also feels that the flexibility offered by the 25 button keypad, gives this new product flexibility previously unavailable to OptoElectronics products. Many thanks for the feedback Kevin.

The good news is, that due to the improvement in the US dollar/Sterling rate, the price of the X-Sweeper has fallen. W&S PLC are now offering the two versions of the X-Sweeper for less - £1399 for the standard version and £1599 for the GPS equipped version.

## Sad News

It is with deep sadness that I have to report the death of 'LM&S' author **Brian Oddy**.

Brian had written for SWM ever since it was acquired by PW Publishing Ltd. back in 1987. I know that compiling 'LM&S' was a task he took very seriously indeed. He developed many friendships with the column's contributors over the 17 years it has been running. There will be many readers who will be saddened by Brian's passing.

Our condolences go to Brian's family and friends. I am personally very grateful to Brian himself for his dedication and hard work over the years.

I'm sure that Brian would approve of my decision to continue 'LM&S' and I'm therefore pleased to announce that **Martin Peters** has agreed to take over its compilation from next month. Please welcome Martin and would anyone wishing to submit their to 'LM&S' logs please note that they need to be addressed to **Martin at 11 Filbert Drive, Reading RG31 SDZ** or E-mail: [martin.peters1@virgin.net](mailto:martin.peters1@virgin.net)

## Free Catalogue

You will have noticed that bagged with this issue is a free MFJ catalogue filled with radio goodies including three discount vouchers. This free catalogue is brought to you courtesy of Waters & Stanton, whom I thank. I hope you enjoy their efforts to the full.

W4 73 Kevin

# communiqué

## Valve Day!



The **Blackmore Vale Amateur Radio Society** are holding a Valve Day on **Sunday 7 March 2004** from 1000 till 1630, at the Youth Club Hall, Coppice Street, Shaftesbury, Dorset. Free entry and open to all interested in valves and early radio. There will also be talks on Military Manpacks, Historic Weymouth Radios & The Evolution of Amateur Radio Valve Receivers.

The Society was formed in 1982 by like-minded radio enthusiasts who found that within the area of North Dorset, South Somerset and Wiltshire, there was no facility or forum for them to share their hobby. The Society grew out of this need and also the desire to 'promote all aspects of Amateur Radio and to assist members to obtain licensed status'.

Today, the Blackmore Vale ARS has a membership that covers a wide range of occupations and walks of life. All visitors are welcome to attend the weekly meetings, experienced, novice and even the 'just inquisitive' will be sure of a friendly welcome and any assistance or information the Society can offer.

Currently the Society meet from 1930 on Tuesday evenings at the Club for Young People, Coppice Street, Shaftesbury, Dorset. This new location provides ideal facilities including a permanent radio shack, a comfortable meeting area, kitchen facilities and a large sports hall suitable for staging open days, etc. A permanent club station has been established and the club regularly holds v.h.f. and h.f. on-the-air evenings. More information at [www.bvars.org.uk](http://www.bvars.org.uk) or telephone (01258) 860741.

## Well Done Dundee!

The **Dundee Amateur Radio Club** wish to congratulate four of their Foundation Licence Holders on the successful completion by all four of their City & Guilds RAE Examination in early December. Congratulations to **Martin Higgins (MM3AWM) MM0DUN, Peter Moodie (MM3PMH) MM0GMP, Stewart MacIntosh (MM3AXE) MM0STX** and **Jim Wilson (MM3JFW) MM0DXD**. Also, thanks must go to the club tutors for their excellent help and guidance.

## Icom Aid Forces Against Cancer

Icom (UK) Ltd. is to give support to a unique and very demanding challenge to raise money for three cancer charities. The challenge - called Forces Against Cancer - will involve 10 officers from the Devon and Cornwall Constabulary and the Ministry of Defence Police kayaking the 10 largest Lochs in Scotland, around 320km in just five days. The team announced the project back at the beginning of January on Icom UK's stand at the Schrodgers London Boat Show 2004.

Icom (UK) are supplying radio equipment and technical support. The major marine distributor SM Group Europe will provide GPS equipment and Perception Kayaks, Yak and Nookie will be providing the Kayaks and clothing.

The team's motivation for this challenge is to raise money for Cancer Research UK, Challenging Cancer and Leukaemia in Childhood (CLIC) and The Chestnut Appeal. Having raised £33,000 in 2002, the aim is to raise more in 2004.

**Simon Costin**, Project Co-ordinator for Forces Against Cancer said, "we are really glad that we have Icom UK on board with this latest challenge. It is critical that the team maintains a safety line throughout the challenge. Our experience in the previous challenge showed that. We can achieve this by the use of their excellent radio equipment".

Simon Costin can be contacted on (07919) 000810 or via E-mail: [simon@costin2765.freereserve.co.uk](mailto:simon@costin2765.freereserve.co.uk) Further details can be found on <http://facfund.topcities.com>



## New Edition

The 19th edition of *Radio Stations In The United Kingdom* (ISBN 0-9540223-1-9) is now available from the **British DX Club**. The 60 page booklet includes up-to-date detailed listings by frequency and station name, of all medium wave and f.m. services in the UK - including BBC, independent, low power a.m. and f.m. services. Plus, as usual, an extra booklet covering all the Irish stations is included!

This ever popular publication has been completely updated since the last edition and is a must for anyone interested in UK radio - from the keen DXer to the casual listener. Why not order an extra copy to keep in the car!

Features include: All stations listed by frequency as well as station name, frequencies cross-referenced to show parallel channels, includes transmitter sites and powers, contact details and websites, comprehensive listing of long-term low power a.m. and f.m. stations at colleges, hospitals, schools, sports venues, prisons and army garrisons, includes details of the extended Access (community) radio stations and Separate Irish supplement covers all RTE and independent stations.

*Radio Stations In The UK* is available from BDXC's London HQ: **British DX Club, 126 Bargery Road, Catford, London SE6 2LR** priced at just £3 (UK), £3.50 (overseas) and five Euros, five US Dollars or seven IRCs. All prices include postage world-wide. For airmail please add two Euros, two US Dollars or two IRCs. Please make any cheques or post orders payable to the British DX Club. Full details also on the BDXC-UK website at: [www.bdx.org.uk](http://www.bdx.org.uk)

## Wrexham ARS Make Return To Scientriffic!

The **Wrexham Amateur Radio Society** are proud to announce their third trip to Wrexham Science Festival's Hands-On event - called *Scientriffic* - on **Saturday 27 March 2003** from 1000 to 1700.

This year, the Wrexham Amateur Radio Society will be located in a different building and have a different line-up of events! Instead of being located in the main Newi building, WARS will be located at the Ex-Yale college Crispin Lane campus. The plan for this year's event is to run more of an exhibition, with demonstrations of h.f. voice, data and contest operating throughout the day (as the event coincides with CQWW) - as well as all manner of hands-on demonstrations. There will also be a 2m voice station throughout the day.

The 2004 event is due to be bigger than last year's event. Currently the 'think-tank' is seriously under way and all manner of ideas are being formulated. Wrexham ARS intend to have many demonstrations and hands-on exhibits in their section, everything from Morse to antennas is planned, with everything in-between - all details are in the final stages of planning.

Turn up on the day to see the action, or work the station somewhere on the bands WARS will be spotting on the DXCluster. The WARS station can be QSLed via the normal routes, via EqsL or direct E-mail to [gb2wsf@qsl.net](mailto:gb2wsf@qsl.net)

For up-to-date information on the event and pictures of the previous two years events - head to [www.qsl.net/gb2wsf](http://www.qsl.net/gb2wsf) *Scientriffic* also caters for the non-amateur and has all manner of events to get involved with. The *Scientriffic* organisers website can be found at [www.wrexhamsf.com](http://www.wrexhamsf.com)

- GB2WSF at the 2003 *Scientriffic* in full-swing about lunchtime.



## New Look Website

**Martin Lynch & Sons** have launched their new look website at [www.hamradio.co.uk](http://www.hamradio.co.uk) - providing a completely new, easily navigable site providing what ML&S say is one of the most extensive radio amateur, short wave and scanner radio information resources on the web. As well as promoting the extensive range of stocked products available to purchase on-line, ML&S aims to offer the premier information resource for the discerning radio amateur, short wave listener, scanner enthusiast, digital photographer and self-confessed gadget buyer.

Customers looking for second-hand bargains will be pleased to know that the pre-owned equipment pages have also been given a facelift. You can now view the vast stock of used equipment and see pictures and specifications before deciding to purchase.

Managing Director **Martin Lynch** commented, "the new look website confirms our wish to offer the best and most flexible radio amateur website on the Internet. We value functionality over aesthetics. The site should get you the information you want quickly and easily, and after that it should look good, which I think it does".

For business users, the new Corporate and Business Radio section of the website will be of great interest.

Traditional short wave and mid-range p.m.r.

solutions are covered in detail and more complex, leading-edge technology solutions, information and advice will be added shortly.

The website also offers a totally secure environment for on-line orders, 128bit encryption ensures that each transaction is completed securely offering guaranteed safe shopping. Full details of the on-line security guarantee are available on the website.

The site re-design was completed by the staff at ML&S and its function and content will be a continually evolving process with new sections and pages added on a regular basis.



## Island Operation

The **North Wakefield Radio Club** will be operating from the island of Inner Farne (IOTA: EU-109) off the coast of Northumberland using their callsign **GX4NOK/P** during daylight hours on **17/18th April 2004**. They hope to be operating on 40, 30, 20 and 17m, as well as putting on a 'digimode' station and 2m.

Further information will be found during the DXpedition by visiting [www.g4nok.org](http://www.g4nok.org). The club will list their operating frequencies on this site along with information about the Farne Islands and the stations. The North Wakefield Radio Club extends thanks to the National Trust for giving permission for the activation to take place and to Leeds Amateur Radio for their QSL card sponsorship.

Look out in a future issue of *SWM* to see how the event went.

## Vintage Wireless Fair

The **West Of England Vintage Wireless Fair** is to be held at Willand Village Hall, just five minutes from J27 on the M5 on **Sunday 18 April**. Doors open 1030-1500. There will be numerous stalls, radios, TVs, gramophones and ephemera, plus a Bring & Buy stall and a mini-auction at 1330. There will also be home-made refreshments and free parking. Admission is £2.50, accompanied under 16s free of charge. More information on (01392) 860529 or (01749) 676635.

## New Look Website

**icom (UK) Ltd.** have updated their website - [www.icomuk.co.uk](http://www.icomuk.co.uk). The site has been given a 'fresh polish' and features enhancements giving the site a more modern/contemporary feel. The home page has been redesigned to incorporate nine different product sections, Marine, Commercial, Avionics, Receiver, Consumer, Computer, Non-UK, Merchandising and Computing.

The FAQ section has also been restructured into market areas, making it easier for visitors to find answers to specific questions. A technical help page has also been included so those customers who cannot find their answers on the product page or in the FAQs can contact Icom (UK).

So, next time you are surfing the 'web, check out [www.icomuk.co.uk](http://www.icomuk.co.uk)

## The Late Brian Oddy

M&S author Brian Oddy passed away in hospital, aged 75, on the morning of 19 January 2004. Ron Ham, long time friend and former *SWM* author remembers Brian.

"The science of radio communication was Brian Oddy's life, to which he contributed so much. He was a brilliant engineer in both the mechanical and electronic fields. His television skills were greatly appreciated in the 1950s when, via his own radio and television business, he serviced a multitude of receivers. Television in those days required a lot of understanding, especially in low signal areas like West Sussex. Brian was among those who saw the beginning and end of the 405-line system in Bands I and III and the start of the 625-line transmissions in Bands IV and V.

Brian was dedicated to amateur radio with special interests in building antennas and equipment for the u.h.f. bands and listening to overseas broadcast stations. In the amateur world he was one of the pioneers of the 70 and 23cm bands and for more than 20 years of his professional life he was a microwave links engineer for BBC Television.

Typical examples of his mechanical skills were shown when he designed and built a 9m tower from Handy-Angle to support his array of u.h.f. antennas. And again when, with a lathe, he made the complex cavities for his 70 and 23cm converters.

Immediately following his retirement from the BBC until his sudden death in January 2004 he wrote the monthly column 'LM&S' in this magazine. He always had great respect for opinions and comments from our readers and his regular contributors. It must have been obvious to anyone who read Brian's pages that he was dedicated to the work and had a deep understanding of the subject.

I knew Brian for over 50 years, a good friend who was always ready with a helping hand coupled with a keen sense of humour. He would often see the funny side of a serious subject and sometimes, just a brief glance in his direction would bring to one's mind an inappropriate desire to laugh. I will always have happy memories of Brian and a lasting admiration of his technical ability".

We extend our deepest sympathy to his wife, Yvette and his two daughters, Elizabeth and Rosilind. **Ron Ham.**



● Brian in the 1960s with one of the special stacked Yagi array which he built for the 70cm band. Testing a 433MHz signal path to London from the top of the South Downs. *Picture - Joan Ham.*

## Tom Walters - A Tribute

Tom Walters, leading light of the AIB and Editor of their Trade Journal *The Channel* and the *Practical Wireless* h.f. broadcast bands 'Tune In' columnist died in early December.

Everyone in the *SWM* and *PW* offices was extremely saddened to hear of the sudden death of Tom Walters. We knew Tom was ill and was struggling to keep to his deadlines, even writing from his bed - but nobody here realised just how ill he was. His copy was always alive, sparkling with enthusiasm and often flavoured with the taste of mild, well-considered controversy because of his passionately held opinions.

Tom wasn't afraid to let his strongly held support for international broadcasting - particularly on the short wave broadcasting bands - be known. If a broadcasting organisation did something, or announced some initiative that Tom considered to be a stupid decision - he'd say so. All around the world his name was known.

Tom's wife **Liz Walters** writes with the following memories and appreciation of her husband.

"Tom was born in Ringwood, Hampshire in 1936. As only child, and due to the fact his father was in the Army, he went to Hurstpierpoint College as a boarder. After taking his A levels, etc., he left to get a "steady job" - as recommended by his father - in the Sun Life Assurance Company which, incidentally, he loathed!

Tom then quickly decided on a change and joined the BBC as an Engineer. He spent all his working life with the broadcaster and took early retirement 10 years ago. By then he was a Senior Producer for the World Service, but continued to work for BBC on a freelance basis reading the news/continuity until 2001.

Eight years ago Tom was one of the founder members of the Association for International Broadcasting, the aim of which is to "bring together the international broadcasting industry, supplying market intelligence, networking, representation, board-level contacts and a range of other services to members". He continued as a Director until August 2003.

On the personal, and family side of things Tom loved sailing and we've always had a boat of some size around, here in Walton on the Naze in Essex. He also loved singing and belonged to a choral society. Tom was the organist and choir master in our local church and it's where he's been buried.

Tom was also a keen member of the 'Save the Naze' campaign. Our home is only about 20 yards from the sea and the cliffs, as in many coastal areas, are eroding and disappearing faster than they can be saved - not that they are being saved, due to the lack of local Council money - hence the campaign. He also loved walking - especially in areas of archaeological importance and was a keen reader of travel/sailing books. The photograph which I've provided shows Tom on one of his favourite walks our local beach. It's one of my favourite photographs.

My late husband was one of the 'Good guys', quiet, kind, respected by all who knew him and very funny! He was so positive when ill and just kept going. In fact he was an inspiration.

Tom leaves children Lizzie and Mike from his first marriage, his stepson Mike from my first marriage and our own son Nick. As I am another Liz, this causes confusion at times! We were a very tight family and at the moment, we're trying to get our combined heads around being 'rudderless'.

Thank you for the opportunity of sharing a little more of Tom. We all miss him. **Liz Walters.**



● Tom Walters 1936-2003

## Southern Event

The **Vintage & Military ARS (VMARS)** are holding their Southern Event on **Saturday 3 April 2004** at Field Place Conference & Sports Centre, The Boulevard, Strand, Goring, Worthing BN13 1NP from 1000 till 1600. This will be a pure Vintage and Military related event, with demonstrations, displays, Bring & Buy and a few sales and traders tables. Weather permitting, there will be operational h.f. as well as v.h.f. More information from Chairman **Mike Hoddy G0JXX** on (01903) 260291 or E-mail: [chairman@vmarsmanuals.co.uk](mailto:chairman@vmarsmanuals.co.uk)

## 25 Years Celebration

**T**he Wirral & District Amateur Radio Club was founded in 1976 and has just celebrated 25 years of service to h.f., v.h.f. operators and s.w.l.s. The club has a unique format of meetings at the Clubhouse on the second and fourth Wednesdays of every month with 'Drinkers and Waffler' nights on the other Wednesdays. This format means that a forum is provided every week for members to get together and 'talk radio'. The club prides itself on a high programme content of radio and related technologies, with additional general interest and social events to encourage YL, XYL and 'harmonic' attendance.

Club meetings are held at the Irby Cricket Club on the Wirral with D&Ws at various pub locations in the area. Contact can be made via **Tom G4BKF** (E-mail: [secretary@wadarc.com](mailto:secretary@wadarc.com) or packet **G4BKF@GB7OAR**). Alternatively call Tom on **07050 291850**. The club also listen out on 70.450MHz.

A full list of events and how to find the club are available by visiting [www.wadarc.com](http://www.wadarc.com) On 10 March the club are featuring a talk on 'Learning To Fly' and an Amateur Radio Software night is planned for the 24th. All newcomers are welcome.

**February 29:** The Cambridge & District Amateur Radio Club Rally is to be held at the Wood Green Animal Shelter, London Road, Godmanchester, 6.4km from Huntingdon, take the A1198 off the A14 (J24). The Wood Green Animal Shelter is well signposted and there will be wheelchair access along with free car parking, Bring & Buy, Talk-in on S22, bar and restaurant. Doors open 1000 and admission is £2 (£1.50 for OAP/disabled visitors), children free. There's also the opportunity to visit the animal shelter and the extensive site including water garden and lake. A great day out for all the family. More information from **John G0GKP** on **(01954) 200072** or visit [www.cdarc.org.uk](http://www.cdarc.org.uk)

**March 14:** The Wythall Radio Club are holding their 19th Annual Radio & Computer Rally at Woodrush Sports Centre, Shawhurst Lane, Hollywood, near Birmingham on the A435, just 3km from J3 of the M42. Doors open 1000 till 1600 and admission is just £1.50. There will be plenty of traders in two large halls and refreshment facilities are available on site. There will also be a Bring & Buy, easy comfortable parking on site. All are welcome. For licensed radio amateurs, a talk-in is available on S22. More information at [www.wrcrally.co.uk](http://www.wrcrally.co.uk) or contact Rally Organiser **Martin G8VXX** on **0121-474 2077** (24hr answerphone) or FAX: **0121-742 3471** working hours or E-mail enquiries to [enquiries@wrcrally.co.uk](mailto:enquiries@wrcrally.co.uk)

**March 14:** The Bournemouth Radio Society are holding their 16th Annual Sale at Kinson Community Association Centre, Pelhams Park, Millhams Road, Kinson, Bournemouth. Doors open from 1000 to 1600. Talk-in from G1BRS on 2m S22, Amateur Radio, computer traders, accessory traders, antenna suppliers, Bring & Buy, also specialist groups and clubs and home-made refreshments. Admission just £1. More details from **Olive & Frank G0GOX** on **(01202) 887721**.

**March 20:** The South Normanton Alfreton & District Amateur Radio Club (SNADARC) in association with the G-QRP Club are running the 4th Junction 28 QRP Rally at the Village Hall Community Centre, Market Street, South Normanton, nr Alfreton, Derbyshire, fully signposted just five minutes from M1 Junction 28 and the A38. There will be Amateur Radio, Electronics and related items, Bring & Buy and special interest group stalls, outdoor flea market (weather permitting), full range of refreshments including the traditional QRP Rally Pie and Peas, a licensed bar and a prize draw. Doors open to the public from 1000. **Russell Bradley G0OKD** on **(01773) 783394** or **Mike Jeffs M0RMJ** on **(01949) 876523** or visit [www.qsl.net/snadarc](http://www.qsl.net/snadarc)

## Two New Rugged Radios

If you enjoy listening to your radio outside, but find it gets a bit of a bashing by being knocked around or damaged by rain and water, then Roberts Radio's water resistant radios are the ones for you. Roberts have launched two new rugged radios designed specifically for use outdoors.

The Poolside radio costs £80 and is water resistant with a nautical look that's ideal for tuning in by the pool or relaxing on a boat during the summer. Poolside is also trimmed with a rubber casing, which will protect it from any knocks or bashes.

The Terrain radio costs £100 and is also water resistant. This 3-band hardy radio has a very masculine look and will appeal to those who spend a lot of time outdoors. It has a heavy duty carrying handle, rather like automotive nudge bars, which protects it from knocks. It can also double up as a PA system - plug in a microphone and away you go!

Features on both models include:

l.w./m.w./f.m. wavebands, rugged water resistant casing, flexible f.m. antenna, headphone socket, very large loudspeaker for excellent sound quality (Poolside has twin loudspeakers) and a d.c. input socket.

For stockists call **(01709) 571722** or visit [www.robertsradio.co.uk](http://www.robertsradio.co.uk)



# Bandscan

Australia

- **Greg Baker** PO Box 3307, Manuka, Australia
- **E-mail:** [greg@paug.org.au](mailto:greg@paug.org.au)

From 1 January this year, Australia's amateur radio operators no longer needed to be proficient in Morse code. As a result, holders of Intermediate and Limited Amateur licences are now able to access the same frequency bands as Unrestricted Amateur licensees and holders of Novice Limited Amateur licences have access to the same bands as Novice licensees.

In addition, from the second half of 2004, Australia will take part in reciprocal arrangements with other countries in recognising amateur radio licences without having to obtain special permission.

The Wireless Institute of Australia, the amateur radio organisation's website is at [www.wia.org.au](http://www.wia.org.au) and the Australian Communications Authority, the government body responsible for the amateur service has information on the changes at [www.aca.gov.au/aca\\_home/publications/reports/info/amateur\\_suite.htm](http://www.aca.gov.au/aca_home/publications/reports/info/amateur_suite.htm)

## Virgin Radio

Richard Branson's Virgin Group is reported to be poised to spend hundreds of millions of dollars buying radio broadcasting licences to establish a national radio system here in Australia. The idea appears to be to use the programming format that Virgin broadcasters use in Britain, France and Asia.

Although, there has been some speculation that Virgin would buy into a small company here called WorldAudio, this has been denied by Branson's group. WorldAudio has 45 licences to operate low-powered a.m. transmitters throughout Australia and is hoping to take part in what it expects to be a digital radio bonanza in a few years time. On the 'net WorldAudio is at [www.worldaudio.com.au](http://www.worldaudio.com.au) and its first Sydney radio station at [www.radio-two.com.au](http://www.radio-two.com.au)

## Digital Radio

It is with a feeling of *dejá vu* that I report the start of new digital radio trials in Sydney and Melbourne and running for eighteen months on commercial and national radio stations. The Sydney trials are being managed by Commercial Radio Australia, the Melbourne trials by Broadcast Australia. Jointly these organisations have set up a consortium called Digital Radio Broadcasting Australia.

The choice of Broadcasting Australia, which has no spectrum rights of its own, has

raised the anger of executives from existing broadcasting networks. They are concerned that Broadcasting Australia will gain spectrum rights via the back door. Interestingly, the first commercial radio station to trial digital radio in Melbourne has been WorldAudio, the company which has been mentioned; then denied - as a possible Virgin group vehicle. WorldAudio is keen to take up digital licences when they become available so is no doubt aware of the need to be near the action.

To kick off the trial the organisers will select 100 listeners to be provided with digital receivers and to participate in test panels. It is reported that the listeners will be selected from taxi drivers, youth, opinion makers, PC users and horse racing enthusiasts. The listening panel will be increased to 500 as a greater range of digital radio receivers becomes available.

The trials will use the Eureka 147 system as used in the UK, but the government has not ruled out the selection of the US IBOC technology. There is no timetable for the introduction of digital radio in Australia.

## Digital Radio History

A quick check back through past editions of Bandscan Australia shows that Australia's Communications Laboratory was testing digital audio broadcasting in 1991; field tests were conducted in Canberra in 1994; the relevant government minister announced support for digital radio broadcasting in 1997; it was reported in 1998 that digital radio would start in Australia in 2001 and major Sydney radio stations conducted a five channel trial in 1999 using the Eureka 147 system. Some commentators are putting this delay down to existing operators fending off possible competition. As if they would!

I reported in March 2003 that digital radio had fallen into a hole and that I wasn't

holding my breath on more trials. Well, these new trials have started but I'll be very surprised if anything concrete happens in the next five years.

Those of you with access to the Internet may wish to look at [www.aba.gov.au/radio/digital/index.htm](http://www.aba.gov.au/radio/digital/index.htm) and [www.commercialradio.com.au/](http://www.commercialradio.com.au/) which is conducting the Sydney trials and [www.broadcastaustralia.com.au/radio\\_digital.html](http://www.broadcastaustralia.com.au/radio_digital.html) which is conducting the Melbourne trials.

## Reception Reports

**Michael Beesley** from Romsey in Hampshire says that reception from the antipodes has been difficult during the last few months due mainly to high solar noise levels. However, he reports hearing Radio Australia on 11.660MHz at 1515, SINPO 35232; on 15.415MHz at 0840, 35232 and 35333; on 13.630MHz at 0850, 25222; 11.880MHz at 0930, 44544 and on 9.580MHz at 0940, 13331. Michael has also received Voice International on 13.685MHz at 1340, rated 34333 and Radio New Zealand International on 9.885MHz at 0900, rated 35433 and on 15.530MHz at 1230, 55544. Michael uses a Sony ICF-2001D and a Sony SW100 connected to a random wire in his loft.

## Other News

Payments to Boeing for work on the Australian Defence department's new High Frequency Modernisation project have been stopped because Boeing failed to meet critical deadlines. The project is way over budget and well behind schedule. The system is now not expected to be functioning until 2007, two years later than specified. The Defence department aims to move all Australian defence signals to digital with this and other projects.

In Tasmania there have been calls to fix as a matter of urgency the Tasmanian police force radio system which is reported to be unreliable and have inadequate coverage. The digital system was only introduced in 1996 following the Port Arthur massacre in which many people were killed by a lone gunman.

Radio New Zealand International (RNZI) now broadcasts 24-hours a day and has a new-look website. RNZI can be found at [www.rnzi.com](http://www.rnzi.com) and the current schedule at [www.rnzi.com/pages/schedules.php](http://www.rnzi.com/pages/schedules.php)

## Your News and Comments are Welcome

I welcome any news and comments. In particular I am interested in any s.w.l. information on Australian stations heard by SWM readers so I can chase up more details and interesting snippets from this end. My address is **PO Box 3307, Manuka, ACT 2603, Australia**. For personal replies please send two IRCs. Those with E-mail please use [greg@wordgraphics.com.au](mailto:greg@wordgraphics.com.au)

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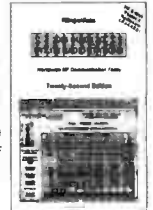
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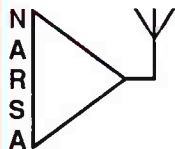


Includes many HF E-mail digital data radionets that we have cracked! Here are the really fascinating radio services on SW: aero, diplo, maritime, metro, military, police, press, telecom, and terrorists. 10,200 up-to-date frequencies from 0 to 30 MHz are listed, plus hundreds of new decoding screenshots, abbreviations, call signs, codes, explanations, metro/NAVTEX/press schedules, modulation types, all Q and Z codes, and much more! 600 pages · EUR 45 = £ 31 (postage included)

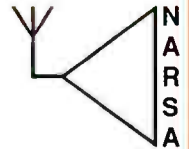
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# NORBRECK

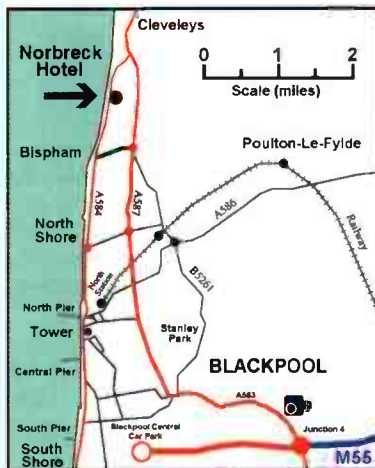


## Radio, Electronics and Computing Exhibition

by the Northern Amateur Radio Societies Association at the

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**on Sunday, March 21st, 2004 - Doors open at 11 a.m.**



*Why not come to Norbreck this year? This will be the 42<sup>nd</sup> rally organised by over 40 clubs from the North West which started life at Belle Vue in Manchester. We had over 4,000 visitors last year and the 2004 rally will feature:*

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- ◆ Over 30 club stands interspersed with the trade stands
- ◆ RSGB stand (several local and national officers usually attend)
- ◆ Radiocommunications Agency (RA) stand – lots of useful advice!
- ◆ Bring and Buy stand (run by the East Cheshire Radio Group)
- ◆ Construction competition (why not bring something!)
- ◆ Accommodation available at the Norbreck Hotel and lots nearby
- ◆ Radio talk in on S22 (by the Thornton Cleveleys Club)
- ◆ Run by Amateurs for Amateurs (friendly atmosphere)
- ◆ Facilities for the disabled (all the stands are on one floor)
- ◆ For the latest information visit <http://www.narsa.org.uk>

Admission £3 (OAP's £1.50, under 14's free) by exhibition plan - Exhibition Manager: Peter Denton, G6CGF, 0151 630 5790

# LM&S

Long, Medium & Short Wave Bands

● Compiled by the late Brian Oddy

Since this is the March edition of SWM may I remind you that British Summer Time (BST) begins on Sunday March 28. On that date clocks in the UK will be advanced by one hour, because BST is one hour ahead of Greenwich Mean Time (GMT), which is displayed at present.

The international short wave broadcasters refer to their transmission times in Universal Time Co-ordinated (UTC), which for most purposes is the same as GMT, so their time system will not change on March 28. To avoid confusion may I suggest that you place a clock by your receiver now and set it to UTC (=GMT). Do not alter it on March 28. Please continue to quote UTC in your logs for LM&S.

Perhaps I should also remind you that many of the s.w. broadcasters will introduce new transmission schedules on March 28 to compensate for propagation changes during the summer. The s.w. data herein will be applicable until 0300UTC on that date.

## Long Wave Reports

Note: l.w. & m.w. frequencies in kHz; s.w. in MHz; Time in UTC (=GMT). Unless otherwise stated, all logs were compiled during December.

Frequent checks were made at night by **Simon Hockenull** in E.Bristol and he noticed that the propagation conditions seemed to favour a southerly direction. On December 18 he picked up the transmissions from two stations in Morocco - one came from Radio Mediterranee International (Medi-1) via Nador on **171kHz** (2000kW), which he rated SINPO 14442 at 2333 and the other from Radiodiffusion-Television Marocaine (RTM-A) via Azilal on **207kHz** (800kW), which was peaking SINPO 33333 at 2348.

During daylight, Simon logged several other stations - see chart. From time-to-time he monitored **252kHz** for further test transmissions from RTE via Clarkestown, Eire but none were heard.

The transmissions from Rikisutvarpid (RUV) via Gufuskalar, W.Iceland on **189kHz** and Eidar, E.Iceland on **207kHz**, which are often used as a guide to propagation conditions, were logged on the 20th at 2315 by **Ernie Strong** (Ramsey, Cambs) as 12433 & 12333 respectively; on the 21st at 2333 by **Eddie McKeown** (Newry, Co.Down) as 42232 & 21321 respectively; also on the 22nd at 0025 by **Richard Reynolds** (Guildford) as 44433 & 54434 respectively.

The RUV transmissions were also received by **Jim Edwards** in Wigan at 0430. Much earlier, he picked up on **189kHz** the 10kW transmission from the Radiotelevisione Italiana (RAI) outlet at Caltanissetta, Italy at 1820. Although no ident was obtained from Van, Turkey on **225** at 1840; or for Tbilisi, Russia on **189** at 2230 both were quite audible. R.Belaruskaje via Sasnovy, Belarus on 279, which Jim heard at 1900, was received at other times by some listeners.

## Medium Wave Reports

Some interesting logs were compiled by the listeners who searched this band after dark for the sky waves from stations in the Middle East, N.Africa, Europe and Scandinavia - see chart.

Some of the most distant stations noted in the reports were Emirates Radio, Dubai (1500kW) on **1476**, rated 22432 at 2040 in E.Bristol; Bushehr, Iran (100kW) on **1503**, rated 21232 at 2043 in Newry; Duba, Saudi Arabia (2000kW) on **1521**, rated 33523 at

2139 in E.Bristol; Voice of America (VOA) via Kuwait (150kW?) on **1593**, noted by **Harry Richards** in Barton-upon-Humber as sounding like a local at 0145 on the 9th.

The medium wave local radio outlets attracted the attention of some listeners. A very welcome first report came from **James Glen** in Dunfermline, Scotland. Whilst searching the band at around 0800 on the 28th he heard some quite distant stations including BBC R.Devon, Plymouth on **855kHz** (1KW), which he rated SINPO 22221; BBC R.Solent, Fareham on **999** (1kW), noted as 22222; ILR County Sound, Guildford on **1566** (0.8kW), noted as 44221; also a number of others - see chart

Much later and in the opposite direction the sky waves from ILR Tay AM, Perth on **1584** (0.21kW) were picked up at 1716 in Guildford by Richard Reynolds. He listened to songs and info for the Dundee area and rated the transmission 43523. He logged a total of 52 stations, mostly during daylight - see chart.

Extensive logs were also compiled during daylight by **Ernie Strong** (Ramsey, Cambs) with 50 stations and **Fred Wilmshurst** (Northampton) with 45 stations - see chart.

## Short Wave Reports

During December, R.France International (RFI) continued to broadcast daily to Africa in the **25MHz (11m)** band but it is not known here how well their transmissions on **25.820** (Eng 1200-1230, Fr 1230-1300) reached the intended target area. Reception reports from listeners in that area would be very welcome here - please post them to me at the address shown above. No doubt RFI would be glad to receive them too - their address is **Radio France International, 116 avenue de President Kennedy, BP 9516, F-75016 Paris, France.**

In the UK, reception of the broadcasts from RFI varied from day-to-day. The following SINPO ratings were quoted in the reports: 45333 at 1200 by **Bernard Curtis** in Stalbridge; 25122 at 1200 in Newry, Co.Down; 25222 at 1250 by **Peter Pollard** in Rugby; 34333 at 1250 by **Thomas Williams** in Truro. Towards the end of December Simon Hockenull (E.Bristol) observed a strong echo on their transmission, which he rated 35422 at 1215.

Propagation in the **21MHz (13m)** band varied from day-to-day but on average reception tended to be better than during November, when solar activity resulted in many disturbances.

There were no reports of R.Australia's broadcasts on **21.725** (Eng to Pacific areas 0000-0900) and/or **21.820** (Eng to Asia 0900-1400) having reached the UK. In fact most of the reports referred to reception from stations located much nearer to the UK! Amongst the entries were the Voice of Russia on **21.790** (Eng to Asia, Australia 0600-1000), rated 44333 at 0830 by **Sheila Hughes** in Morden; Swiss R.Int (SRI) via Sottens **21.770** (Eng, It, Ger, Fr to Nr.East, Africa 0830-1030) 44333 at 0835 by **Vic Prier** in Seaton; BSKSA Riyadh, Saudi Arabia **21.505** (Ar to N.Africa 0600-1500) 55445 at 0950 in Stalbridge & 33343 at

### Listeners:-

- (A) Jim Edwards, Wigan
- (B) James Glen, Dumfermline.
- (C) Simon Hockenull, E.Bristol.
- (D) Sheila Hughes, Morden.
- (E) Eddie McKeown, Newry.
- (F) Richard Reynolds, Guildford.
- (G) Ernie Strong, Ramsey, Cambs.
- (H) Thomas Williams, Truro.
- (I) Fred Wilmshurst, Northampton.

### Long Wave Chart

kHz	Station	Country	Power (kW)	Listener
153	Bechar	Algeria	1000	A*,H*
153	Donebach DLF	Germany	500	A*,C,D,E,G,I
153	Bod	Romania	1200	A*,D*
162	Allouis	France	2000	A*,B*,E,G*,H*,I*
171	Nador Medi-1	Morocco	2000	A*,B*,F*,G*
171	B'shakovo etc	Russia	1200	A*,B*,C*,E,F*,I*
171	Sasnovy	Belarus	1000	G
177	Oranienburg	Germany	500	A*,D*,E,G*,I*
180	Polati	Turkey	1200	A*
183	Saarlouis	Germany	2000	A*,E,G*,H*,I*
189	Gufuskalar	W.Iceland	150	A*,E*,F*,G*
189	Caltanissetta	Italy	10	A*,F*
189	Tbilisi	Georgia	500	A*,F*
198	Droitwich BBC	UK	500	D,E,G*,I
207	Munich DLF	Germany	500	A*,C*,E,G*,H*,I*
207	Eidar	E.Iceland	100	A*,E*,F*,G*
207	Azilal	Morocco	800	A*,C*,F*
215	Roumoules RMC	S.France	1400	A*,C,E,G*,H*,I*
215	Krasnovarsk	Siberia	1200	G*
225	Polskie R-1	Poland	7	A*,D*,E,F*,G*,H*,I*
225	Van TRT-1	Turkey	600	A*
234	Gavar	Armenia	500	A*
234	Beidweiler	Luxembourg	2000	A*,B*,D*,E,G*,H*,I*
243	Kalundborg	Denmark	300	A*,C,D,E,G*,H*,I*
252	Tipaza	Algeria	1500	A*,C,D,E,F*,G*,H*,I
252	Yerevan	Armenia	150	A*
261	Sofia	Bulgaria	80	F*
261	Burg	Germany	85	A*
261	Taldom Moscow	Russia	2500	A*,E,G*,I*
270	Topolna	Czech Rep.	1500	A*,C,D*,E*,F*,G*,I*
279	Sasnovy	Belarus	500	A*,B*,C*,D*,E*,F*,G*,I*

Note: Entries marked \* were logged during darkness. All other entries were logged during daylight or at dawn/dusk.

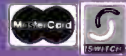




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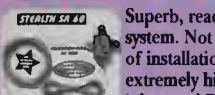
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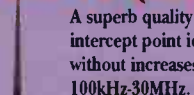
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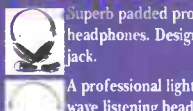
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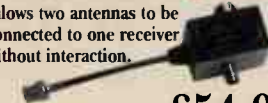
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Optional battery pack and drop in charger **£39.99**

Soft case.....£15.99  
PC interface .....£42.95



## ICOM IC-R5

New pocket hand-held scanner (0.1-1310MHz) AM/FM/WFM. Superb high-speed scanner featuring alpha tag and much more.

INCLUDES FREE EP-300 EARPIECE

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BATTERIES AND CHARGER INCLUDED

Optional soft case.....£17.99  
Optional cigar lead .....£19.99  
Scanner + TV screen.....£299.99



## YUPITERU MVT-7100

Wideband hand-held scanner covers 500kHz-1650MHz. (All mode). Includes nicad/car charger/charger/antenna. Extremely user-friendly hand-held receiver with outstanding performance unmatched by its rivals.

INCLUDES FREE EP-300 EARPIECE

OUR PRICE **£199.95** Del £10

Soft case for 7100EU/9000 - specify .....£19.99  
MVT-9000 MkII.....Our price £325.00  
MVT-7300EU .....Our price £199.95



## YUPITERU MVT-7300

A superb wide-band (520kHz-1300MHz) AM/WFM/NFM/USB/LSB. Ideal for the pocket thanks to its compact size. (Runs on 3AA batteries). Includes FREE EP-300 earpiece.

A BARGAIN AT OUR PRICE **£199.99** Del £10

Optional mains charger and batteries.....£14.99  
Cigar lighter lead.....£9.99



0700?), rated 24222 at 0652 in Newry; R.Slovakia Int **13.715** (Eng to Australia 0700-0730), rated 54444 at 0710 in Herstonceux; R.Austria Int via Moosbrunn **13.730** (Ger to Eur 0400-1800) 44344 at 0800 in Rugby; Voice International via Darwin, Australia **13.685** (Eng to SE.Asia 0800-1300) 33333 at 1113 in Truro & 33343 at 1145 in Liverpool; R.Nederlands via Flevo **13.700** (Dut to S/SE.Eur 0900-1600, Sat/Sun) 33333 at 1135 in Truro; R.Sultanate of Oman via Seeb **13.640** (Ar to M.East 0600-1400) 33333 at 1150 in Liverpool; R.Canada Int (RCI) via Sackville, Canada **13.655** (Eng to E/C.USA, Caribbean 1300-1600) 43333 at 1300 in Morden; Croatian R, Deanovec **13.830** (Cr to Eur, M.East 1000-2200) 35422 at 1324 in E.Bristol; Deutsche Welle (DW), Germany via Trincomale, Sri Lanka **13.780** (Eng to E/C.Asia 1900-1959) 34553 at 1900 in Larnaca, Cyprus; RCI via Sackville **13.650** (Fr, Eng to Eur, Africa, M.East 2000-2159) 15432 at 2131 in Manchester.

The **11MHz (25m)** band may be the one to choose if you reside in the UK and would like to listen to R.Australia's broadcasts. They have been heard quite well on the following frequencies from Shepparton: **11.660** (Eng to E/SE.Asia 1330-1700), rated 44444 at 1345 in Morpeth & 54444 at 1515 in Liverpool; **11.880** (Eng to Asia 0900-1330), 43343 at 1253 in Newry.

During early December R.New Zealand's broadcasts on **11.675** (Eng to Pacific, W.USA 0800-1059) could sometimes be received in the UK. They were rated 33233 at 0800 in Appleby & 34333 at 1055 in Truro. However, they have now been moved to a new frequency in the **9MHz (31m)** band - see below.

Also noted in this busy band were the BBC via UK **12.095** (Eng to C/E.Eur 0400-1700), rated 44344 at 0756 in Rugby & 35544 at 1000 in Northampton; AWR via Agat, Guam **11.900** (Eng to Asia 1000-1100) 34333 at 1005 in Morden; R.Prague, Czech Rep. **11.640** (Eng to N.Eur 1130-1157) SIO443 at 1142 in N.Bristol; Polish R, [R.Polonia] Warsaw **11.820** (Eng to Eur 1300-1359, Sat) 53443 at 1320 in Herstonceux; R.Finland via Pori **11.755** (Fin to W.Eur, W.Africa 0800-2300) 44434 at 1435 in Truro; WWCN Nashville, USA **12.160** (Eng to N.America, Eur 1300-2200) 32222 at 1440 in Liverpool; R.Nederlands via Madagascar **12.080** (Eng to S.Asia 1400-1600) 23111 at 1450 in Newry; R.Nederlands via Tashkent **12.070** (Eng to S.Asia 1400-1600) 44233 at 1452 in Newry; R.Jordan via Al Karanah **11.690** (Eng to W.Eur, N.America 1400-1730) 35333 at 1604 in E.Bristol; R.Nederlands via Madagascar **11.655** (Eng to E.Africa 1800-2000) 44434 at 1800 in Seaton; R.Kuwait, Kabd **11.990** (Eng to Eur, N.America 1800-2100) 54445 at 1920 in Stalbridge; Israel R Int, Jerusalem **11.605** (Eng to Eur, N.America 2000-2030) 55555 at 2000 in Appleby.

R.New Zealand may now be heard in the **9MHz (31m)** band during the morning on a new frequency of **9.885** (Eng to Pacific, W.USA 0800-1059). This replaces **11.675MHz**. This

change has improved reception of their 100kW transmission in the UK - typical ratings being 43334 at 0935 in Stalbridge & 44433 at 1042 in Truro. At 1100 they move to **15.530MHz**.

R.Australia has also been received here on the following frequencies from Shepparton: **9.710** (Eng to Pacific 0800-0900), rated 23333 at 0800 by Christopher Pierce in Harwich; **9.580** (Eng to Oceania, N.America 0800-2130), 32222 at 0834 in Oxted; **9.475** (Eng to Asia 1330-1858), 34333 at 1533 in E.Bristol; **9.500** (Eng to Asia 1900-2130), 33233 at 1900 in Appleby.

The many other broadcasters using this band include WTJC Newport NC, USA **9.370** (Eng to N.America 24hrs), rated 44444 at 0530 in Morpeth; AWR via Moosbrunn, Austria **9.660** (Eng to Eur 0830-0900) 43434 at 0830 in Harwich; R.Vilnius, Lithuania **9.710** (Eng to Eur 0930-1000) 54544 at 0935 in Herstonceux; Polish R, [R.Polonia], Warsaw **9.525** (Eng to Eur 1300-1359) 45344 at 1322 in Newry; BBC via Singapore **9.740** (Eng to E.Asia 1000-1600) 45554 at 1431 in Larnaca, Cyprus; BBC via Cyprus **9.410** (Eng to W/SW.Eur 1500-2200) 43323 at 1800 in Seaton; R.Thailand, Udon Thani **9.535** (Eng to Eur 1900-2000) 44444 at 1900 in Harwich; AIR via Aligarh? **9.445** (Eng [Gen.Overseas Svce] to W/NW.Africa 1745-1945) 54445 at 1915 in Stalbridge; VOA via Kavala, Greece? **9.760** (Eng to Eur, N.Africa, M.East 1700-2200) SIO 444 at 1958 in N.Bristol; Israel R Int, Jerusalem **9.435** (Eng to Eur, N.America 2000-2030) 54545 at 2000 in Harwich; R.Nederlands via Flevo **9.895** (Eng to Africa 1800-2100) 33343 at 2010 in Liverpool; R.Ext.Espana (REE) **9.595** (Eng to Eur 2000-2059 Mon-Fri, 2100-2159 Sat/Sun) 35444 at 2015 in Northampton; R.Mediterranean Int [Medi-1], Morocco **9.575** (Ar, Fr to N.Africa, S.Eur 0500-0400) 54444 at 2035 in Liverpool; R.Cairo, Egypt **9.990** (Eng to Eur 2115-2245) 55444 at 2115 in Appleby; R.Taiwan Int via WYFR Okeechobee FL, USA **9.355** (Eng to Eur 2200-2300) 44433 at 2200 in Morden; All India R. (AIR) via Delhi? **9.950** (Eng, Hin to UK, W.Eur 1745-2230) 33444 at 2200 in Harwich; R.Canada Int via Sackville, Canada **9.770** (Eng to Eur, N & W.Africa, Mid.East 2100-2230) 24111 at 2215 in Newry; SRI via Sottens **9.885** (Fr, Ger, It, Eng to S.America 2200-0000) 33323 at 2330 in Truro.

Noted in the **7MHz (41m)** band were Christian Science Herald Broadcasting via WSHB in Cypress Creek, USA **7.535** (Eng to N/C.America, W/C.Africa, Russia, Eur 0000-1000, Fri, Sat & Sun), rated 44243 at 0804 in Newry; VOA via Thailand **7.125** (Eng to Far East, Asia, Oceania 1400-1800) 34454 at 1430 in Larnaca, Cyprus; Sudwestfunk via Rohrdorf **7.265** (Ger to Eur 24hrs) 54454 at 1815 in Liverpool; Voice of Russia **7.290** (Eng to Eur 1800-2200) 54444 at 1815 in Liverpool; Polish R. (R.Polonia), Warsaw **7.150** (Eng to Eur 1800-1859) 53444 at 1820 in Seaton; AIR via Bangalore? **7.410** (Eng, Hindi to UK, W.Eur 1745-2230) 44444 at 1900 in Morden & 24222 at 2030 in Truro; R.Nederlands via Madagascar

**7.120** (Eng to E/S.Africa 1900-2100) 44423 at 2012 in E.Bristol; R.Romania Int **7.105** (Eng to W.Eur 2030-2100) 54434 at 2030 in Seaton; R.Vlaanderen Int, Belgium **7.330** (Eng to Eur 2030-2100) SIO 333 at 2037 in N.Bristol; Vatican R. Italy **7.250** (Various to Eur) 45544 at 2050 in Newry; VOA via Botswana **7.415** (Eng to Africa 1900-2230) 43334 at 2055 in Stalbridge; Voice of the Mediterranean, Malta via ? **7.440** (Eng to Eur 2000-2100, Mon to Sat except Fri) 33222 at 2055 in Appleby; R.Tashkent, Uzbekistan **7.185** (Eng to Eur 2130-2200) 54444 at 2135 in Herstonceux; R.Romania Int **7.250** (Eng to W.Eur 2200-2300) 35444 at 2202 in Manchester; R.Bulgaria via Plovdiv **7.500** (Eng to Eur 2200-2300) 55544 at 2210 in Northampton; World Harvest R. (WHRA) via Maine, USA **7.580** (Eng to E.USA 2300-1000) 54444 at 0001 in Morpeth.

Many of the broadcasts in the **6MHz (49m)** band are intended for listeners in Europe. Some come from the BBC via UK **6.195** (Eng 0500-0700; also to N.Africa), rated 44554 at 0525 in Larnaca, Cyprus; R.Vlaanderen Int (Belgium) via Germany **5.965** (Eng 0800-0830) 55555 at 0810 in Herstonceux; Deutsche Welle (DW) via Julich, Germany **6.140** (Eng 0600-1000, 1300-1600) 54445 at 0925 in Stalbridge; R.Slovakia Int **5.915** (Eng 1730-1800) 44434 at 1730 in Seaton; Deutschland R, Berlin **6.005** (Ger 24hrs) 44423 at 1740 in Seaton; BBC via UK **6.195** (Eng to Eur 1700-2300) 43344 at 1825 in Rugby; R.Vlaanderen via Julich, Germany **5.910** (Eng to Eur 1830-1900) 55555 at 1830 in Appleby; Bayerischer Rundfunk, Germany **6.085** (Ger 24hrs) 55555 at 1845 in Liverpool; Sri Lanka BC via Skelton, UK **6.010** (Eng 1900-2000) 44243 at 1910 in Newry; RAI Rome, Italy **5.965** (Eng 1935-1955) SIO 444 at 1941 in N.Bristol; Voice of Turkey, Ankara **6.055** (Eng 1930-2020) 34443 at 1945 in Manchester; R.Slovakia Int **5.915** (Eng 1930-2000) 45544 at 1950 in Northampton; Voice of Russia **6.235** (Eng 1900-2200) 44444 at 2100 in Truro; VOA via Kavala, Greece **6.040** (Eng 2100-2200; also to M.East) 44444 at 2130 in Morden; R.Budapest, Hungary **6.025** (Eng 2200-2230) 33232 at 2206 in E.Bristol.

Some of the broadcasts to other areas may be received in the UK. Among those mentioned in the reports were AIR via Delhi, India **6.045** (Hindi to S & W.Asia 1430-1930), noted as 32232 at 1855 in Liverpool; VOA via Sao Tome **6.035** (Eng to Africa 1800-2230) 45444 at 2220 in Northampton; BBC via Antigua, W.Indies **5.975** (Eng to C & S.America 2100-0500) 43333 at 2345 in Morpeth; R.Havana, Cuba **6.000** (Eng to N.America 0100-0500) 33433 at 0134 in E.Bristol; BBC via Ascension Is **6.005** (Eng to W/C.Africa 0400-0715) 34132 at 0650 in Newry; WHRI South Bend, USA **5.745** (Eng to N.America 2000-1000) 44333 at 0800 in Morden; WEWN Birmingham, USA **5.825** (Eng, Sp to N.America 0000-1200) 54433 at 0800 in Herstonceux; WWCN Nashville TN, USA **5.935** (Eng to N.America 0100-1300) 44344 at 0930 in Stalbridge.

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**Sadly, this is the last LM&S to be compiled by Brian as he passed away the same day as his column was posted to SWM. If you contributed logs to LM&S and haven't received a letter from me, please contact me at the SWM Editorial Offices.**

**Kevin Nice takes a quick tour of the new AOR spectrum display unit. This development of the product line, features both a colour display and d.s.p. FFT processing.**

The SDU5600, ARS000 combo.



What on earth is an SDU5600? You may well ask. It's a Spectrum Display Unit and before you ask me what that is, I'll explain.

Firstly, something you may or may not know, although you should do really because it's been explained within these pages before. Maybe you're new here or you've missed the previous explanation? To the point. Typical modern receivers, especially scanning receivers, have pretty wide open front-ends, most having no tracked tuning mechanism other than rudimentary band-pass filtering, which is specifically designed to allow broadband use. This system suits rapid changes of operating frequency that are essential with the high speed scanning of channels with potentially large jumps of frequency with the minimum reaction time.

The spin-off to this engineering solution is that these receivers process a wide section of spectrum all the way up to the i.f. filters thus providing the opportunity to literally take a look at what signals are on air at any given moment.

To some of us, this is very handy indeed as it allows the simultaneous

more functionality, but sadly, never got around to it and I still get requests for details now!

We have also given coverage to the SDU5600's predecessors, the SDU5000 and the SDU5500.

# In The Ed's Shack

## The Professional SDU5600 Reviewed

checking of blocks of typically a few MHz at a time. Much easier than attempting to achieve the same by scanning sets of frequencies with known or likely activity. Or indeed possibly wasting valuable time by visiting unused spectrum by sequentially searching bands in finite incremental steps. This is where the spectrum display is really useful.

### Improved Sophistication

Over the years in *SWM* we have covered a number of such devices of varying complexity. At the simple end of things, the late **Bill Wilson** produced a low complexity design for a panoramic adapter using a single i.c. based circuit - he promised to develop a three chip version too with

AOR have, with each generation of their SDUs, improved the sophistication and complexity of the spectrum display's function. The latest SDU5600 is no different on that front. Now featuring a 127mm colour TFT display instead of the blue and white l.c.d. of its forerunner, the SDU5600 also operates using d.s.p. based FFT or Fast Fourier Transform analysis techniques. This allows a very useful screen update rate, up to six samples per second, which is now independent of the resolution bandwidth setting. This was something that was a pain with the SDU5500 as it was easy to miss short duration signals at maximum resolution. This is certainly not the case with the new unit.

There's certainly lots of functionality built into the relatively compact case of the SDU5600. Though I imagine that the majority of users are most



likely to rack mount their SDU5600s, there are M4 threaded holes provided for connecting to the appropriate bracketry. Measuring 220 x 120 x 195mm and weighing a little over 2kg the unit is quite happy sat atop of the receiver to which it's connected, which is fine for us hobby users. To enable the SDU5600 to perform its role in the shack it must interconnect with a suitably equipped receiver. The requirements are as follows; the radio must have an i.f. output of 10.7 or 45.05MHz and it must also have the provision for remote control via an RS-232 port. AOR supply the interconnecting leads and a mains powered 12V p.s.u., as well as the slick Operating Manual.

Connecting up the SDU5600 and receiver combination is straightforward, as it ensures that the RS-232 settings on both the receiver and the SDU coincide. Essential if they are to converse. The receiver's i.f. output is connected to the 'r.f.' input on the SDU'. Then it is simply a case of informing the '5600 as to your receiver of choice via the set-up menu. That done, you're ready to roll.

During the review period, I was using both an AR5000 and my stalwart Icom R8500, which is normally, permanently connected to my SDU5500 that incidentally, I became very attached to back in 1999, when it was launched and JW reviewed it for SWM. Both of these receivers are included in the SDU's firmware, as are the other current AOR base station receivers. You can even use a later manufactured AR3000A, but they need modifying to provide a suitable i.f. output. Plus it is possible to connect an unsupported radio by choosing the 'other' option from the SDU's receiver menu, though you lose the interactive facilities provided by the SDU, such as the ability to jump to an active channel identified by the SDU's cursor, direct control via the display's keypad and the ability to use the SDU in Channel Scope Mode.

### More Control

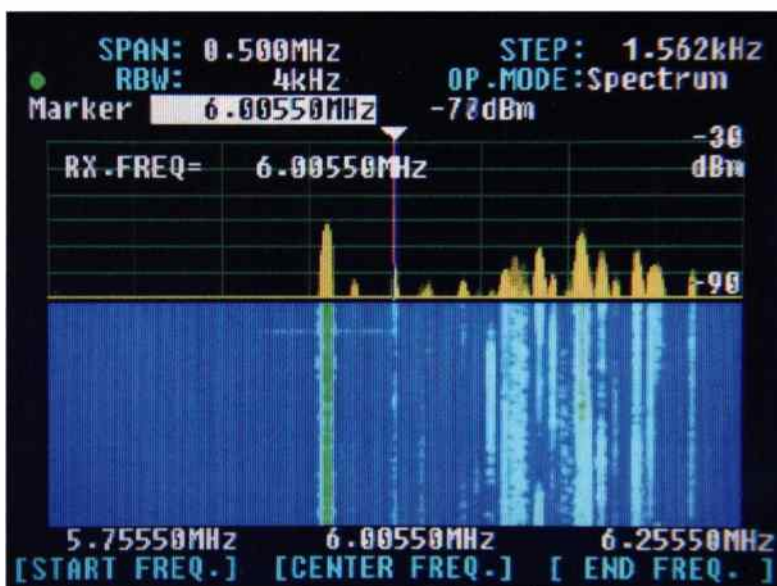
Since the SDU5600 utilises the receiver's RS-232 port, a second port is provided on the unit to allow the continued use of remote control by computer. This also allows the use of software, which takes SDU5600 data and allows it to be manipulated, displayed and stored plus it controls the SDU. Unfortunately, the suite is still being developed here in the UK by AOR in Derbyshire and therefore wasn't available for review. We may well revisit the SDU5600 and its control by the use of PC and software at a later time. I can envisage that the usefulness of the SDU will be even further enhanced. I suspect that it will be possible to time-date stamp chunks of spectrum to be saved to disk on the PC. This will solve one of my frustrations of not being able to freeze the waterfall display. It's odd isn't it, I was very happy to see the waterfall function added to this model, but here I am moaning about it's shortcomings - never happy we radio enthusiasts! It really is a very useful feature which is made possible due to the unit being d.s.p. FFT based. I spent an age with the SDU configured to span the 49m broadcast band with the waterfall running, it was pretty enlightening to watch the effects of propagation as the dozen or so stations exhibited significant changes in signal strength. Not only in absolute terms but relative to each other. At times to the extent that one would disappear for a period whilst others would increase, this was then followed by the opposite effect. The result was a succession of vertical dashed lines and a dancing yellow signal strength plot.

### Very Familiar

The SDU5600 is, without stating the obvious, very similar to the SDU5500 and shares many common functions, though due to the expanded keyboard of the '5600 these are accessed a little differently. As a result of the new keyboard, the new unit has three instead of the former's six soft keys under the display as can be seen in the picture.

The new unit has three main modes of operation these are; 1) Spectrum analyser mode, which is best for general listening and for hunting for non-specific signals or noise. This mode operates by the SDU sweeping across a defined range of spectrum up to a maximum of 10MHz.

2) Step resolution Mode, this mode offers a solution for monitoring specific signals across a section of spectrum with a well defined allocated band plan with known step sizes such as v.h.f. air band. The total



49m under observation with the SDU5600.

horizontal axis (frequency) of the SDU's display features 320 pixels, and therefore allows a sweep of 320 channels at a time.

Lastly, 3) Channel Scope mode. This mode is best for watching narrower bands of channelised activity say two or four megahertz wide. This mode provides almost real-time band scope with defined start stop and step data.

Whilst on the subject of the frequency characteristics of the AOR's new spectrum display has a minimum span of 160kHz and a maximum of 10MHz which is  $\pm 5$ MHz of the centre (receiver) frequency.

Although the dynamic range of the SDU5600 is fixed at 60dB it is possible, by use of the unit's input sensitivity control, to move the displayed amplitude up and down so that the top of the trace varies between -30 and 0dBm, with a corresponding maximum sensitivity, i.e. the bottom of the screen -90 and -60dBm. This facility allows four 10dB steps and provides the adjustment to position the trace at the optimum level to view the most useful detail.

Other tools offered by the SDU5600 that concern amplitude of the captured band of spectrum are the likes of the vertical measuring cursor, which can be manipulated left and right by the operator to align with any part of the trace. The SDU display provides a permanent value displayed which corresponds to the signal strength of the trace that is coincident with the marker. If the cursor is away from the centre point of the display, the essential ability to tune the receiver to the cursor position is provided at the touch of a button. With such a comprehensive box of tricks such as the '5600 there are as one would suspect also peak detection, and continuous peak facilities in addition to plain old instantaneous capabilities.

Lastly, I must mention that this new spectrum display unit also provides both a maximum hold and average value trace facility (2 to 31 cycles) these are present on the '5500. New to the SDU5600 is a Median function to enable the plotting of impulse noise.

### Finally

As you might expect, the SDU5600 is certainly head and shoulders better than the SDU5500. I was fascinated that it enabled me to see a frequency agile 100kHz wide data mode operating around 5.5MHz with a very short transmit time on any given frequency a few milliseconds at most. It is impossible to spot this kind of activity with the older unit due to both the lack of waterfall facility and also the slower screen update speed. I wonder if I can get away with sending my '5500 back and keeping this new unit.

Many thanks to AOR (UK) Ltd., 4E East Mill, Bridgefoot, Belper, Derbyshire DE56 2UA who not only lent me the SDU5600, but also a shiny new AR5000A so that I could compare operation on two receivers. The SDU5600 costs £1099 inc. VAT and is available from all good radio dealers. For more information please visit [www.aoruk.com](http://www.aoruk.com) or call (01773) 880788.

SWM

# Listening Contest

## Listen & Win!

Following on from last year's successful event, the second Short Wave Listening Contest will be held on **Monday 3 May 2004**. The event will again be organised by *Short Wave Magazine* in conjunction with a day's operation of the magazine's amateur radio callsign **G3SWM**.

We will be running a station manned by *SWM* Editor Kevin G7TZC, M3SWM, Amateur Bands author Clive G4SLU and various other keen volunteers from the Dorset Police Radio Club. The station will, as last year, operate from Dorset's famous Island of Portland at grid reference SY700727.

G3SWM operation will commence at 0700 and finish at 1600, the main band used will be 40m on approximately 7.070MHz. It is likely that the station will also be operating on other bands, this will be mentioned on the day in the 40m frequency. The event station's objective is to work as many other stations as possible so that entrants in this listening contest have as many logging opportunities as possible. We welcome all licensed amateurs to work the event station. The more contacts we make the better. Every hour on the hour, starting at 0800, we will have a 10 minute window for M3 exclusive contacts to promote M3s working G3SWM. There will be an attractive and unique QSL card available for the day's activity from the Portland location. To make things even more interesting we will be located in the relatively rare WAB square SY77DOR\*. This square's rarity is due to most of the area being occupied by ocean.

The overall winner of the *SWM* Listening contest will have amassed the most points based on the stations they have logged during the 12 hour operating period. All stations must have worked the Event station G3SWM to be a valid logging. All reports must include the report given to G3SWM and the serial number allocated by G3SWM, if the contact is to be considered. Please note that the event station will not be repeating their received report from the station worked, so you'll have to listen carefully. There will be several winning categories, including overall winner, best UK place and best overseas place.

\*Note that G3SWM is not an active WAB Book Holder.

**Good luck - we look forward to receiving your entries and/or 'working' you on air.**



## The Rules

### Purpose

This contest is designed to promote the short wave listening hobby and to provide those s.w.l.s and DXers interested in competing an opportunity to participate in a carefully run, challenging contest.

### Eligibility

The 2004 *SWM* Listening Contest is open to all *Short Wave Magazine* readers. *SWM* staff are excluded from participation.

### Listening Period, Frequencies & Times

The contest listening period will begin on Monday 3 May 2004 at 0700UTC and end Monday 3 May 2004 at 1600UTC.

### Prizes

A plaque will be awarded by *SWM* to the winners. All entrants will receive a participation certificate indicating that they competed in the 2004 *SWM* Listening Contest. The certificates for the top ten will have their position indicated on the certificate.

### Scoring

Contestants are to log as many stations being worked by G3SWM as possible from as many countries as possible within the prescribed listening parameters. The first station logged from each country = 1 point. The second station from each country = 3 points; each additional station from that country = 5 points. To qualify for the contest, each contestant must present logs of 30 entries as a minimum - entries without these 30 logs will not be considered. These required loggings are to be counted in point totals. Upon completion of the contest, multiply the point total by the number of countries heard to determine the final score. A station is a radio amateur who has established contact with and been allocated an event serial number by G3SWM. All entries will be checked against the G3SWM station log for validity.

Each contestant is required to submit a paper log to include date, country, callsign, frequency, time, RST given to G3SWM, operator name and points for contact. Electronic log print-outs are acceptable.

Each contestant is required to total his own entry and provide a summary of the number of countries and stations claimed to support the point totals. The receiver(s) used in the contest must also be indicated. Logs must be in the format below and will be judged on accuracy, completeness and neatness. If the judges cannot read a log, it will not be counted for scoring purposes. The decision of the judges is final.

### Entry

Entries should be sent to: *SWM* 2004 Listening Contest, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. All entries must be received by Monday 19 May 2004.

Contestants will be notified of the results in the August 2004 issue of *Short Wave Magazine* in which a list of winners will be published.

## Sample Log

**DXers Name:** Mr SW Listener  
**Address:** The Shack, Antennaville, W. Midlands, UK

**Receiver:** HF-150

Date	Time	Callsign	Frequency	RST for G3SWM	Op Name	Country	Points
3 May	0700	M3SWM	7.070	48-	Kevin	England	1
3 May	0703	G4SLU	7.071	59-	Clive	England	3
3 May	0710	G3XFD	7.071	47-	Rob	England	5
3 May	0801	MM3ABC	3.685	56-	Bruce	Scotland	1

<b>Total No of Pages</b>	1
<b>Page 1 of</b>	1
<b>Total Points</b>	10
<b>Points this page</b>	10

## Well-known ATV guru Giles Read G1MFG describes the construction and flights of two high-altitude balloon experiments carrying 2.4GHz TV transmitters up to the very edge of space.

### How It All Started

The phone rang. "We want a balloon payload that will transmit TV pictures from ground level to 100000 feet, maybe 160km down range. Are you interested in helping?"

What a question! Of course I was interested - that's the sort of challenge I relish. The voice on the other end of the 'phone turned out to belong to **Dr Ilya Eigenbrot**, scientific communicator from Imperial College, London. He was speaking for **Mike Jones** of Film and Video Umbrella, who was working on behalf of the artist **Simon Faithfull**. Sounds complicated, but I found all the guys really easy to work with. Simon had a particular artistic requirement and after a few meetings and a lot of E-mails we hammered out a specification that would do what he wanted. We also decided to build two similar payloads rather than one, so that if one didn't work well then we'd have a second to fall back on.

#### Building The Payloads

The only information I had about the balloon was that it had a lifting capacity of 2kg. That isn't actually very much weight to play with, when you think that we'd be fitting batteries, a camera and a transmitter into the weight limit. Weight was to be a determining factor in terms of what could and could not be flown.

The first step was to specify the r.f. link. It had already been determined that the operating frequency would be in the 2.4GHz band, on one of the JFMG-licensed programme making and special events channels. Conveniently, that is well within the range of unmodified G1MFG.com transmitters, amplifiers and receivers!

The expected flight profile was that the balloon would go more or less straight up for the first 20,000 feet or so and then encounter winds of around 160km/h which would carry it off. Flight duration would be about two or three hours, so the payload might be anything up to 320km away at the end of the flight. Discussions with Ilya and his contacts in the Met. Office indicated that the normal distance was actually nearer 160km, so I tried to figure out a suitable specification by examining the path characteristics.

We could assume that it would be line-of-sight and so the normal Free Space Path Loss rules would apply. Don't worry about the calculations - they're only included for the benefit of mathochists.

For the purposes of the calculations I'd use a figure of 160km downrange, and the operating frequency would be 2.5GHz.

Free Space Path Loss =  $32.5\text{dB} + 20 \log(160\text{km}) + 20 \log(2500\text{MHz})$

Free Space Path Loss = 144.5dB

Receive sensitivity = -86dBm (typical for good quality on a G1MFG.com receiver)

Link power + antenna gain required =  $144.5 - 86 = 58.5\text{dB}$

Using a G1MFG.com 24dBi gain receive antenna, we still need 34.5dB of gain relative to 1mW.

A 6W amplifier equates to about +38dBm, giving a margin of 3.5dB over the minimum requirement. This means that we could use a relatively low gain transmit antenna for maximum coverage area.

Discussions with ANTEC (G8CKN) suggested that a hemispherical coverage with circular polarisation would be best. A suitable antenna was commissioned and constructed - an equal-angle spiral, to be precise. Circular polarisation, when received on a linearly polarised antenna, would result in a 3dB loss of signal but this would still leave a small margin.

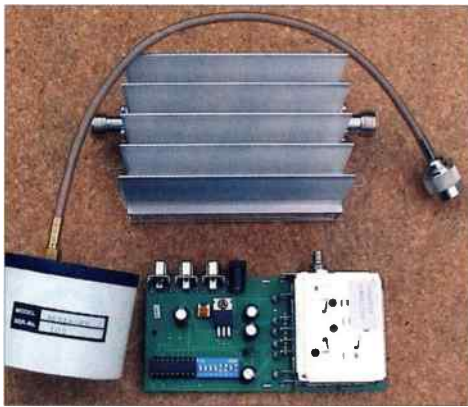
So, at this point the transmit equipment was pretty much decided. A quick visit to my stock room with my trusty scales indicated that a transmitter and 6W amplifier left plenty of weight over for batteries and a camera, so the project began in earnest.

Simon particularly wanted to start with an image of his face, which would then shrink into insignificance as the camera was carried away on the balloon. After a false start with a cheap p.c.b. camera we decided to use a high resolution JVC security camera as the main imaging element. We couldn't decide exactly what focal length lens would be appropriate, so we compromised by getting a zoom lens. Consultation with the camera supplier suggested that a video drive lens would be the best method of iris control. We didn't want to use an electronic iris because of the strobing effect which would have been apparent at high brightness levels (hence short exposure).

Fig. 1: The edge of space.



Up, Up and Away!



**Fig. 2:**  
Transmitter,  
amplifier and  
antenna.

### Power Supply

Batteries proved to be a huge problem. We needed a guaranteed operating life of at least three hours. Calculations suggested that the current requirement would be in the order of 2.5A so, on the face of it, a battery of about 10AH would be adequate. Most alkaline D-cells are quoted at about 14AH, so that should be an

ideal choice, right? Well, actually, no. That capacity is only achieved at low discharge rates. One respected manufacturer's data sheet showed that at a discharge rate of 2A their D-cell would only provide about 3AH. Shock,



**Fig. 3:** High resolution video camera.



**Fig. 4:** The lithium batteries.



**Fig. 5:** GPS receiver and TinyTrak.



**Fig. 6:** Expanding  
foam - the first test  
piece.

horror! What could we do? An extensive look around the available battery technologies suggested that lithium sodium dioxide was the answer. SAFT make such batteries in D-cell form, with a terminal voltage of 3V and rated capacity of 7.5AH at 1.5A drain. It was decided to use two sets of five batteries, for 15V open-circuit voltage. On load this reduced to about 13V, which was perfect for our application. Diodes were used to parallel the batteries safely. The only problem is that the batteries are stunningly expensive - about £15 each once you include VAT and carriage.

Once the batteries were sorted out, most of the rest of the payload came together fairly easily. Payload balance was something we had to take account of, so that it would stay fairly stable in flight. Again, this was fairly easy because the camera weighed about the same as the transmitter and power amplifier, so these could sit naturally either side of the heaviest item, the battery pack.

All that remained was to fit in the GPS element. The smallest GPS system we could easily find was a 'GPS Mouse' made by Fortuna, at around 80g it didn't add much to the weight and it was quite small. The easiest way to turn the GPS data into useable telemetry is to use a TinyTrack converter, which accepts standard NMEA data from a GPS

receiver and outputs APRS audio suitable for transmission by a radio link. This output was sent via the 6MHz audio subcarrier for decoding on the ground.

Now I had to determine how to package the various bits. Although a nice strong waterproof aluminium case would be ideal, the weight limitations meant that I only had about a hundred grams left over for the enclosure. Quite a problem! Also, I knew that in the upper atmosphere it gets pretty darned cold so I'd need to give the electronics some sort of protection. Thankfully, help was at hand by way of lightweight building filler foam. Although it's not much fun to work with, it can be used to make flat panels and fill voids. It comes in an aerosol and expands when it comes into contact with moisture in the atmosphere. I thought about using expanded polystyrene but decided it would be hard to make sure it stayed in one piece, and I wasn't sure if the filler foam would stick to it properly.

I found out that the foam didn't stick to Clingfilm, so I used that to line anything I didn't want it to adhere to. I made some thin flat foam panels by arranging a couple of sheets of plywood about a centimetre apart, covered with Clingfilm and spaced with wood. I filled the void with foam which then set into 10mm-thick panels. Then I cut pieces to size and constructed a tray about 75mm deep, using more spray foam as adhesive. Finally, the box was sprayed with fluorescent paint in a 'high-tech' cardboard box spray booth. Payload One was painted yellow, whilst Payload Two was orange.

A quick trip to the scales showed a looming disaster, because the various bits for the payload weighed more than 2kg. So, I decided to try removing the camera's case, which turned out to be made of steel and quite heavy. This proved to be the key to getting the weight down below the 2kg mark, so I could now start building

the payload in earnest.

As I've already said, the arrangement of the parts in the payload was pretty self-evident. The batteries, as the heaviest item, had to go in the middle. Given that Simon wanted to hold the payload close to his face, I needed to keep the transmitting antenna as far from the camera as possible, so the lens and antenna had to be at opposite sides. This naturally led to the arrangement of the camera on one side and the r.f. bits on the other side of the batteries. The GPS subsystem was put in where there was space, with the GPS receiver above the camera and the TinyTrak above the transmitter.

Incidentally, I knew it may be necessary to alter the frequency of the transmitter at any time up to the day of the flight. This would obviously be difficult with the DIP switches encapsulated inside the payload, so I added an extra set of switches on the opposite side of the board. A hole cut in the bottom of the box enabled access to the switches.

Initial testing was carried out at very low power in the license-free part of the band. An attenuator fitted between the transmitter output and the rubber duck antenna reduced the output to around 1mW e.r.p., which was sufficient to check that pictures were good and that the GPS subsystem was working OK.

Finally, the power amplifier and antenna were added and the payload was sealed with foam.

It was also necessary to work out a method of suspending the payload from the balloon. Although I hadn't been given



Fig. 7: Painting Payload 2.

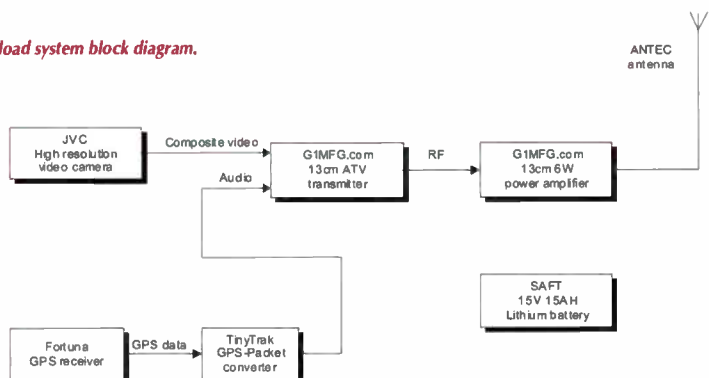


Fig. 9: Assembling the payload.



Fig. 10: Payload One completed.

Fig. 8: Final payload system block diagram.



any information on the subject, I figured that the balloon itself would have some sort of attachment point to which the payload could be affixed. So it was only necessary to work out a way of interfacing between that point and the payload. After due consideration spanning several cups of coffee and a nice hot bath, I decided that the perfect attachment method would be string! Two pieces were thus duly threaded through the payload in a suitable position to be load-bearing. They can just be seen in the photo of the completed payload.

After a discussion, we agreed that we wouldn't make any attempt to recover the payloads when they inevitably came down. Privately, I hoped that they'd land in a radio amateur's back garden so that the parts could be re-used, but of course that was extremely unlikely. It may seem odd that the project management team was prepared to throw away several thousand pounds worth of electronics but as the payloads weren't intended to be re-useable there simply didn't seem to be any point. We did write a return address on them though, just in case.



Fig. 11: A portable DVCAM recorder with integral l.c.d. screen.

### The Downlink Truck

Now we knew what we'd be throwing up into the air it made sense to pay a little attention to how we'd be capturing the transmitted images. Simon needed the highest quality capture possible because he was intending to project the finished tape onto the wall of a gallery. We discussed S-VHS and mini-DV, but eventually settled on DVCAM. In case you're not familiar with DVCAM, it's a professional digital format similar to mini-DV. The tapes look identical to mini-DV but the digitisation and recording format is different. Most DVCAM units can play mini-DV but the converse isn't normally true. A standard DVCAM tape lasts around 40 minutes, whilst a mini-DV one goes for an hour in standard play. There is no DVCAM long-play mode.

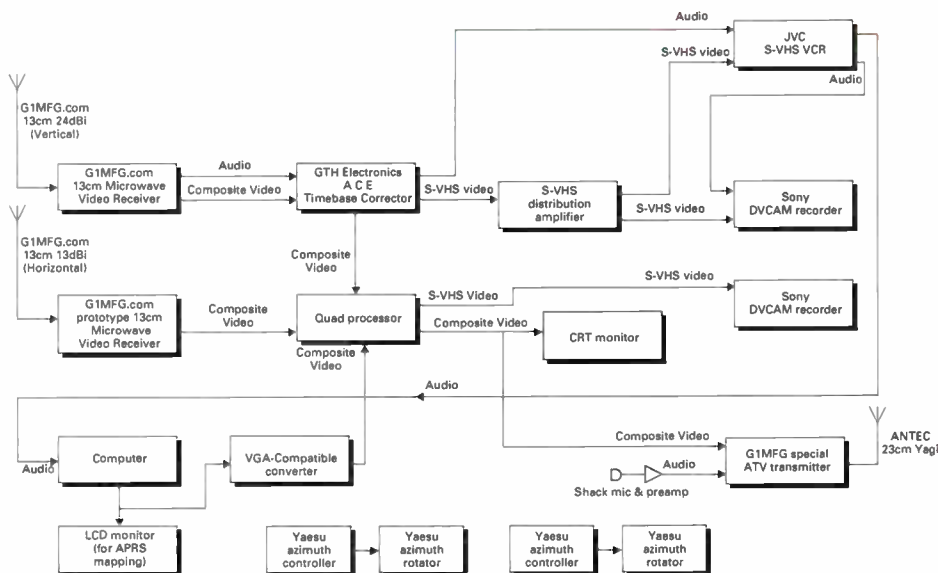


Fig. 12: Downlink configuration.

The downlink system turned out to be far, far more complicated than the payloads. I decided that it would be sensible to use two separate receive paths, one with a high gain (highly directional) and one low gain (not-so-directional) antenna. The reasons for this boil down to the fact that when the payload was being launched it would be moving quite quickly (in angular terms) relative to the vehicle. This could easily mean that it would go into a deep null of the directional antenna if the rotators couldn't keep up with the rate of turn. A lower gain antenna, with a wider beamwidth, would be more forgiving. Running two recorders, one on each receiver, would mean that during the edit phase any nulls from one could be replaced with video from the other, rather like a post-production manual

Continued on page 32

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Fig. 13: UI-View map display.



Fig. 14: Equipment inside the van.



Fig. 17: Launch T+3 seconds.



Fig. 15: The van seen from the outside.



Fig. 16: Filling the balloon.

Pictures from the Quad processor were transmitted on 23cm to GB3AT at Winchester, about 32km away. From there, pictures were linked by G8CKN to GB3HV at High Wycombe. Several local stations were also able to see the pictures on 1249MHz as they were transmitted from the downlink site. Successful reception reports were also received after the flight from

places as far apart as Norfolk and Stoke-on-Trent.



Fig. 18: One thousand feet and counting.



Fig. 19: The Western Solent and Lymington.



Fig. 20: Map of the previous aerial photo.

diversity receiver.

The downlink diagram, Fig. 12, looks daunting but is in fact relatively simple. The main high gain antenna (top left) feeds a standard G1MFG.com 13cm Microwave Video Receiver and thence into a GTH Electronics ACE, used as a timebase corrector. Incidentally, when used with the appropriate software version the ACE is a marvellous device for ATV because it will

drag colour out of nowhere and regenerate the syncs, burst and colour subcarriers to virtually broadcast standards. Certainly, without it the DVCAM recorder wouldn't have worked nearly as well. The S-VHS output from the ACE was then fed into a distribution amplifier which provided signals for one of the DVCAM recorders and my S-VHS recorder. Audio from the receiver (carrying the APRS data) was also fed to the S-VHS deck and the DVCAM recorder.

A second lower gain antenna was connected to a prototype G1MFG.com Microwave Video Receiver and the output video sent to a quad processor, which was being pressed into service as a timebase corrector. It didn't work anything like as well as the ACE but was good enough during the launch phase. The Quad's S-VHS output was fed to the second DVCAM recorder, and its composite output went to the 23cm ATV transmitter (more of which later). The Quad also took inputs from the main receiver and the computer.

Speaking of the computer, this was used to receive and decode the APRS packet data. For those who are not familiar with it, the Automatic Position Reporting System is a way of reporting position information using packet radio transmissions. In this instance we were using a GPS to find the location, which was being transmitted from the balloon. Decoding was accomplished by AGW Packet Engine by SV2AGW and map displays were courtesy of UI-View.

It had originally been intended to use a picture-in-picture display so that the UI-View map was superimposed on the downlinked video before transmission to the ATV repeaters. However, using the Quad as a timebase corrector for one of the DVCAM machines meant that this wasn't possible.

All of this equipment stacked up quite tidily in one corner of my motor caravan. If you saw the recent contest report and the pictures of a 'normal' temporary installation in the van, you'll realise what a triumph of tidiness this is!

The small mast in the foreground carries the 23cm transmit antenna and the 13cm receive antennas can be seen on the rear of the van. Rigging the antennas, connecting and testing the electronics and checking out the payloads took about half a day - launch day minus one.

### Countdown To Launch

Our original launch site should have been near Andover, but due to a last-minute problem with CAA clearance (where have we heard *that* before?) we had to move to the New Forest, just north-west of Sway at Set Thorns Inclosure. The Forestry Commission was very helpful in arranging permission for us to launch the balloon, camp overnight, and generally do all those things associated with a film shoot.

After a number of false dawns, launch day was set for 12 September 2003. We needed a day when the weather was going to be as near perfect as possible, but had missed all the glorious summertime. But the Met. Office promised us a great big high pressure system over the country on that day, and it duly materialised. So we were good to go!

The first task was to inflate the balloon. This took quite a while and rather a lot of helium!

As you can see, the balloon was a good size - and that was only about two thirds full! As the balloon rises and air pressure reduces, the balloon swells considerably. At its maximum altitude it would have been about eight metres across.

Apart from our payload, we also carried a Met. Office



radiosonde which transmitted meteorological data back. This gave us an insight into things like the atmospheric pressure and temperature, which went down to below -60° centigrade at one point. Frankly, I was amazed that the camera, transmitter and amplifier continued to operate in such hostile conditions. The foam used to encapsulate the payloads would have offered some insulation of course, and the electronics were dissipating a bit of power so it would have kept itself warmish but even so, none of the equipment had ever been tested at freezing let alone at such intense cold.

### At Last The Moment Came For Lift-Off

Up, up and away the balloon lifted the payload. But - horrors - we found that the pictures were all terribly overexposed! There was nothing we could do about it except cry into our beer and hope that some post-processing would be able to get some information back into the pictures. The other problem with the first launch was that there was a bit of a breeze blowing and, even running at full tilt, Simon couldn't keep in the frame. That in itself rather negated the usefulness of the launch, which was a pity. Otherwise, flight one went well and provided good r.f. for about an hour, then poorer signals as the distance increased.

Towards the end of the flight we started preparing the second payload. The first thing to do was adjust the camera so it wouldn't suffer the same overexposure as the first. This done, we filled another balloon and went back to the launch site.

After a couple of false starts (including one unscheduled balloon burst!) we managed to get the second payload off the ground and aloft. After a few moments the GPS was reporting that the thousand foot mark had been passed, and we were getting good pictures!

The r.f. link from the second payload didn't behave anything like as well as the first one. We experienced deep nulls in the transmission as the balloon spun round. This resulted in pictures varying from P5 to P0 over a period of a few seconds. But because we had two receivers running we generally got good video all the time from one receiver or the other so although editing will be a pain it will be possible to get a good result with only minimal fades.

As the balloon gained height we were treated to some stunning images of the western Solent.

The flight path took the balloon south-east over the Isle of Wight. By the time it was over the southernmost tip of the Isle of Wight the pictures were starting to get a bit weaker but were still fantastic to behold. Unfortunately, the land rose slightly to the south east of the links vehicle and the top of the rise was covered in trees. I suspect that the attenuation caused by those trees was largely responsible for the poor signals we were getting - we all know how efficiently trees attenuate 13cm signals.

Shortly after this picture was taken, the balloon got caught up in the high speed winds which are often present at high altitude. Having reached this position in a fairly leisurely manner, the payload started haring off at over 160km/h in the general direction of Le Havre, France.

As the flight progressed the signal strength continued to deteriorate so that we lost the audio subcarrier and with it the GPS position data. We did occasionally get enhancements though and know that near the end of the flight the balloon was about 70000 feet above a point roughly 40km north-west of Le Havre.

### The Balloon Burst

The payload started to tumble as it fell and we got a tantalisingly brief glimpse - about ten frames - of the

parachute beginning to deploy, the burst balloon material, and other parts of the suspension harness, silhouetted against the inky blackness of space. The edge of the Earth was clearly visible, as was the razor-thin atmosphere shining a beautiful blue. The wide-angle lens caused a weird effect in this shot, making the outline of the Earth bend the wrong way. The black was deep space, honest.

As the balloon continued to fall and tumble we got more shots of the edge of space, above a featureless sea. These pictures were spellbinding to behold live - tantalising glimpses of the edge of our home planet interspersed with bursts of noise. I suspect it's the closest I'll ever get to being an astronaut...

The payload took a surprising length of time to fall to Earth. We were still receiving intermittent pictures over 20 minutes after the balloon burst, and believe it was still at over 20,000 feet at that point.

SWM



**Fig. 21: Southernmost tip of the Isle of Wight at about 30,000 feet.**



**Fig. 22: Moments after the balloon burst - at the very edge of space.**

### Conclusion

The second flight was agreed by all concerned to have been much better than the first from an artistic point of view, because it had kept Simon in the frame during the launch phase and had stayed more-or-less above the launch site. From my point of view, it's a close-run thing. Although the video was overexposed on the first flight it did respond to post processing and the r.f. was a lot cleaner, with fewer dropouts. Both flights gave us stunning images and the thrill of seeing the edge of space, so overall it's very hard to choose between them.

This was not a cheap project. The hardware for each payload cost well over £1000, plus of course the time involved in putting them together. Then there were all the people involved in the launch day and all the post-processing and so on. I shudder to think of the total bill, but I'm glad I wasn't paying for it.

I learned a few useful things during the project. If I was doing it again for myself I think I'd use a lower power transmitter - probably one of my 250mW ones - and two cameras. Because of cost and weight considerations they'd have to be cheap p.c.b. cameras, and I'd use a simple switch to give a minute of 'down' then half a minute of 'sideways'. That would give a lovely view of the Earth and also of the horizon as it broadens and outer space

becomes visible. I would probably not bother with GPS either, because I found it was actually quite easy to work out the position over land simply by comparing the downlink video with a road map! Having re-evaluated the trajectory I think I'd also use a simple dipole antenna, vertically polarised, below the payload. At maximum range, when we need the best r.f. performance, the payload is effectively only a few degrees above the horizon so a dipole radiation pattern would be ideal. At closer ranges there would still be enough from the ends of the dipole to be able to get pictures.

A lighter, lower power transmitter and lightweight camera would also mean that fewer, lighter and cheaper batteries could be used. Four lithium C-cells would probably be sufficient to provide the power. This would mean that the whole payload was a lot lighter so a much smaller balloon (and hence less gas) could be used. I would guess that a decent payload could be put together in less than 500g if you put your mind to it.

You can see Simon Faithfull's finished work, 30km, at the Aspex Gallery, Portsmouth from 1 May - 19 June or at the Pumphouse Gallery, London from 8 June - 31 July. Find out more about Simon at [www.simonfaithfull.org](http://www.simonfaithfull.org) and of course take a look at Giles' website at [www.g1mfg.com](http://www.g1mfg.com)

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World Radio History

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# Ol' Sol and Its Effect on Radio Propagation Part 2



**In the light of recent massive solar activity which had a very significant effect on radio propagation, here is a comprehensive run-down on the sun's mechanisms that effect radio communication here on planet earth. The late Joe Carr explains.**

**D**isturbances in the ionosphere can have a profound effect on radio communications and most of them, but not all, are bad. Let's briefly examine some of the more common forms.

**Sporadic E-Layer.** A reflective cloud of ionisation sometimes appears in the E-layer of the ionosphere; this layer is sometimes called the Es layer. It is believed that the Es layer is formed from the effects of wind shear between masses of air moving in opposite directions. This action appears to redistribute ions into a thin layer that is radio reflective.

Sporadic-E propagation is normally thought of as a v.h.f. phenomenon, with most activity between 30 and 100MHz, with decreasing activity up to and above 100MHz. However, about 25 to 50 percent of the time sporadic-E propagation is possible on frequencies down to 10 or 15MHz. Reception over paths of 2200 to 4200km are possible in the 50MHz region when sporadic-E is present. In the Northern Hemisphere,

the

months of June and July are the most prevalent sporadic-E months. On most days when sporadic-E is present, it lasts only a few hours.

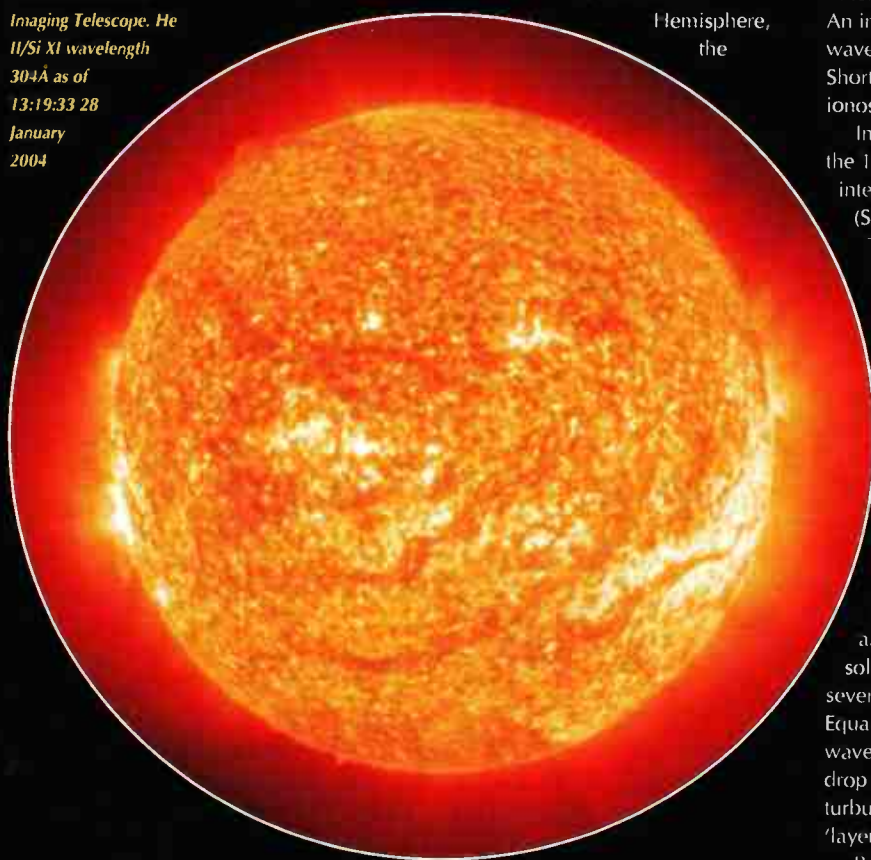
**Sudden Ionospheric Disturbances (SIDs).** The SID, or 'Dellinger Fade', mechanism occurs suddenly and rarely gives any warning. Solar flares, **Fig. 1.4** are implicated in SIDs. The SID may last from a few minutes to many hours. It is believed that SIDs occur in correlation with solar flares or 'bright solar eruptions' that produce immense amount of ultraviolet radiation that impinges the upper atmosphere. The SID causes a tremendous increase in D-layer ionisation, which accounts for the radio propagation effects. The ionisation is so intense that receiver operators on the sunny side of the Earth experience profound loss of signal strength above about 3MHz. It is not uncommon for receiver owners to think their receivers are malfunctioning when this occurs. The sudden loss of signals on sunny side receivers is called 'Dellinger fade'. The SID is often accompanied by variations in terrestrial electrical currents and magnetism levels. An interesting anomaly is seen when SIDs occurs. The short waves drop out, and may stay there for awhile. This is called Short Wave Fade (SWF). A point of refraction from the ionosphere on the sunny side of the Earth - **Fig. 2.9**.

Interestingly enough, distant v.l.f. signals, especially in the 15 to 40kHz region, experience a sudden increase in intensity. This is called Sudden Enhancement of Signal (SES). Also, a Sudden Phase Anomaly (SPA) can occur. These are due to the fact that the SID event results in deep ionisation way into the D-layer. This ionisation increases absorption of h.f. signals. But the wavelength of v.l.f. signals is close to the distance from the Earth's surface to the bottom of the D-layer, so that space acts like a gigantic 'waveguide' (as used in microwave) when the SID is present...thus propagating the v.l.f. signal very efficiently.

**Ionospheric Storms.** The ionospheric storm appears to be produced by an abnormally intense rain of atomic particles in the upper atmosphere and are often preceded by SIDs 18 to 24 hours earlier. These storms tend to last from several hours to a week or more, and are often preceded by two days or so by an abnormally large collection of sunspots crossing the solar disk. They occur most frequently and with greatest severity, in the higher latitudes, decreasing toward the Equator. When the ionospheric storm commences, short wave radio signals may begin to flutter rapidly and then drop out altogether. The upper ionosphere becomes chaotic, turbulence increases and the normal stratification into 'layers' or zones diminishes.

Radio propagation may come and go over the course of

A sample image captured by the SOHO Extreme ultraviolet Imaging Telescope. He II/Si XI wavelength 304Å as of 13:19:33 28 January 2004



the storm, but it is mostly dead. The ionospheric storm, unlike the SID, which affects the sunny side of the Earth, is world-wide. It is noted that the m.u.f. and critical frequency tend to reduce rapidly as the storm commences.

An ionospheric disturbance that I observed in November 1960 was preceded by about 30 minutes of extremely good, but abnormal propagation. Here in the USA at my QTH, some 2000 European stations were noted with S9+ signal strengths in the 7.0 to 7.3MHz region of the spectrum, which is an extremely rare occurrence. After about 30 minutes, the bottom dropped out and even m.w. skip (later that evening) was non-existent. At the time, the National Bureau of Standard radio station, WWV was broadcasting a W2<sup>1</sup> propagation prediction at 19 and 49 minutes after each hour. It was difficult to hear even the 5MHz WWV frequency in the early hours of the disturbance, and it disappeared altogether for the next 48 hours.

### Great Circle Paths

A great circle is a line between two points on the surface of a sphere such that it lays on a plane that passes through the Earth's centre and including the two points. When translated to 'radiospeak', a great circle is the shortest path on the surface of the Earth between two points. Navigators and radio operators use the great circle for similar, but different reasons. The navigator in order to get from here to there, and the radio operator get a transmission path from here to there.

The heading of a directional antenna is normally aimed at the receiving station along its Great Circle path. Unfortunately, many people do not understand the concept well enough, for they typically aim the antenna in the wrong direction. For example, I live near Washington, DC, which is on approximately the same latitude as Lisbon, Portugal. If I catch a lift on Superman's back, and he flies due East, we'll have dinner in Lisbon, right? Wrong. If you head due East from Washington, DC, across the Atlantic, the first landfall would be West Africa, somewhere near Zaire or Angola. Why? Because the great circle bearing 90° takes us far south. The geometry of spheres, not flat planes, governs the case.

**Long Path v Short Path.** The Earth is a sphere, or more precisely, an 'oblique spheroid'. So, from any given point to any other point there are two great circle paths: **long path** - major arc and **short path** - minor arc. In general, the best reception occurs along the short path. In addition, short path propagation is more nearly 'textbook' compared with long path reception. However, there are times when long path is better, or is the only path that will deliver a signal to a specific location from the geographic location in question.

### Using The Ionosphere

The refraction of high frequency and some medium wave radio signals back to Earth via the ionosphere gives rise to intercontinental h.f. radio communications. This phenomena becomes possible during daylight hours and for awhile after sunset when the ionosphere is ionised. The mechanism of long distance skip communications is reiterated in Fig. 2.10. The transmitter is located at point T, while receiving stations are located at sites R1 and R2.

Signals 1 and 2 are not refracted sufficiently to be able to make it back to Earth, so they are lost in space. Signal 3, however, is refracted enough to return to Earth, so it is heard at station R1. The skip distance (D1) for signal 3 is the distance from T to R1. At points between T and R1 signal No. 3 is inaudible, except within ground wave distance of the transmitter site (T). This is the reason why two stations 64km apart hear each other only weakly, or not at all, while both stations can communicate with a third station 3200km away. In amateur radio circles it is common for South American stations to relay between two USA stations only a few kilometres apart.

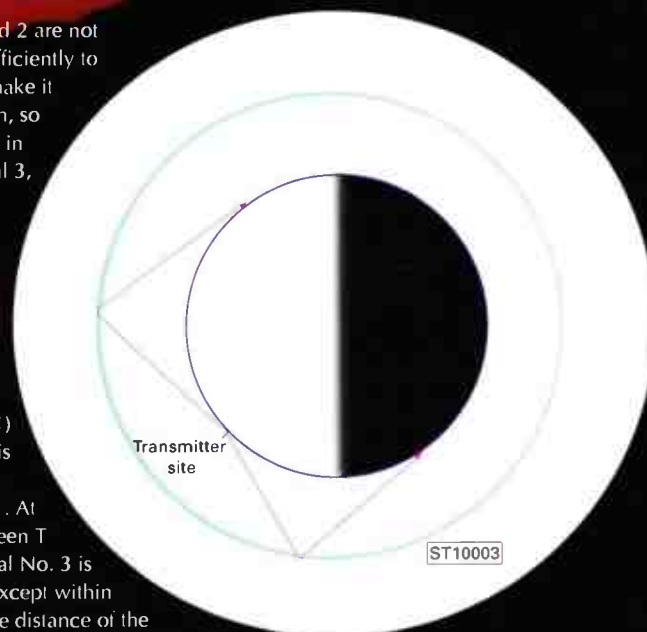


Fig. 2.9: A point of refraction from the ionosphere on the sunny side of the Earth.

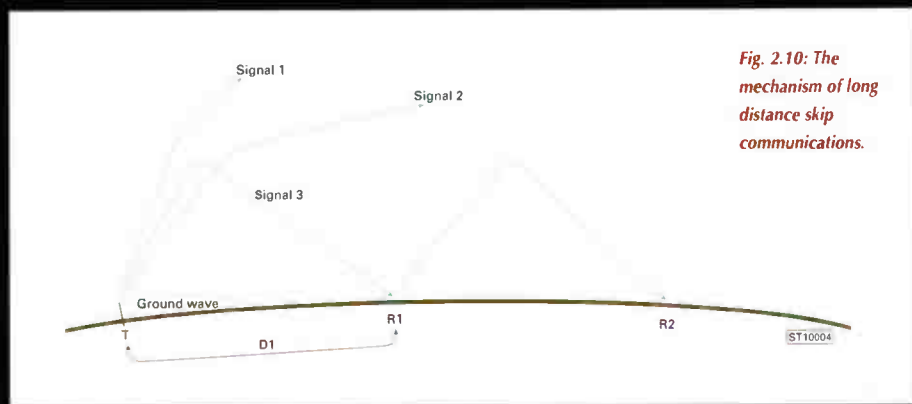


Fig. 2.10: The mechanism of long distance skip communications.

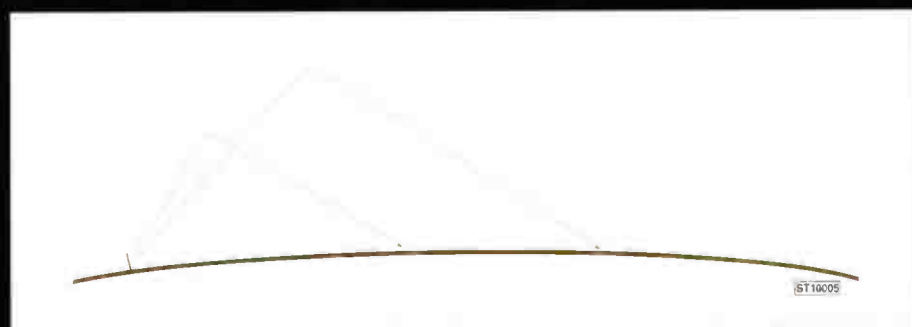


Fig. 2.11: Skip signals are received at different distances depending upon the angle of radiation of the transmitting antenna.

Multi-hop skip is responsible for the reception of the signal from transmitter T at site R2. The signal reflects (not refracts) from the surface at R1, and is retransmitted into the ionosphere where it is again refracted back to Earth.

Figure 2.11 shows a situation where skip signals are received at different distances depending upon the angle of radiation of the transmitting antenna. A high angle of radiation causes a shorter skip zone, while a lower angle of radiation results in a longer skip zone. Communication between any particular locations on any given frequency requires adjustment of the antenna radiation angle. Some international short wave stations have multiple antennas with different radiation angles to ensure that the correct skip distances are available.

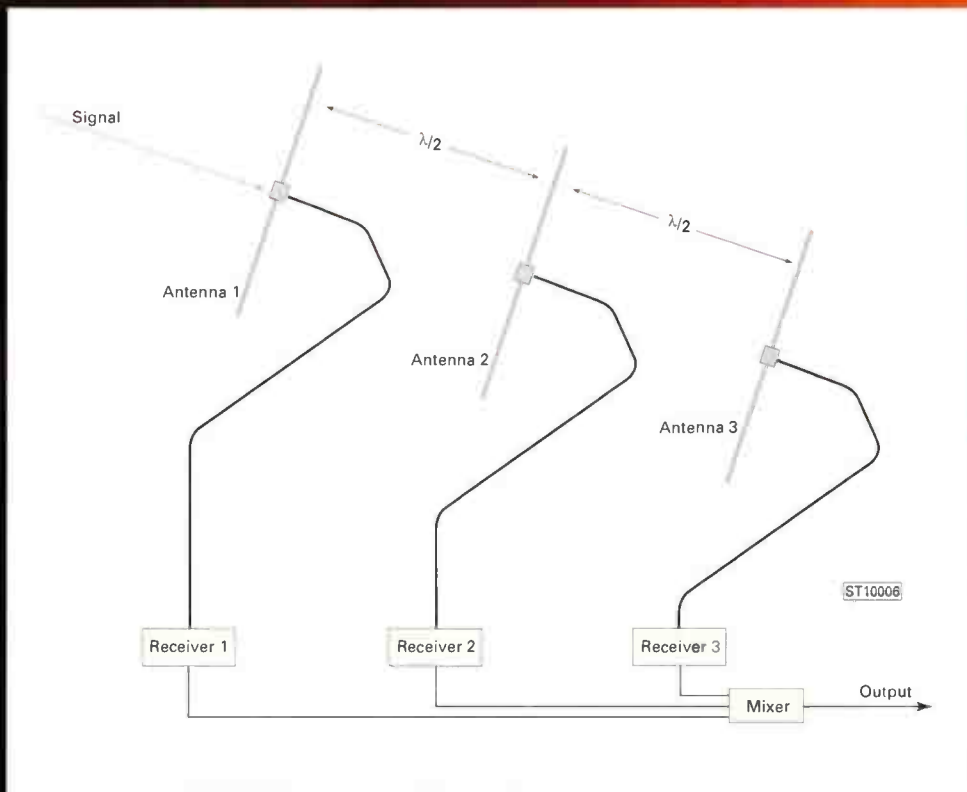


Fig. 2.12: The spatial diversity system.

### Grey Line Propagation

The grey line is the twilight zone between the night and daytime halves of the Earth. This zone is also called the **planetary terminator**. It varies up to 23° either side of the north-south longitudinal lines depending on the season of the year (it runs directly north-south only at the vernal (spring) and autumnal equinoxes). The D-layer of the ionosphere absorbs signals in the h.f. region. This layer disappears almost completely at night, but builds up during the day. Along the grey line, the D-layer is rapidly decaying west of the line, and has not quite built up east of the line.

Brief periods of abnormal propagation occur along the grey line. Stations on either side of the line can be heard from regions, and at distances, that would otherwise be impossible on any given frequency. For this reason, radio operators often prefer to listen at dawn and dusk for this effect.

### Fading

Skip communications has problems. One phenomena is fading, i.e., a variation in signal strength as perceived at the receiver site. This problem can sometimes be overcome by using one of several diversity reception systems. Three forms of diversity technique are used: **frequency diversity**, **spatial diversity** and **polarity diversity**.

In the frequency diversity system, the transmitter will send out two or more frequencies simultaneously with the same modulating information. Because the two frequencies will fade differentially, one will always be strong.

The spatial diversity system, Fig. 2.12, assumes that a single transmitter frequency is used. At the receive site two or more receive antennas are used, spaced one-half wavelength apart. The theory is that the signal will fade at one antenna while it increases at the other. A three-antenna system is often used. Three separate, but identical, receivers, often tuned by the same Master Local Oscillator, are connected to the three antennas. Audio mixing, based on strongest signal, keeps the audio output constant while the r.f. signal fades.

Polarity diversity reception, Fig. 2.13, uses both vertical

and horizontal polarisation antennas to receive the signal. Like the spatial diversity system, the outputs of the vertical and horizontal receivers are combined to produce a constant level output.

Another form of fading, **selective fading**, derives from the fact that fading is a function of frequency. The carrier and upper and lower sidebands of an a.m. signal have slightly different frequencies, so they arrive out of phase with each other. Although this type of fading is lessened by using single sideband transmission, that does not help a.m. users. In those systems some people use a filtering system that eliminates the carrier and one sideband, it then reconstitutes the a.m. signal with a product detector.

The use of s.s.b. receivers with stable local and product detector oscillators, and a sharp i.f. bandpass filter, allows the reduction of the effects of differential fading of a.m. signals due to phasing of the l.s.b., u.s.b. and carrier components. Carefully tune the receiver to only one sideband of the signal, and note when the heterodyne

beat note disappears. The correct point is characterised by the fact that you can then switch among u.s.b. and l.s.b. modes without changing the received signal output. An even better solution, is the use of a synchronous detector, which provides phase locking of the receiver's carrier insertion oscillator to the carrier of the transmission's carrier.

### Scatter Propagation Modes

Ionospheric scatter propagation occurs when clouds of ions exist in the atmosphere. These clouds can exist in both the ionosphere and the troposphere, although the tropospheric mode is more reliable for communications. The mechanism for scatter propagation can be seen in Fig. 2.14. Radio signals from the transmitter are reflected from the cloud of ions, to a receiver location that might otherwise not receive it. Scatter propagation occurs mostly in the v.h.f. region, and allows communications over extended paths that are not normally available.

There are at least three different modes of scatter from ionised clouds: **backscatter**, **side scatter** and **forward scatter**. The backscatter mode is a bit like radar, in that signal is returned back to the transmitter site, or regions close to the transmitter. Forward scatter occurs when the reflected signal continues in the same azimuthal direction (with respect to the transmitter), but is redirected towards the Earth's surface. Side scatter is similar to forward scatter, but the azimuthal direction may change.

Unfortunately, there are often multiple reflections from the ionised cloud, and these are shown as 'multiple scatter' in Fig. 2.14. When these reflections are able to reach the receiving site, the result is a rapid fluttery fading that can be of quite profound depths.

### Auroral Propagation

The visual auroral effect is a luminescence in the upper atmosphere resulting from bursts of particles released from the Sun 18 to 48 hours earlier. The light emitted is called the **northern lights** (*Aurora Borealis*) and the **southern lights** (*Aurora Australis*). The ionised regions of the atmosphere

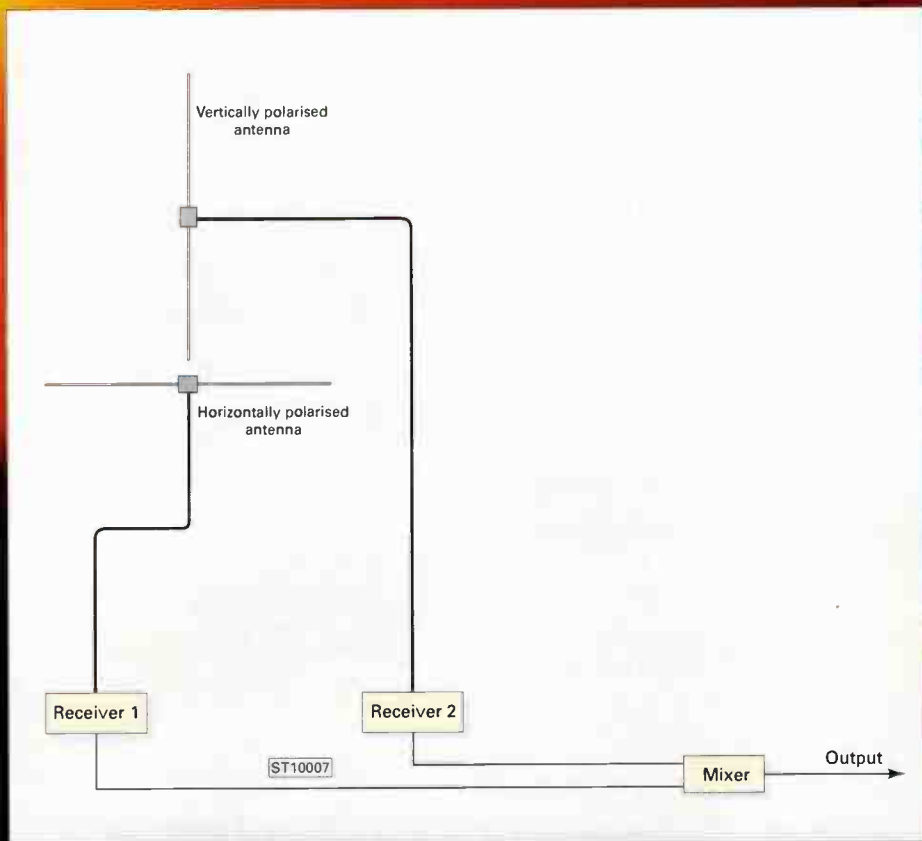


Fig. 2.13: Polarity diversity reception.

that create the lights form a radio reflection shield, especially at v.h.f. and above, although 15 to 20MHz effects are known. Auroral propagation effects are normally seen in the higher latitudes, although listeners in the southern tier of states in the USA and in Europe are often treated to reception of signals from the north reflected from auroral clouds.

### Meteor Scatter Propagation

When meteors enter the Earth's atmosphere, they do more than simply heat up to the point of burning. The burning meteor leaves a wide, but very short duration transient cloud of ionised particles in its path. These ions act as a radio mirror that permits short bursts of reception between sites. Meteor scatter reception is not terribly reliable, although at least two companies offer meteor scatter communications services for users in the higher latitudes.

### Other Propagation Anomalies

The ionosphere is a physically complex place, and even the extensive discussion in this article is not sufficient to do it justice. Indeed, entire books are available on the subject, and it is a valid engineering subspecialty. It is therefore not surprising that a number of propagation anomalies are known.

**Non-reciprocal Direction.** If you listen with an amateur band receiver on the East Coast of the United States you will sometimes hear European stations, especially in the late afternoon. But when you try to work those stations there is no reply whatsoever. They simply don't hear you! This propagation anomaly causes the radio wave to travel

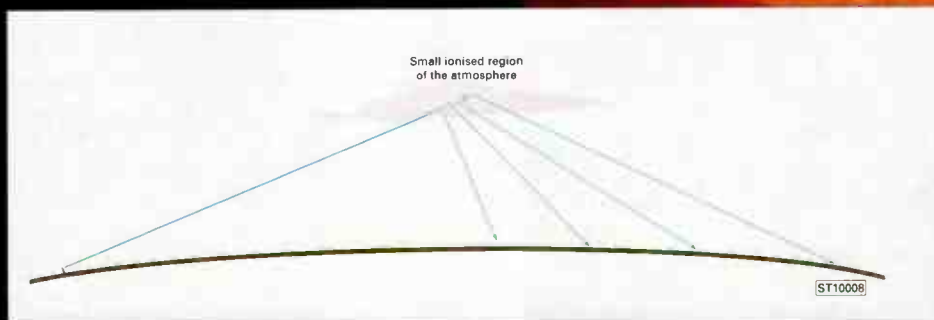


Fig. 2.14: The mechanism for scatter propagation.

different paths dependent on which direction it travels; i.e. an east-to-west signal is not necessarily the reciprocal of a west-to-east signal. This anomaly can occur when a radio signal travels through a heavily ionised medium in the presence of a magnetic field, which is exactly the situation when the signal travels through the ionosphere in the presence of the Earth's magnetic field.

Another anomaly seen in the radio literature of the 1930s is the 'Radio Luxembourg Effect'. It is named after the radio station where it was first noticed. In a non-linear ionosphere, it is sometimes noted that the modulation of superpower (i.e. >500kW) short wave broadcasters will be transferred to the carrier of a weaker signal in the same or nearby band. The interchange noted in the 1930s when this phenomenon was first discovered was between Radio Luxembourg and Britain's British Broadcasting Corporation overseas outlets.

SW

### References

<sup>1</sup>An Astronomical Unit is about 149,501,201km, or the distance from the Earth to the Sun.

<sup>2</sup>Obsolete designation. Later that weekend WWW must have broadcast a WW1, but it was inaudible.

For and all round useful web resource on the Sun and propagation visit <http://prop.hrradio.org/>

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***When a mere metre just isn't enough...Dave Cawley the Managing Director of Timestep Electronics Ltd. recounts his experience of arranging a 'large' dish to enable reliable reception of the new LRIT format transmissions.***

Unlike the film of the same name\*, we are not looking at the Moon but the weather satellite *GOES East* covering the eastern side of North America. Receiving *GOES* in the UK has always been a big problem. In my former home's West Suffolk location it was well and truly below the horizon. Only Lawrence Harris had seemed to get reliable access between the neighbouring houses when he lived in Plymouth.

Recently, Timestep relocated from West Suffolk to Dartmouth, Devon to be on the river and so close to the 14 pubs! My first temporary office was located on Jawbones Hill at 167m above sea level. It was there that to my amazement, using a 225mm flat panel 'patch' antenna, I received *Meteosat 5* over India,

*Meteosat 7* over Europe and by standing on the hedge, *GOES East* over America. This was a very neat party trick, but not of any great importance, until...

**LRIT**

Both Timestep and RIG attended the 2002 NOAA conference in Miami, Florida where we learnt that *GOES WEFAX* would be replaced by LRIT, a new higher resolution system but still transmitting on 1691.0MHz.

Trials were scheduled to start in early 2003 and the dawning of an idea started. However, by now I had vacated the 'Office on the Hill' and moved to an industrial unit in the town. Did I want to receive the new LRIT or not? Of course I did!

A quick chat with **Richard Rendle** the Town Mayor, resulted in his suggesting that it would be

a good idea to find a site and apply for planning permission.

I estimated a 3.7m dish about 1m off the ground would be quite good enough, in all almost a 5m high dish! After some investigation, I found two sites, one on a new industrial site at the entrance to the town, and the old 'Office on the Hill'. Richard suggested I attempt to engage the enthusiasm of the local councillors, the district councillors, the economic development officer, the industrial estates manager and the chief planning officer. What a task!

The Mayor supported me fully, suggesting it might put Dartmouth on the Industrial Map. In fact we did manage a site meeting on the industrial site at the beginning of the town, the dish would have made a statement to everyone entering

the town. The planners were not impressed, high tech yes, an eyesore too? - yes! So I humbly suggested we go to the 'Office on the Hill'. Here they unanimously said yes, subject to a meeting and drawings.

I commissioned **Bob Benns** of BBH Architects who drew up a plan and after the first council meeting the plans were approved, provided that the potentially invisible dish was painted grey not cream.

So now I had planning permission, but no dish and I had also forgotten to get permission from '**Cutty**' Rogers the land owner, oh and an office too!

**600 Pieces**

'Cutty' said yes and gave me a bottle of red wine from his holiday in France! **Nick Bailey**,



my ex-neighbour 'on the hill' kindly said I could use one of his offices rather than rent a new suite, only the dish remained...

A quick scout of the Internet news groups raised our old friend **John Locker** who said he knew of a 12 foot dish in pieces in Birmingham, and instead of £1,700 it was £250. Quick as a flash, my friend **Bob Ward** was in the car with my trailer behind. The dish was everything promised, but it had been disassembled into around 600 pieces with a half-complete assembly manual. Annoyingly, it would have fitted in the car without the need of a trailer. Luckily, the next week our subcontractors **Peter** and **Brenda** were in Dartmouth and, as they do, just assembled it from scratch.

But it was big, very big, much bigger than we had

expected. Nick Bailey happens to be the industrial designer responsible for the shape of the London Eye pods; he suggested at least three tonnes of concrete and a minimum of a heavy walled 90mm diameter pole. Quotes revealed the pole alone might cost over £100.

Having another beer with Richard (the Mayor), who also runs the Vosper Thornycroft boat yard that services the Royal Navy fleet of training ships in Dartmouth, revealed a large amount of used and scrap metal, and there on one side was a 6m length of truly heavy walled 90mm diameter steel. The trailer was there hours later and minutes after the pole was by the 'Office on the Hill'. Cutty suggested a local farmer who had a digger and £40 later the big hole was dug. Concrete was a problem, and I just had to bite

the bullet and pay a man just over two hundred pounds. **Sam Elsdon** (of RIG fame) supervised the job and **John Keel** made a wooden crucifix type object that kept the pole still in the concrete during its two week setting period.

#### All's Well...

Eventually, Bob, John and I got the dish up onto the pole and we were staggered at the size once again. However, our problems were not yet over. The Office on the Hill is 550 feet above sea level with a sea view for nearly 180° degrees, it gets the wind, in a big way! The original bracket failed almost immediately. But Dartmouth is boat country, John called on a favour of the aptly named fabricators 'Hercules' and they made a strong bracket from

12mm plate stainless steel. This fixed the problem once and for all.

Many months later and with so many favours from so many different people, we were finally there. A truly amazing joint effort. But does it work? Yes, and of course a big yes! The signal is truly huge and totally reliable, even at 3° above the horizon. A few months ago GOES started to broadcast LRIT for 30 minutes in every hour. Our software is nearly finished and the hardware in progress. The images are very good, but that is the subject of another article.

I cannot overemphasise my gratitude to the many people who willingly helped me. Every obstacle was overcome in a team like fashion. As we say down here, "another Dartmouth moment!".

**SWM**

\*Based on a true story, *The Dish* recounts the emotions, drama and humour behind the four-day Apollo XI mission in July 1969 and the extraordinary role that Australia played in televising the historic lunar landing to the world. Inauspiciously located on a remote sheep farm in the rural town of Parkes, New South Wales, Australia, The Dish is a mammoth, 1000 tonne radio telescope. In 1969, NASA intended to use the Australian telescope, the most powerful receiving dish in the Southern Hemisphere, as a 'back-up' to its prime receiver in Goldstone, California. But a last-minute change in the Apollo XI flight schedule change rendered the Goldstone telescopes ineffective and the Aussie dish became NASA's only hope for conveying to the world man's first steps on the moon.

Technical difficulties threaten to disrupt the scientists' bid for glory: hours before Apollo XI is scheduled to land on the moon, disaster strikes at the Parkes dish when our earth-bound crew loses contact with the Apollo XI spacecraft during a power outage. Scrambling to restore contact with the Apollo XI, the dish technicians launch an exhaustive effort to relocate the spacecraft in time to broadcast images of Neil Armstrong's landmark lunar trek to the world. With help from the colourful cast of local characters, the dish team and their American counterpart struggle to overcome a series of mishaps and play their part in one of mankind's greatest achievements.

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This SGC d.s.p. Speaker's performance is pretty impressive and the ADSP<sup>2</sup> copes well with a wide range of signal types and modes. We found that during use and evaluation there was no doubt that the ADSP<sup>2</sup> reduces noise very effectively

Making the ADSP<sup>2</sup> ready for use is simple, you just need to plug the 3.5mm mono jack plug into the audio output of your receiver and provide the unit with 10 to 15V d.c. via a supply that can provide up to 500mA.

As with all audio d.s.p. units, the ADSP<sup>2</sup> takes the band of audio frequencies which have been processed by the receiver circuitry and digitises the analogue waveforms by sampling the audio energy at a suitably high rate. Once the audio has been transformed into digital data the dedicated digital signal processing device can apply its noise cancelling algorithms to this data stream. When the noise removal process is done the data is fed through another conversion process to return it back into an analogue waveform that is used by the internal audio power amplifier

The noise reduction level selection is implemented by using the ADSP<sup>2</sup>'s top mounted push button. Either 13dB (one l.e.d.), or 26dB (two l.e.d.s) of noise reduction are available. With neither illuminated, the d.s.p. circuitry is bypassed.

Now you have a chance to win one of these excellent units for yourself.

Our thanks go to **W&S [www.wsplc.com](http://www.wsplc.com)** for donating the prize SGC ADSP<sup>2</sup> d.s.p. speaker.

### ENTRY FORM

To enter this prize draw, please fill in your details on the entry form, photocopies are accepted with the original corner flash attached and answer the three questions. Post your entry to: **SWM/SGC ADSP<sup>2</sup> Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.**

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### QUESTIONS

**Q1:** What does the acronym DSP stand for?

**Q2:** In which *SWM* can you read a review of the SGC ADSP<sup>2</sup>?

**Q3:** How many levels does the ADSP<sup>2</sup> DSP Speaker offer?

The closing date for this competition is 25 March 2004, the winner will be drawn on 5 April 2004 - the first correct answer drawn will win. The winner will be announced in the May 2004 *SWM*. The Editor's decision is final.

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# DRM With & Without

**Receiving DRM using an AOR AR5000 both with and initially, due to lack of patience, without auxiliary hardware. Francois Michaud-Herbst shares some experimenting from his native Canada.**

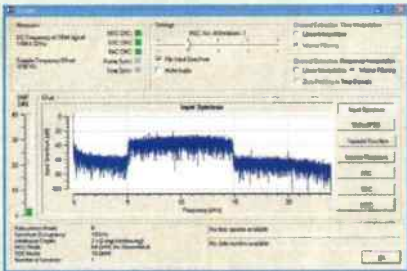


Fig. 1: The DREAM decode screen.

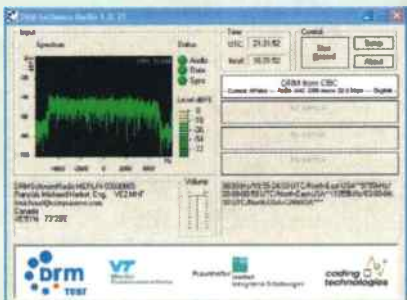


Fig. 2: The DRM main screen, active on 9.8MHz.

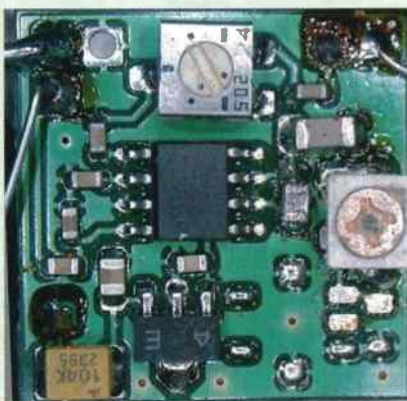


Fig. 3: The 10.7MHz to 12kHz converter module.

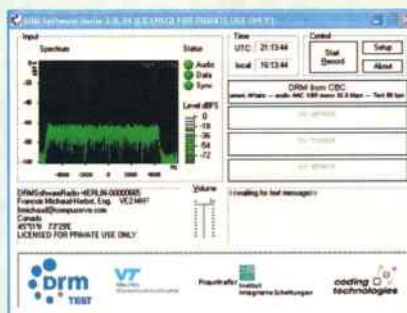


Fig. 5: The DRM v 2.0.34 in action via the

Recently, after some 40 years of monitoring analogue short wave broadcasts and reading interesting papers about DRM on the AOR UK Internet website - [www.aoruk.com/drm.htm](http://www.aoruk.com/drm.htm) - I decided it was time to experiment, especially because there are transmissions directed to Canada and USA every evening on 9.800MHz. These originate from the Radio Canada International transmitter site in Sackville. There is a complete schedule and frequency listing available at [www.drm.org/system/globfieldtrial.htm](http://www.drm.org/system/globfieldtrial.htm)

The currently accepted way of receiving a DRM

being impatient to get on and experiment, I found another solution by using my trusty AOR AR5000 receiver. The AR5000, it turned out, allowed demodulation without the external conversion process being used.

I discovered that it was possible, using the standard 'wide' 30kHz filter and the resultant audio from the ACC1 connector. In summary, the method I utilised is:

- \*Increase the frequency of reception by 12kHz,
- \*Select mode u.s.b.
- \*Change i.f. Bandwidth to 30kHz

This will result in a signal very similar to that available when you have the converter.

I found that it is essential that you need to use the

input can load the output too much and this results in failure to produce a decoded DRM audio signal.

Another essential step is to adjust the gain of your sound card to a very low level so as to avoid overloading its input, if you don't take care you will have too high a level and distortion. This will also result in failure to decode. To be sure of your level setting look at the 'vu' meter display on the decoder screen to adjust your level.

## Software

There are two possible options for the realisation of audio from the DRM data stream being fed into the sound card.

Firstly, the software developed by Darmstadt University of Technology DREAM, this is available free at [http://sourceforge.net/project/showfiles.php?group\\_id=71084&release\\_id=160987](http://sourceforge.net/project/showfiles.php?group_id=71084&release_id=160987)

The other alternative is the official DRM software which is available after purchase at [www.drmx.org/downloads/bin/software.html](http://www.drmx.org/downloads/bin/software.html)

## DREAM

I have had excellent results using the DREAM package with the following settings:

- \*Receiver set to frequency 9.810MHz (transmission centred on 9.800MHz)
- \*Select u.s.b. mode
- \*Select i.f. bandwidth of 30kHz
- \*Flip Spectrum

Looking at Fig. 2 you can easily see the 10kHz band occupied by the digital signal, in this instance I obtained a better result using 9.810MHz instead of the theoretically value of 9.812MHz, the DREAM programme has a.f.c.



Fig. 4: The housed module and isolation transformer.

transmission is to use an external converter or mixer to convert the receiver's i.f., typically centred on 10.7MHz or 455kHz into a 12kHz centred band, which is then suitable for demodulation using a computer and sound card combination. I duly ordered a converter module to allow me to decode and enjoy the quality DRM broadcasts on its arrival.

## Couldn't Wait!

Having ordered a converter module from Germany, but

unfiltered demodulated output signal available on ACC1 connector on the AR5000's front panel. Using this output allows the passage of a 12kHz bandwidth signal for use by the sound card.

If you use the standard audio output, the bandwidth is limited and decoding will not be successful.

Due to the impedance of the ACC1 derived output, you will need to use a buffer (a simple operational amplifier in voltage follower mode) after the output, the low impedance of the sound card

and it can therefore adjust the position of signal band automatically. It is not perfect, as it is necessary to have a stable r.f. signal without fading.

## DRM

I have also achieved excellent results with the *DRM* software with the following set-up:

\*Frequency 9.788MHz (transmission signal on 9.800MHz)

\*Select u.s.b. mode

\*Select i.f. bandwidth of 30kHz

With *DRM*, I found the decoding is more stable and the sequences of recovered audio longer. I found that adjusting the input level to have all the green bars and one or two yellows ones provided best results.

## Interim Thoughts

With the arrangement described above, it is possible to recover audio, it is not a continuous stream, the system loses lock frequently, but for a start it is encouraging. I am sure that with the proper hardware connected I will have a better result. This account is intended to encourage others to experiment, it is not necessary to spend a fortune to receive DRM - just so long as you have access to a receiver with a wide i.f. filter and unfiltered audio output.

## Reception with the Converter

Now we'll look at my experiences of receiving DRM with my AR5000 and the auxiliary converter hardware, but no modification of the receiver.

My experiments described above were done with the *DREAM* software, version 0.9.1 and *DRM* version 1.0.21.

Since 15 December 2003, the audio coding of the signal has been changed, at this moment only *DRM* version 2.0.34 can decode the audio of DRM signal, probably a new version of *DREAM* will be available soon.

Now I'm using the 10.7MHz i.f. output from the AR5000 with an external

converter purchased from <http://home.t-online.de/home/sat-service/sat/DRM/DRM.htm>

The AR5000 must be set to IF2 to enable the signal path from the output of the 10.7MHz filters. Again the i.f. bandwidth must be set to 30kHz, the actual mode is not important as we collect the signal prior to the demodulation section of the receiver, the a.g.c. must be set to 'slow'.

The i.f. signal level available on the rear BNC connector is directly related to the level of the input signal see:

[www.aoruk.com/5000bull.htm#if\\_out\\_level](http://www.aoruk.com/5000bull.htm#if_out_level)

If your received signal is too low you can insert a 20dB amplifier between the 10.7MHz output of the AR5000 and the input of the converter, I use a simple one transistor antenna amplifier that I normally use to boost antenna signal on some short wave signals.

## My Converter

I mounted the converter in a shielded box and connected the output via a 1:1 isolation transformer - a 600Ω Hammond 560G (the big black box in Fig. 4) to avoid hum problems. In my shack all the receiving equipment uses different low voltage power supplies and ground to the computer equipment which is powered by the a.c. mains.

When I did the first tests without hardware I had a Signal to Noise ratio of 16 to 17dB, with the new set-up and software *DRM* version 2.0.34, I experienced a S/N ratio of 20 to 22dB.

## Conclusion

The use of an external converter provides a serious improvement in the quality of the signal sent to the computer for decoding and doesn't require any modification to the AR5000. I will report later on the installation of a 455kHz converter at the output of the last i.f. stages of the AR5000 as the resultant signal will have then been subject to the extra conditioning of the 455kHz filters.

SWM

## Digital Radio Mondiale (DRM) - Digital Radio for the AM Bands

DRM is a new digital radio standard for the m.w., l.w. and s.w. bands that use frequencies below 30MHz.

DRM uses COFDM, as do DAB and DVB-T (Freeview), but DRM uses a very narrow analogue bandwidth compared to the bandwidth used for DAB (1.7MHz) and DVB-T (8MHz). The analogue bandwidths are narrow so that DRM channels can be backwardly compatible with the current frequency grid. For example, m.w. in the UK has channels that are spaced in multiples of 9kHz (Radio 5 Live transmits on 909 and 693kHz).

DRM offers the following advantages compared to a.m.:

- Robust transmission in fading channels - reception of analogue a.m. transmissions are plagued by multipath fading effects, and using COFDM as the transmission scheme makes the transmission more robust to multipath fading
  - Far better audio quality than m.w. broadcast signals allow - but not as good as f.m.
  - Lower transmitter powers required
  - Data services
- There are a range of bandwidths that DRM transmissions can use:
- 4.5 or 5kHz - half-bandwidth, this allows simulcasting the a.m. signal along with the digital signal
  - 9 or 10kHz - standard-bandwidth
  - 18 or 20kHz - double-bandwidth

The 9/10kHz channels can carry bit rates in the region of 20 - 24kb/s, which is very low compared to DAB (most stereo stations use 128kb/s) and DVB-S or DVB-T (most stereo stations use 160 or 192kb/s), therefore to allow a decent audio quality with such a low bit rate the codec (enCOder/DECOder) has to be very efficient. The codec that DRM uses is AAC+SBR (also known as AACplus). This codec is a state-of-the-art codec and is far more efficient than MP2 or MP3. AAC stands for Advanced Audio Coding, and is the codec that supersedes MP3, and SBR stands for Spectral Band Replication. SBR generates/simulates the higher frequencies of a signal but uses a very low bit rate to do so, and SBR effectively doubles the bandwidth of a signal. This is important because analogue a.m. transmissions that use a 9kHz channel bandwidth only allow an audio bandwidth of 4.5kHz, which is similar to the bandwidth of a telephone signal, so SBR allows the audio to sound more natural.

The drawback of SBR is that the higher frequencies are artificially generated and some people say that the higher frequencies that SBR generates don't sound very natural. But SBR is a new technology so in time it would be hoped that these early problems may be improved.

One thing for sure is that DRM does sound a lot better than your average m.w. radio station, but claims that DRM sounds anywhere near as good as f.m. are exaggerated because f.m. is a highly underrated broadcast radio system when it comes to providing high audio quality (this depends on how good an f.m. signal you can receive as well as the level of audio processing that the broadcasters apply to make their station sound louder).

For more information about DRM visit the following websites:

[www.drm.org/indexdeuz.htm](http://www.drm.org/indexdeuz.htm) this website has DRM audio samples that you can download.

[www.wohnot.demon.co.uk/DAB/rxdrm.html](http://www.wohnot.demon.co.uk/DAB/rxdrm.html) shows all available DRM receivers.

[www.drmmradio.co.uk/](http://www.drmmradio.co.uk/)

[www.drmmrx.org/](http://www.drmmrx.org/)

A good overview of the technology that comprises the DRM system see this research paper:

[www.drm.org/pdfs/newsevents/drm\\_trans\\_on\\_broadcasting.pdf](http://www.drm.org/pdfs/newsevents/drm_trans_on_broadcasting.pdf)



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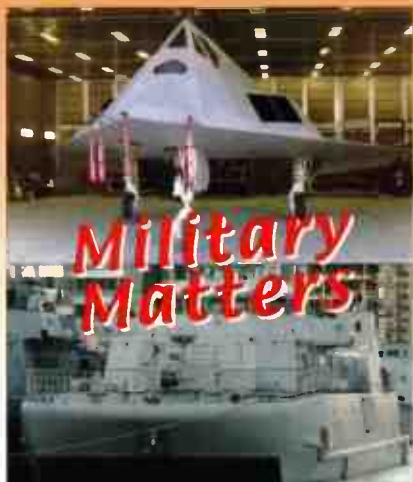
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# Amateur

Bands

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- **E-mail** [clive@pwpublishing.ltd.uk](mailto:clive@pwpublishing.ltd.uk)

Last month I mentioned that a 'simple a.t.u.' would probably suffice to tune the G5J antenna and I'm aware that I didn't define 'simple'! So, with a little trial and error, I knocked-up a little something. It's a PI match using a tapped coil wound on another T130-2 toroid like the one I used for the antenna.

The tapping points are selected by rotary switch and the capacitors are a mixture of polyvaricon variable and fixed polystyrene. All the components used are available from the usual stockists.

Figure 1 is the circuit diagram and the photos in Fig. 2 show my working prototype.

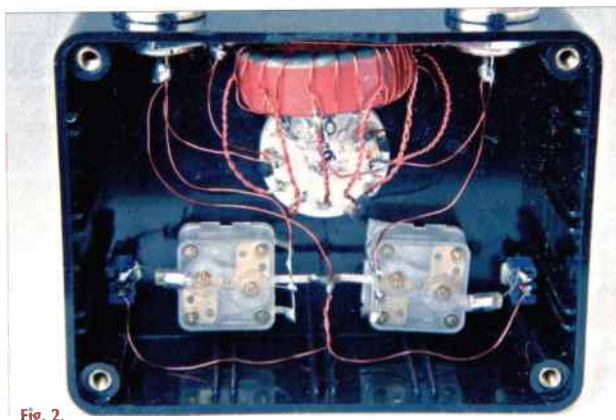
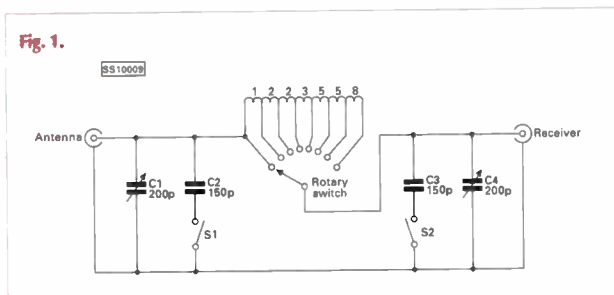


Fig. 2.



Used with my outdoor G5J the a.t.u. managed to keep the s.w.r. well below 2:1 from 7 to 30MHz. Below 7MHz it struggled, but did provide a match of around 1.4:1 across the 3.5MHz band. So, that's all the h.f. amateur bands covered, not a bad result.

Although the a.t.u. with those polyvaricon capacitors isn't useable for transmitting other than with the lowest of low powers, the low s.w.r. obtained using the MFJ analyser as the signal source does indicate that an acceptable match to 50Ω is obtainable. On

receive it's just a matter of tuning for best signal.

## Construction Tips

For those of you who'd like to have a go at building the little a.t.u. a few construction tips might not go amiss! There's no need to find fiddly screws to hold the polyvaricon capacitors in place as double sided sticky fixers work well.

Once through the toroid with the wire equals one turn. I didn't fix the toroid in place as the windings seem to hold it fairly securely, but it might be wise to use another couple of sticky fixers to hold it. Even with the supplied extension pieces fitted the polyvaricons' shafts are relatively short.

I trimmed back the skirt of the knobs used on those capacitors to ensure the fixing screw was far enough down the shaft to grip properly. The polyvaricon contains two capacitors, (141.6 + 59.2pF) with the centre tag being the common connection. Join the two outer tags to obtain the nominal 200pF.

## Worth A Smile!

A cautionary tale now from the West Country for those who like their amateur transceivers 'opened up' to transmit everywhere. Having been listening to the International Aeronautical Distress & Safety Frequency of 5.680MHz, one seasoned

amateur decided to put out a call on the amateur bands. You can guess the rest!

Whatever frequency he thought he was on, his CQ call went out on 5.680MHz and was duly answered by Kinloss Rescue. After querying the callsign of the station that answered him, our accidental 'pirate' became aware of his wanderings from the amateur bands and apologies were made!

Why amateurs with no legitimate access to other bands feel the need to have general coverage transmit capabilities on their transceivers I don't know. Keeping the rig within specification and stopping such embarrassing mistakes occurring seems more than enough reasons not to open up an amateur transceiver on transmit.

## Low Power Loonies Meet

Fans of low power operating will be looking forward to the Yeovil QRP convention to be held in Sherborne, Dorset. It's on Sunday 18 April at the Digby Hall, Hound Street. There's ample free parking either on site or in nearby car parks.

The lectures and trade stands specialising in components and other radio miscellany make this event well worth a visit. As usual there will be a construction challenge and the task this year is to build a device, using only passive components, which will receive and measure the frequency of a carrier wave radiated between 3.5 and 3.6MHz. The winner will be the one who most accurately measures the frequency.

## Ofcom Away!

It's a couple of months since the Radiocommunications Agency disappeared during the last week of December 2003 and its role was taken over by Ofcom. The report on Ceefax that Ofcom will cost 25% more to run than the agencies it took over doesn't generate thoughts of efficiency. Nor do the redundancies and the two rugby teams worth of managers on six figure salaries. (It was League when I wrote this piece, but probably Union with a couple of subs by now!).

What practical difference it will make to amateur radio only time will tell.

## DXpedition News

The Five Star DXers Association will be embarking on Project 'Star Reach' during March and April with an intended radio activity start date of 20 March. The multinational team callsign, **3B9C**, will be on Rodrigues Island.

Rodrigues Island is part of the Mauritius group to the east of Madagascar in the Indian Ocean and is famed for its chilli. The DXpedition team will be operating up to 15, yes 15, high power h.f. stations using all bands and modes until 12 April.

A group of eight Mexican amateurs are hoping to mount a DXpedition to Socorro Island, which will use the callsign **XF4IH**. Although the Pacific island is only a few hundred km south of Baja California, getting there is no easy task.

Described as Mexico's little Galapagos, the island group which includes Socorro has a fantastically varied flora and fauna. Maintaining this is more likely if humans are kept away and this is achieved by strictly limiting the number of visitor permits issued. Hopefully, the bureaucracy will have been overcome so that the two week DXpedition can start as planned on the 3 March.

Half a dozen French amateurs will be using the callsign **5V7C** when they operate from Lome, Togo for the week commencing 6 March. They should be using all the usual h.f. bands and modes, plus 50MHz. Take a look at [http://5v7c.free.fr/les\\_news1eng](http://5v7c.free.fr/les_news1eng) for more information.

## Postponed DXpedition

Finally, the Peter 1 Island DXpedition that I reported on in January's column has been postponed. The same time next year is being put forward for the next attempt.

# Decode

- **Mike Richards G4WNC**, 49 Cloughs Road, Ringwood, Hants BH24 1UU
- **E-mail** [decode@pwpublishing.ltd.uk](mailto:decode@pwpublishing.ltd.uk) **Web site** [www.mikespage.btinternet.co.uk](http://www.mikespage.btinternet.co.uk)

## PSK Signals

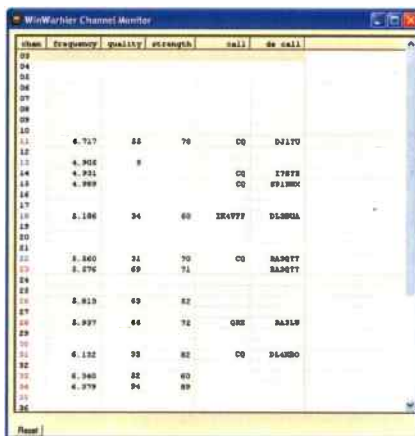
Time to bring you up-to-date with developments in the world of amateur h.f. p.s.k. signals! Although this is a mode primarily used by radio amateurs, it is so effective that it has lots of commercial potential. The system was originally devised as a modern replacement for good old RTTY. Whilst RTTY has served the radio community very well over a remarkable period in radio development, there are better ways to fulfil the simple demands of an on-line keyboard chat system over h.f. radio.

The p.s.k. system that abounds on h.f. amateur bands started with the development of a 31 baud phase shift keyed system by **Pawel Jalocho**. Instead of sending data using discrete frequency shifts, Pawel's system used phase reversals of the transmitted signal. This can be likened to reversing the leads to the antenna for each data bit. In practical systems this is done electronically back in the audio stages, but the principle is the same. The change to a phase keyed system created the potential to develop really low bandwidth systems so lots could be squeezed into a conventional voice channel.

Transforming p.s.k. into the PSK31 system we know today, was done by **Peter Martinez G4PLX** - the man behind AMTOR. Peter combined the p.s.k. modulation system with a modern coding system known as Varicode. Whereas the RTTY code (ITA2) uses a set number of characters to represent each letter, Varicode takes a fresh approach. As the name implies the first departure from convention is that the data code is not a fixed length for each character. The practical system uses code lengths that range from one to 10 elements.

Another important point about the Varicode is that there is a unique code for each of the 128 ASCII characters. This is a significant change from RTTY where the limited five-unit character set means that each code has two or more interpretations. Just this change alone gives a dramatic improvement in the resilience of the new code. The varicode has one or two special characteristics that make it easy for the receiver to identify the start and end of each character and so synchronise very quickly.

Every character in the code starts and ends with a logic '1' and at no point is there more than one zero in a row. Very simple rules, but they make decoding synchronisation extremely easy. Determining which characters



The comprehensive WinWarbler signal monitor.

get which code combination was the result of a significant study. The objective was to make sure that the shortest codes were used for the most common letters.

Optimisation was achieved by analysing a huge amount of text and checking each letter's frequency. The end result allocates a word space the shortest, one element code, and the less common control and punctuation the longest 10 element codes. As proof of the value of the analysis and code allocation Peter did some analysis of text samples when compared to other common systems such as Morse, RTTY and ASCII. Not surprisingly, Varicode came out on top with an average code length of 6.5 bits per character.

A further important point about Varicode is that upper and lower case letters have unique codes, with lower case having the shortest codes as they are more common. At the receiving end of the system, life is pretty easy for decoder, simply because the encoding system is so well thought out. The next development in p.s.k. was the extension to q.p.s.k. as the keying system. This can be likened to adding two more possible states to the transmitter output giving a total of four to work with. With this extra capacity Peter set about devising an error correction system that could help q.p.s.k. perform well under adverse conditions. The option chosen was to use what's known as convolution code.

In the convolution code scheme, the individual elements of the transmitted text are examined in batches of five before determining the state that should be used by

the transmitter. If you imagine that the transmitter can adopt one of four phase shifts called 0 through to 3 the table here shows a sample of how the convolution code would examine a group of five data bits and then determine the phase shift:

Bit Sequence	Phase Shift
00000	2
00001	1
00010	3
00011	0
00100	3
00101	0
00110	2
00111	1

At the receiving end a special decoder known as a Viterbi decoder is used to process the signal. This is unlike most conventional decoders as its really a sophisticated guessing system. At its heart are a series of 32 encoders - all looking at the signal, all 'trying to guess' the next received phase shift. The result is compared with the actual phase shift and the worst 16 eliminated.

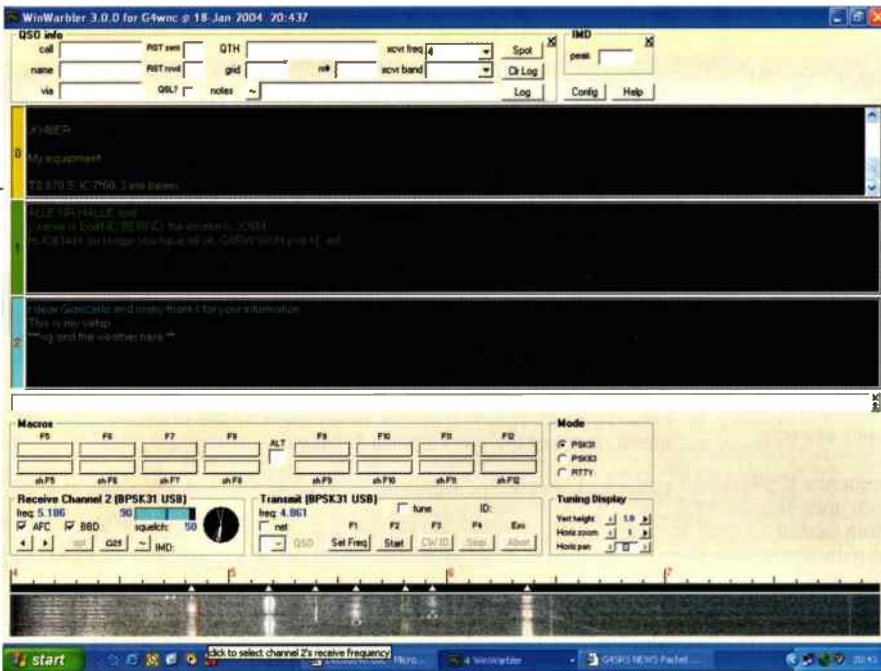
The 'best' encoders then move on to the next stage and spawn 16 more encoders to carry on the guessing game. This process continues with the results getting ever more accurate. In the real system you have to wait for five generations or bit periods of the process to get an accurate decoded output. The final system adopted in the q.p.s.k. mode was to go for 20 generations which gives an overall decoding delay of around 800ms which is fine for on-line comms.

The net result of all this work is an extremely effective system that serves its original purpose very well. The mode is very narrow band and seems to be able to cut through some pretty awful conditions. If you want to find out more I would recommend Peter Martinez's article that can be viewed or downloaded from the following site:

<http://psk31.com/G3PLXarticle.pdf> It's also worth paying a visit to the main p.s.k. site for lots of up-to-date information and this fascinating mode: <http://psk31.com/>

## PSK Software

As you will find from a visit to the main p.s.k. site, there's lots of free software available. All are designed for radio amateurs, but one is particularly well suited to short wave listeners. WinWarbler has all the features you would expect to see, i.e. it can handle q.p.s.k. and



Winwarbler's excellent multi-signal display.

PSK31 in transmit and receive mode plus RTTY. The real gem for listeners is its ability to receive three stations at the same time!

As you can see from the screen shots, the main window has three separate text decoding windows. What *WinWarbler* is doing is taking advantage of the fact that most p.s.k. transmissions are grouped very closely together often within the normal bandwidth of an s.s.b. receiver. However, to make the most of this decoder its helpful if you have a receiver with a wider bandwidth setting - 5 or 7kHz is ideal.

In use you just set your receiver to a common p.s.k. frequency (3.58, 7.03 or 14.07MHz) open up the receiver bandwidth and away you go. At the bottom of the main window is a neat spectrum display that shows a full 4kHz of audio spectrum. Within this display, p.s.k. signals usually show-up very clearly as a bold, closely spaced double trail. Just to make life really easy *WinWarbler* even puts an arrow by any trace that it thinks is a real p.s.k. signal.

As well as putting the trace arrow it actually starts decoding the signal and will capture the callsign, etc. The program supports up to 42 of these markers - each one processing the incoming signals! If you enable the *WinWarbler* Channel Monitor from the Config menu, you can even see the summary data from each of the monitored channels! This makes it incredibly easy to get started and spot p.s.k. signals.

If you want to start displaying a signal, you just click on the required text window then on the spectrum trace and you're in business. This really is a great way to monitor p.s.k. and you can quickly hunt around all the active stations until you find one you particularly want to monitor. The really great thing about *WinWarbler* is it's completely free! To get your copy visit the following site: [www.qsl.net/winwarbler/](http://www.qsl.net/winwarbler/)

## HF E-mail Intercepts

One of the most prevalent h.f. data modes these days is PACTOR II - a really robust packet data system that's ideally suited to h.f. communications. One of the drivers behind its amazing success has been the introduction of h.f. E-mail. Whilst many of us use E-mail on a daily basis at work, those at sea or in remote areas don't have easy access to E-mail. Whilst this could be thought of as a blessing, E-mail is a really useful tool, particularly for those operating in extreme or remote environments. Satellite is often not practical, either due to size, but more often due to cost. With h.f. transmitters being so portable and affordable the combination with a PACTOR modem and a laptop computer makes a viable communications terminal.

At the heart of the system is the PACTOR II modems developed by SCS in Germany. These use a combination of software and hardware to create a robust and effective system. For listeners such as you and I, the only drawback is the cost. However, those lucky enough to own some of the more advanced decoders can receive PACTOR II.

I would be really interested to hear from any listeners that have managed to monitor h.f. E-mail, especially the equipment and software employed. If you'd like to learn more about h.f. E-mail the following sites should prove interesting:

[www.sailmail.com/](http://www.sailmail.com/)  
[www.cruiseemail.com/connecting.html](http://www.cruiseemail.com/connecting.html)  
[www.shipcom.com/email.htm](http://www.shipcom.com/email.htm)

## Spectrogram - Updated

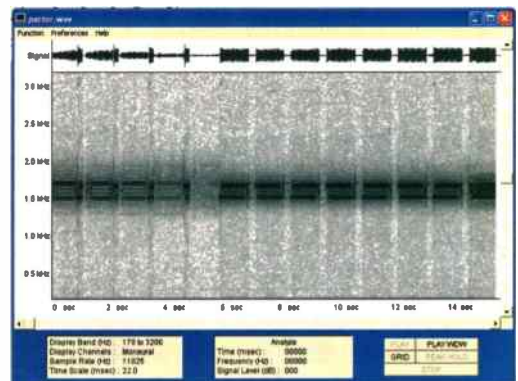
Back to an old favourite of mine - *Spectrogram* is a wonderful spectrum analysis tool that's been around for a very long time now. Fortunately, it's been continually updated and is currently at version 8.7, so is still a useful tool. The

program was originally developed to help with the clinical analysis of voice patterns so is well suited to dealing with speech band data signals.

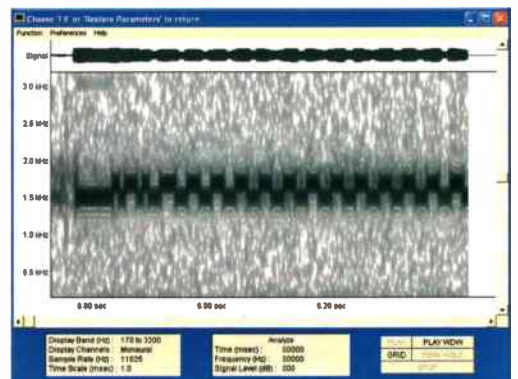
The key to its success is its excellent processing engine that makes full use of your on-board sound card to produce a very detailed display. Over the years the interface has improved significantly and you can now really get into the detail of just about any signal. As well as taking a signal direct from the input of your sound card, *Spectrogram* will also analyse a previously recorded .WAV file.

One of the features I particularly like is the facility to select and 'zoom-in' to parts of the signal. I've shown an example of the power of this in the screen shots - you will see a full Pactor signal and then a zoom-in to one small section. This is really powerful stuff if you want to start getting to understand unusual signals.

To try *Spectrogram*, it's available in demo form from the following site: [www.visualizationsoftware.com/gram/gramd1.html](http://www.visualizationsoftware.com/gram/gramd1.html) This demo gives you 10 days for free. If you like it, the full version is just \$45.



Spectrogram showing a full Pactor signal.



Using Spectrogram to get to the detail!

# Propagation

forecasts

- Jacques D'Avignon VE3VJA
- E-mail: [Jacques@pwpublishing.ltd.uk](mailto:Jacques@pwpublishing.ltd.uk)

## How to use the Propagation Charts

The charts contain three plots. The lower dashed line represents the lowest usable frequency (LUF), or ALF (Absorption Limiting Frequency). The chances of success below this frequency are very slim.

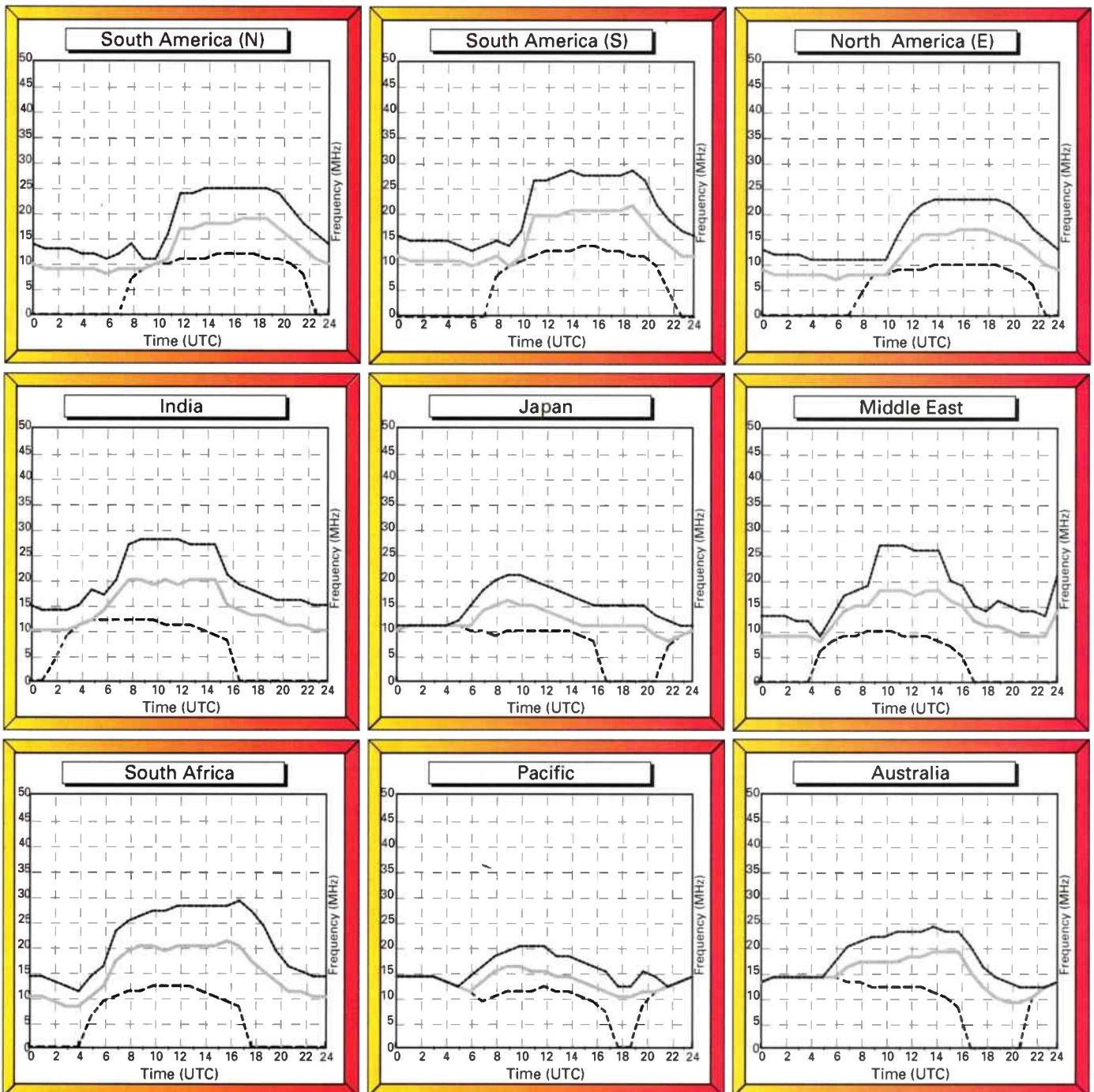
The middle line indicates the optimum working frequency (OWF) with a 90% probability of success for the particular path and time.

Lastly, the upper dashed line represents the maximum usable frequency (MUF), a 50% probability of success for the path and time.

To make use of the charts you must select the chart most closely located to the region containing the station that you wish to hear. By selecting the time chosen for listening on the horizontal axis, the best frequencies for listening can be determined by the values of the intersections of the plots against frequency.

Good luck and happy listening.

March 2004  
Circuits to London



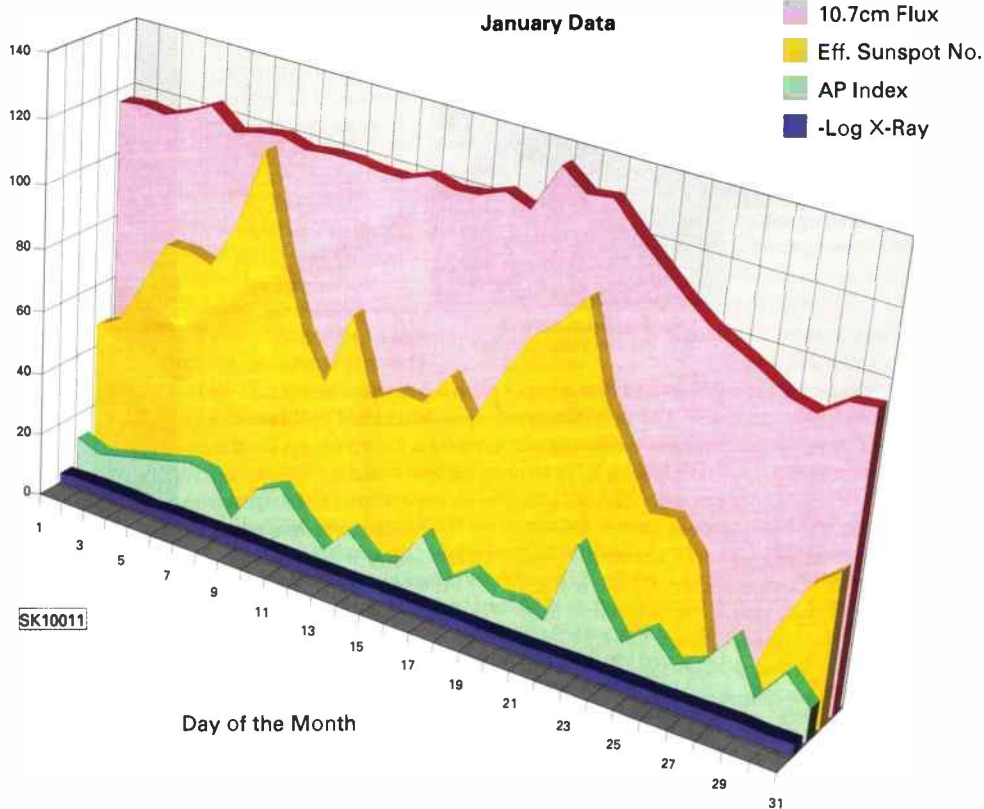
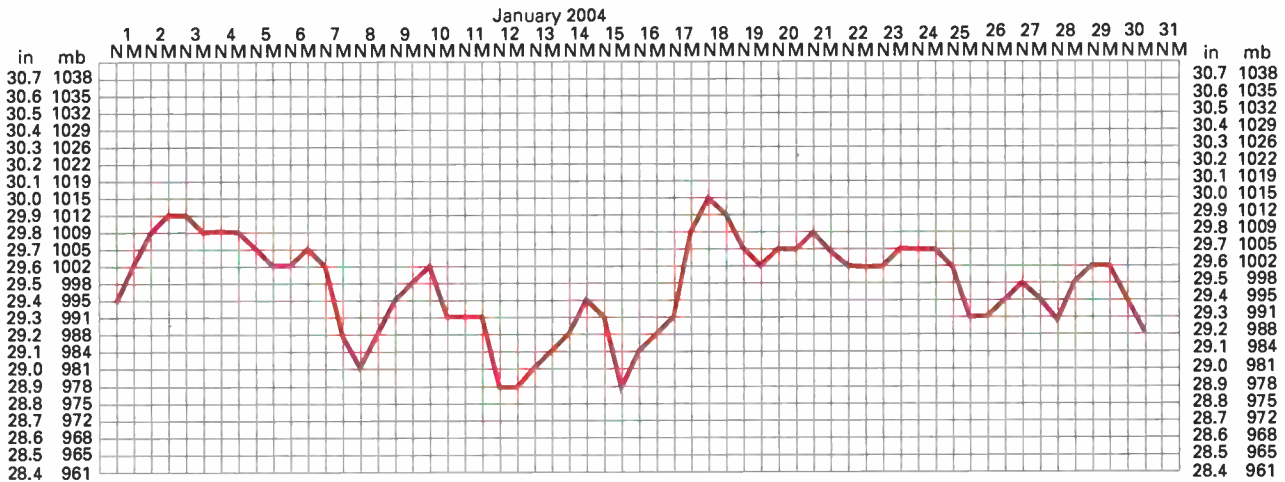
SK10010

# Propagation

Extra

- **Kevin Nice** G7FZC, M3SWM,  
SWM Editorial Offices, Broadstone
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Ron Ham's barometric pressure chart, taken at Storrington, W. Sussex, January 2004



## guide to the chart

The 10.7cm solar radio flux is used as an indicator of the general level of solar activity. The K and AP indices are measures of geomagnetic activity. The K index ranges from zero (very quiet) to nine (severely disturbed). K values of five or greater correspond to geomagnetic storm conditions that can relate to poor propagation conditions. The AP index ranges from 0 to 400. An AP of 30 is the threshold for geomagnetic storm conditions.

# Satellite

TV News

● Roger Bunney 35 Grayling Mead, Fishlake, Romsey, Hants SO51 7RU

Christmas Day, 2003, in the late afternoon a suicide bomber blasted a bus-stop in Tel Aviv killing three people waiting for a bus. This was the first successful suicide bombing after 35 other failed attempts, the news first picked up over the APTN *Eutelsat W1*, 10°E feeder lease @ 10.973GHz-V (SR4167+FEC5/6) closer checks found the live uplink footage via the 'R.R. Feed' Israeli based truck, using *Eutelsat W2*, 16°E @ 12.533GHz-H (5632+3/4). As New Year approached a bomb exploded in a Baghdad restaurant, killing five. Rescue work seen on 10.961GHz-V (4167+5/6) on *W1*. Smoke can be seen rising from the blast site by CBS News bureau at the Rimal Hotel in central Baghdad, from their roof-top vantage point. Recently CBS have used frequencies between 11.515 to 12.500GHz-H (5632+3/4) on *W2*, 16°E. On New Year's Day they down-linked on 12.525GHz-H.

Bam, a 2000 year old city in SE Iran built mainly from mud bricks and incapable of surviving a major earthquake, the event that began 31 December reduced the city to ruins, including the 'Great Palace of Bam', formerly a World Heritage site. The first live TV reports came from reporters with videophones and the improvement in hand-held technology since war images of April 2003 from the Iraqi Desert is remarkable. Within a day the sat trucks arrived and high quality pictures began from Bam. First downlink sighted was on 1 January via *W1*, 10.980GHz-V (6109+5/6) which conveyed pictures of rubble, bodies and burials. This disaster has perhaps eased tensions between the 'States and Iran'.

Political activity was noted in Afghanistan over the past few weeks. Mid-December and APTN were noted running 'Afghanistan 1' and 'Afghanistan 2' feed paths out of Kabul on 10.958/10.964GHz-V respectively (4167+5/6) on *W1*. The occasion was the Afghan Grand Council Meeting and officials from the country were seen entering various tents. Pictures also revealed that serious security was in operation. The Turkish news agency 'IHA' were seen on New Year's Day preparing for a news transmission the 10°E popular frequency - 10.967GHz again ('IHA AFGHANIST') with either an ornate test card or other ethnic display.

New Year's Eve and a plethora of OBS, satellite feeds were active across the sky. *Eutelsat W2*, 16°E provided inspiration with 'NTV RUS-6' during the afternoon, a song and dance spectacular This at 12.548-H (5632+3/4). The CBS '523209' circuit was busy out of Baghdad though not with New Year celebration the aftermath of the restaurant bombing above. Happier pictures with skiing courtesy of the 'RTL DSNG D219' sat truck over 16°E - 12.560-H and an unusual SR 12560+FEC 3/4. The competitive skiing was for the 'Ski Springen' contests in the Bavarian Alps which made for a dramatic backdrop. The very bad weather hit the Edinburgh New Year celebrations, both the fireworks and a concert being cancelled due to safety! SisLINK's 'SIS 9 UKI-717' was on site at 'The Royal Bank Street Party' for uplink. Members of the crew welcomed the new year in amongst themselves, sent colour bars and also switched off. This non-event over 16°E again, 12.563GHz-H (5632+3/4).

There was considerable satellite activity from Poland on new Year's Eve, *W2*, 16°E seemed to be the life and soul of the party. 'POL 020 WARSAW', 12.642GHz-H. 'POL 019 SNG KRAKOW', 12.703GHz-H meanwhile attempted an outdoor concert whilst

'TVN 24 GDANSK' 12.651-H attempted their own outdoor concert to large snowflakes. 'POZNAN TVN 24' fared little better at 12.552GHz-H with even heavier snow. A happier event over 16°E was a report from Reuters in Bogata carrying footage of the freed European hostages. The original uplink into the USA from Columbia via 'Globecast 1 Network' - 12.642GHz-H, all the above 16°E reports ran 5632+3/4. December 22 - hostages appeared over the 'BT Channel 4' - 'P9 1K - Adhoc C' slot on *PAS-9*, 58°W, 11.477GHz-H (26463+3/4). The English backpacker thanked the Bogata priests and Embassy staff in Columbia for their help and support in securing his release. Alan Richards has been very busy with the above catches.

Roy Carman (Dorking) found a UK Living - *Most haunted* spectacular being fed via satellite back to the studio. This was part of three day investigation on haunting around the City of London, three sat trucks were in use, 'BT TES-38' and 'BT TES-10' over *W1* and uplink company 'Links n Things' over the *Thor/Intelsat 1°W* slot. The 'Dick Turpin Experience' a tourist attraction in Nottingham features video inlays of horses and Roman soldiers - was shot in Southampton, I worked on it and never heard ghostly calls from either living or dead highwaymen! Noting that 'BT TES-10' had been involved with haunting action over New Year, it was interesting to see this veteran sat truck take up station at Heathrow offering live coverage of parked flight BA-223 to Washington into Sky News. The aircraft eventually took off, pictures downlinked over *W2*, 11.127GHz-H (5632+3/4). The life of a sat truck engineer is varied, wide ranging and of travel, occasional ads offering employment appear in the *Broadcast* magazine. A couple of curious sightings over the CNN Newssource lease, *NSS-7* @ 21.5°W, 11.565GHz-H (6110+3/4).

*Telstar-11*, 37.5°W featured an historical re-enactment afternoon of 20 December. This year is the 200th anniversary of the handover of the State of Louisiana by France to the United States called the 'Louisiana Purchase' in which the state changed hands for a relatively small sum of money. The pageant was screened over 12.637GHz-V (SR 4700+3/4). Roy C. watched

the event with "lots of colour, pomp and ceremony under blue skies". One for horse race enthusiasts, 'VITEL DUBLIN IR' has been seen occasionally with racing out of the Republic on *Telstar 11*, 11.595GHz-V. French racing has been carried from time to time over *NSS-7* out of the 'Equida' French racing studio uplinked over SIS capacity and seem to use 11.670GHz-H, both 5632+3/4.

Alan Richards (Nottingham) watched the launch of the Israeli *Amos-2* satellite 28 December out of the Baikonur Cosmodrome in Kazakhstan. It's an all Ku-band satellite and has successfully slotted at 4°W and will offer satellite action across the Middle East, Europe and into the Eastern parts of Canada/USA.

A news snippet now from Edmund Spicer (Littlehampton) who has been advised that *Telecom 2A* @ 3°E has been carrying the often encrypted France 2 TV in free-to-air mode. Unfortunately, this satellite is running in an inclined orbit of nearly 2° which calls for an elevation and azimuth tracking dish to maintain signal lock. Edmund hasn't found the satellite as yet which is said to be downlinking at 12.635GHz-V, 6283+7/8.



Louisiana's 200th anniversary pageant.



Earthquake at BAM of 31 December.



North Arabian Gulf, distant surveillance by US forces shows Arab dhow.



This is a dhow smuggling heroin and attempts are made to throw stacks of drugs overboard before US forces board and arrest the smugglers (via *W1*).



A past president of Azerbaijan is buried and the population file past his grave in silent tribute. (SESAT 36°E).



IHA transmitted this test card or logo from Afghanistan.



This is the information panel of the 'blind search' Coship Chinese satellite receiver.



Reuters TV relay live pictures over the CNN Newssource downlink as the year 2004 arrives in Moscow (*NSS-7*).



Tel Aviv bombing kills three on Christmas Day, live pictures on *W2*.



Jerusalem Capital Studio test pattern.

# DX

## Television

● **Keith Hamer & Garry Smith**  
17 Collingham Gardens, Derby DE22 4FS

December was another excellent month for long-distance reception. Sporadic-E was active on several days and prevailing anticyclonic conditions intensified, paving the way for strong tropospheric reception. The *Geminids* meteor-shower was far from impressive with relatively little impact on reception.

### Reception Reports

**Simon Hockenull** (Bristol) comments that Sporadic-E on December 11 resembled a summer opening with strong, stable pictures from Spain (TVE-1) on Channels E2 and E3. The m.u.f. reached the top of Band II by 1935 with a host of Spanish stations heard up to 108MHz for almost an hour. A ten-minute opening followed on the 13th with a Portuguese children's programme on E3 at 0935. Over in Coventry, **Peter Barber** noted adverts and cartoons on E2. Spain returned on the 28th on E3 at 1630 with adverts for the Lidl supermarket chain preceding a wide-screen feature film.

Tropospheric enhancement occurred on the 4, 5 and 6th, returning on the 14 to the 18th. **Peter Barber** (Coventry), **Stephen Michie** (Bristol) and **Tony Jones** (Basildon) all logged an impressive list of French, Belgian, Dutch and German stations.

Stations included:- Netherlands - NED-1 E4 (Lopik), E7 (Markelo) and E29 (Goes) NED-2 E27 (Lopik) and E32 (Goes) NED-3 (Lopik) and E35 (Goes); Belgium - RTBF-1 (French-language) E3 (Liège) and E8 (Wavre) VRT TV1 (Flemish language) E10 (Wavre) and E43 (Egem); France - Canal Plus L5 (Lille), L6 (Cherbourg) and L9 (Reims) France-2 L21, France-3 L24 and TF1 L27 (all Lille); Germany: ARD E7 and 10 (Harz-West); Luxembourg - RTL+ on E7 (Dudelange)

Tony also received the French M6 network in perfect SECAM colour, possibly via the Lille outlet on L53. The highlight for Stephen Michie occurred on the 18th when the Danish TV2 network was identified on E27 (Åbenrå) and E33 (Varde).

### FM Reception

**George Garden** (Edinburgh) discovered the f.m. band was awash with signals on the 8th, mostly unidentified but some definitely



Fig. 1: The French C3 (Chaine 3) identification caption from 1974 when the service was first introduced.

Fig. 2: The modified French third network PM5544 test card.

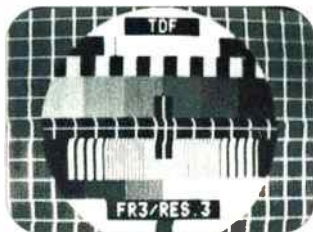


Fig. 3: Scrooge is still alive and kicking -at the BBC Television Centre! This

2003 BBC-2 Christmas Ident Symbol was a rehash from 2001 and 2002! The BBC-1 Christmas Ident was also a repeat from 2002. Just how tight can they get?

Norwegian in origin judging by the advertising jingles preceding the news on the hour. The only definite identification was the German NDR-1 network on 91.1MHz from the 100kW Steinkimmen outlet. George is having some success with DAB DXing from stations in the north of England using a rotatable Band III array mounted vertically.

Incidentally, George Garden and Simon Hockenull both advise that the 2004 *Radio Listeners' Guide* now includes digital terrestrial and satellite TV information.

### Farewell Izaña!

The 350kW Channel E3 transmitter located on the island of Tenerife was finally switched off sometime between 0200 on 10 December 2003 and 0300 the following day. We witnessed some of the last transmissions from this high-power TVE transmitter. According to the Sony Centre in Puerto de la Cruz, its planned switch-off date was supposed to have been mid to late November.

### BRC 980 TV

The reference to the BRC 980 TV receiver in our DXTV special in the January 2004 issue

revived memories for Simon Hockenull who noticed some similarities with his own introduction to the hobby. Simon was about eleven years old when he obtained one of these 405-line portables for the bedroom. Considering the location in West Cornwall, it worked amazingly well providing good reception on both 405-line channels just using its telescopic rod antenna. Strangely, it would pick up very clear Spanish and Italian TV sound during Sporadic-E openings even though it shouldn't have done! The set was very sensitive but, unfortunately suffered water damage which wrecked the tuner.

### Telephone Interference

Over the festive period, Peter Barber traced a carrier interfering with the E4 vision frequency to the second harmonic of a neighbour's new cordless 'phone operating around 30MHz. Meanwhile, Simon Hockenull noticed his scanner indicating short bursts of signal on E3 with a 245kHz offset. The culprit was a Nokia mobile-phone in standby mode positioned close to the receiver.

### Daily French Pictures

**John Lees** (Cheltenham) previously lived at Winstone in the Cotswolds, about 300m above sea-level where the Brest transmitter in France was viewable most of the time using a French SECAM System L TV. As regular as clockwork at 1750 every evening there was the news in Breton, followed by *Le Jardin des Enfants*. John says when he wins the lottery he intends to move back up there!

The test card aired by all three French services (TF1, A2 and FR3) was a modified version of the famous PM5544. Modifications included symmetrical frequency gratings and also the absence of the colour-difference panels which are normally present on either side of the circle.

### Service Information

**Norway:** Following George Garden's mystery Norwegian transmitter on Channel E28, **Gösta van der Linden** (Rotterdam, Netherlands) offers the following information regarding outlets currently active:-

TV2 (Kongsvinger) 200kW e.r.p. (horizontal polarisation); TV Norge, TV Nord-Trøndelag, TV Nordland, TV Helgeland (Vega) all with 17.8kW e.r.p. (horizontal); TV2 (Norefjell) with 3.3kW e.r.p. (horizontal). In addition, there are nine low-power repeaters using the channel.

**Germany:** Gösta also adds that in Germany two low-power horizontally-polarised SAT-1 E5 outlets exist. They are located at Bremerhaven/Schiffdorf (400W e.r.p.) and at Bonn/Venusberg (50W e.r.p.). **Tom Crane** and **Peter Barclay** have both identified SAT-1 on this channel during recent openings

**United Kingdom:** According to Roger Bunney (Romsey), York TV is now active on Channel E54.

### Keep On Writing!

Please send your DXTV, slow-scan TV and f.m. reception reports, news, off-screen photographs and information to arrive by the first of the month to:- **Garry Smith, 17 Collingham Gardens, Derby DE22 4FS.** We can also use off-air pictures stored as JPG files on PC discs and good-quality video recordings.

Our DXTV and Archive TV website can be found at: [www.test-cards.fsnet.co.uk](http://www.test-cards.fsnet.co.uk)

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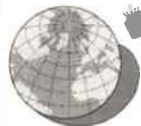
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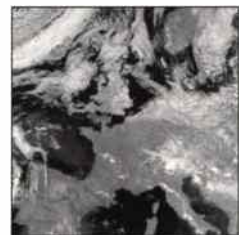


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Remote Imaging Group

Weather satellites are passing overhead daily and geostationary satellites image 24 hours per day.

With fairly simple equipment, you could be receiving images from these weather satellites in your own home.

The Remote Imaging Group is an international organisation of over 2000 enthusiasts who are interested in receiving weather satellite transmissions from all over the World. RIG publishes a quarterly journal containing articles and information related to the radio reception and display of image data from meteorological weather satellites. There are regular articles on meteorology, receiving, creating and enhancing satellite images, construction articles which allow you to build your own reception hardware, plus lots of images, many in full colour.



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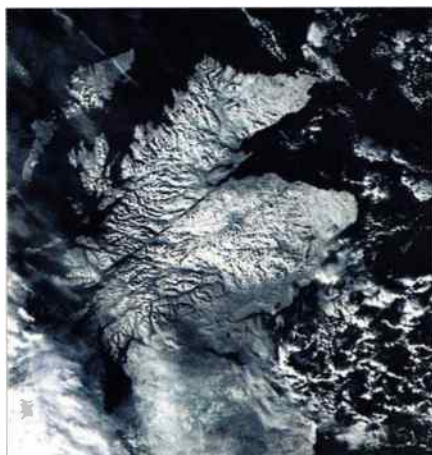
If you are new to weather satellites, you have arrived at an interesting time! There are many opportunities for participation - the choice is yours and it is a big one. You can set up equipment to receive pictures from satellites that pass near the poles (polar orbiting WXSATs) and there are satellites in geostationary orbit that provide near-continuous images, again available to those with suitable equipment. You can set up either or both systems.

To make such a choice you need to know about the equipment required to receive pictures. In the recent 'WXSAT Special' (November 2003 edition) I described the superb range of imagery available from *MSG-1 (METEOSAT-8)* and summarised the picture transmissions from the NOAA satellites. This month I am continuing my feature on the future of WXSATs - notably EUMETSAT's METOP.

## Correspondents' Pictures

On many days during December I noticed that when Scotland was under cloud, the south was enjoying sunshine. Conversely, **David Taylor** in Edinburgh sent **Fig. 1** showing Scotland enjoying sunshine. The south of Britain was under cloud. David selected this portion of a *NOAA-16* pass using NOAA's online facility for requesting specific data from stored orbits. I described this process a few years back - perhaps an update in a future edition would be timely?

**Lindsay Vincent** recorded a picture from *NOAA-17* at exactly midnight UTC, making it the first picture of the New Year that I can show.



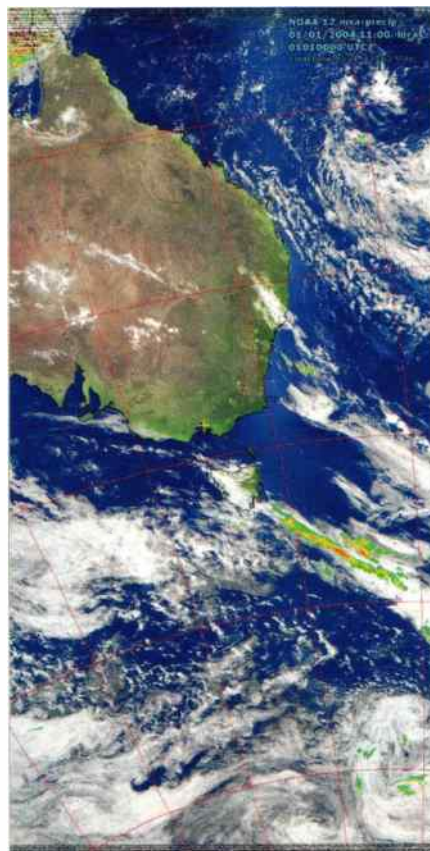
**Fig. 1:** NOAA-16 1343 30 December 2003 from David Taylor.

**Kevin Hughes** of Tamworth contacted the former RadioCommunications Agency (RA) - now Ofcom again regarding an unexpected renewal of the interference that plagued him last year. The former RA had previously investigated this and traced it to a poor quality light fitting at a local supermarket. Kevin has been told that the supermarket has been requested to take action. Kevin still records many images and sent **Fig. 3**. Even by late morning in January, the ground illumination seen by *NOAA-17* is low.

## Polar WXSAT News

The latest h.r.p.t. imagery from *NOAA-16* has been showing evidence of recurring problems. NOAA engineers reported that the AVHRR scan motor current performance had degraded significantly during the week following Christmas and appears to be on the threshold of impacting image quality.

In addition to the motor current, AVHRR component temperatures also appear to have been adversely affected. Another concern is



**Fig. 2:** NOAA-17 0000 1 January 2004 from Lindsay Vincent in Australia.

the possibility that increasing temperatures might affect the HIRS filter wheel. As of early January, imagery is basically good, though wavy lines have appeared on the left side of the image.

## METEOSAT Operations & Monitoring

We have entered the two year period during which the old stands beside the new, the former now looking possibly rather antiquated - but still working adequately. I refer to *METEOSAT-7* that is providing Primary Data (PDUS) and WEFAX - and should continue to do so until the end of 2005 - and the new *METEOSAT-8*.

## METEOSAT-5

Also known as Indian Ocean Data Collection (IODC). This WXSAT is providing imagery, both high resolution and occasional WEFAX from its location over 63°E longitude. It can be received directly at very low elevation from some eastern counties. Instead of trying to receive direct transmissions from the satellite, we can use the re-transmission facilities provided by both *METEOSAT-7* and *METEOSAT-8*. *METEOSAT-5* is scheduled to end operations at the end of 2005.

## METEOSAT-6

Located at 10°E, this satellite is the backup for *METEOSAT-7* and provided the rapid scanning support for the Mesoscale Alpine Programme (MAP). This was very successful and led to a general request from the user community for more frequent imagery. A new operational Rapid Scanning Service (RSS) was started in September 2001 using the high resolution (HRI) transmission. The RSS has been tested successfully as part of the *MSG-1* trials.

## METEOSAT-7

As EUMETSAT's primary satellite, this provides all the meteorological products from its location at 0° longitude and transmits WEFAX and PDUS imagery from two transponders. From geostationary orbit, *METEOSAT-7*'s radiometer produces an image having pixel resolution equivalent to about 2.5km at ground level, below the satellite. This resolution reduces at more northerly latitudes to about 10km.

If you already have a *METEOSAT-7* WEFAX or PDUS reception station, you can be assured that transmissions are scheduled to continue until the end of next year. WEFAX is an old transmission format that enables users



**Fig. 3:** NOAA-17 3 January 1039 from Kevin Hughes.

to receive low resolution images from some other geostationary WXSATs at fairly economical cost. The transmission on 1691.0MHz provides near-continuous images - see **Fig. 7**.

To receive WEFAX you need a dish of about 1m diameter, fitted with a suitable feed and either a METEOSAT receiver (1691.0MHz) or a down-converter (1691.0/1694.5 to 137.50MHz) to feed an a.p.t. receiver. Because of the newly operational *METEOSAT-8*, such WEFAX systems would normally now be obtained via the second-hand market. It is probably unrealistic for anyone to buy a new WEFAX system now that the new HRIT data flow is available.

If you do obtain a cut price WEFAX system, it should include full setting up instructions and can be tested at ground level. The economics of buying such a system depends on paying only a nominal price. If you have never received WXSAT imagery then a second-hand WEFAX system in full working order should provide almost two years use.

Buying a new PDUS system seems hard to justify, unless - as for WEFAX - the equipment is available at a very nominal price. You have to use a dish of about 1.8m diameter and some otherwise pricey electronics. If you are looking at monitoring geostationary WXSATs for the first time, much as *METEOSAT-7* is fully operational, I would recommend setting up an *MSG-1* (*METEOSAT-8*) reception system as probably the most cost effective entry.

## METEOSAT-8 2004

This year sees the formal start of routine operations from *MSG-1* (*METEOSAT-8*). By the end of January, the dissemination trial was virtually complete - apart from some delayed encryption tests. These were delayed by a few weeks because of the difficulty in organising the essential decryption keys for users.

Decontamination of *METEOSAT-8*'s sensitive sensors was scheduled in early January and this was followed by drift of the spacecraft from its checking-out location at 10°W longitude to 3.4°W between 14 and 27 January. Routine operations then started. During decontamination, only the visible-light channels (1, 2, 3 and 12) are obtained

because the infra-red sensors are warmed to expel accumulated impurities.

Early February provides the first 24 hour encryption test. The EUMETCast Key Unit (EKU) test was scheduled to be conducted for several hours. Users operating stations without EKUs are not able to receive MSG services (other than the essential six hourly SEVIRI data, FSD, EARS, meteorological products and DCP retransmissions).

March sees full implementation of EKU encryption on EUMETCast. We have all been aware of impending encryption in which users have to be licensed and have to have an EKU in order to receive MSG SEVIRI data - other than the six hourly transmissions.

There are inevitably costs involved with decryption. To put this in financial perspective, note that I operated my PDUS system - the high resolution data flow from *METEOSAT-7* - without buying a decryption box because of its enormous cost to me. At one time I nearly obtained access via a third party, but that possibility failed. I was, however, very pleased to be able to receive the foreign satellite dissemination service from GOES, GMS and of course I received the six hourly unencrypted images.

Occasionally there was the unexpected interest in seeing a normally encrypted image come in clear! The only system maintenance involved was keeping the cable contacts dry and preventing the large (1.8m diameter) dish from leaving the premises!

In early 2004 EUMETSAT plan to have their credit card payment facility set up for the purchase of TELLICAST software and eTokens - the EKU - EUMETCast Key Unit purchase. They are also making the software required available to local manufacturers and suppliers.

## News From EUMETSAT

EUMETSAT Operations announced that the current EUMETCast data stream (*MSG-1* data from *HotBird-6*) is to be expanded to include full half hourly *METEOSAT-7* data. Serious discussions are also taking place about the *HotBird* EUMETCast service becoming

Europe's 'primary' meteorological data distribution service - and this could continue even when *MSG-2*, *MSG-3* and *MSG-4* are disseminating via L-band.

I understand from **John Tellick** (Remote Imaging Group) that "We have been informed that METOP data will join the service after the satellite becomes operational, so one can only wonder what other satellite data might be disseminated via EUMETCast in the future?". METOP is the EUMETSAT polar orbiting satellite constellation, of which *METOP-1* is due to be launched in 2005.

## METOP - Europe's New Satellite (Pre-launch)

We have been monitoring NOAA WXSATs for decades and hopefully the dramatic changes to the WXSAT scene that are scheduled to happen during the next ten-plus years will not prevent us continuing to monitor. There is a significant political pressure from thousands of users all over the world for low resolution imagery to remain obtainable using low-cost equipment.

As discussed briefly in a previous edition, America is merging its civilian (NOAA WXSATs) and military (DMSP) satellite constellations and forming a new constellation called NPOESS (National Polar-orbiting Operational Environmental Satellite System). NOAA will be joining with EUMETSAT in the Initial Joint Polar-orbiting Satellite system (IJPS) in which NOAA will provide the 'afternoon' satellite and EUMETSAT will provide the 'morning' satellite. EUMETSAT's METOP satellite is proceeding towards launch in December 2005, as reported in last month's column.

METOP will be monitored and controlled via the EUMETSAT Polar System (EPS) Command and Data Acquisition (CDA) station located on the island of Spitsbergen in Svalbard (N). At its high northern latitude (78°N) it is in close proximity to all orbit tracks over the north pole. This ensures visibility for commanding by the station for all METOP daily orbits, so there are no 'blind' orbits. The satellite(s) should have contact



Fig. 4: NOAA-16 1208 7 January close-up of left edge showing north-west France and south-east UK with 'wavy lines'.



Fig. 5: *METEOSAT-7* (First generation). © EUMETSAT 2003.

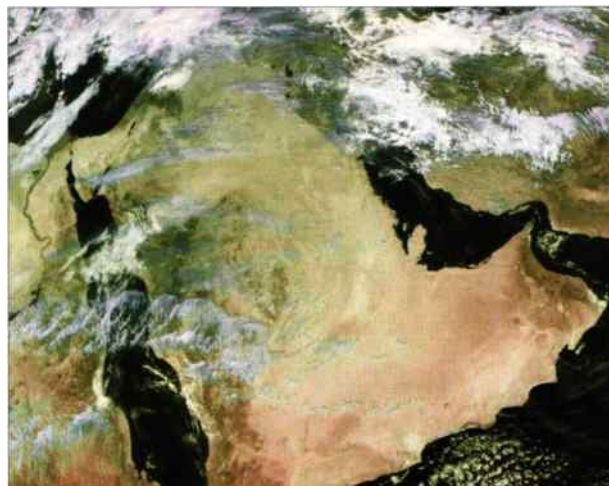
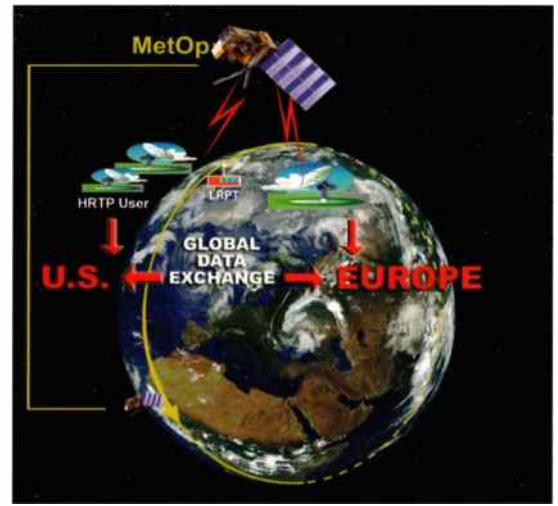


Fig. 6: *METEOSAT-5* (IODC) imagery showing Middle-east at 0900 2 January 2004 retransmission from *METEOSAT-8* (*MSG-1*). © EUMETSAT 2003.



**Fig. 7: METEOSAT-7 WEFAX infra-red D2 format 4 January 2004, 1300. © EUMETSAT 2003.**



**Fig. 8: METOP data exchange - courtesy ESA.**

periods varying between four and 12 minutes, with a typical period longer than 10 minutes.

### METOP Transmission Frequencies

The question that we would all like answering is whether amateurs will be able to directly receive and decode any form of imagery from the new METOP polar WXSATS? The answer lies partly in the transmission frequencies listed here:

Band	Service	Data Rate	Frequency
X-band	Global Data	70Mb/ps	7.8GHz
L-band	HRPT	3.5Mb/ps	1.7GHz
VHF	LRPT	72Kb/ps	137MHz

The transmissions are used as follows: X-band is used to dump global data once per orbit to a northern ground station. The system supports scenarios with only one station like Svalbard (N) as well as a two station scenario with a European station like Kiruna (S), in combination with an American station like Fairbanks (Alaska). The high frequency (7.8GHz) allows rapid transfer of large quantities of data during the satellite's pass over the ground station.

There are many data streams - including house-keeping information - and these are multiplexed (combined sequentially into the telemetry frame). The streams are provided on three channels going to an on-board solid-state recorder (SSR), including the High Rate Picture Transmission (h.r.p.t.) and Low Rate Picture Transmission (l.r.p.t.) direct broadcast systems. The SSR has a capacity to store a minimum of 24GB, which is slightly more than one full orbit of data. This could mean that whole orbits of full resolution data become available for downlink to the ground station.

NOAA WXSATS have provided digital h.r.p.t. for decades. The new METOP h.r.p.t. system is based on the latest standard protocols and will not be compatible with the NOAA HRPT system transmitted from current NOAA satellites. New equipment will be required to receive this data stream from METOP.

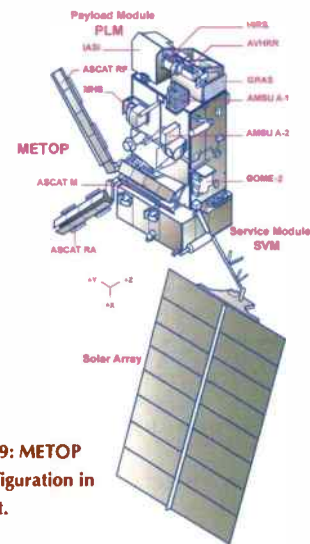
METOP h.r.p.t. contains the complete

instrument data and LRPT provides a selection of data from some but not all of the onboard instruments. It is reduced resolution data in a form suitable for reception by relatively low-cost user stations. Imagery includes three compressed channels of the Advanced Very High Resolution Radiometer (AVHRR) instrument. LRPT is a digital evolution of the APT system. Further details about these transmissions will be published in this column in due course.

### One Of My Favourite Views!

High resolution (HRIT) image channels originating from *MSG-1* (*METEOSAT-8*) are transmitted every 15 minutes from *HotBird-6* and are instrumental in providing an accurate snapshot of the current weather. When Britain is under the influence of a high pressure area, it becomes particularly easy for non-meteorologists to use the images to forecast the weather for the next few hours.

**Figure 10** shows the frosty fields of Britain in mid-December. This picture provided a series of clear skies for several days and nights in a row. An occasional patch of mist or fog could be seen crossing the country. By day, as seen in this picture, the shadows of clouds are visible on the north side of many of the clouds.



**Fig. 9: METOP configuration in orbit.**



**Fig. 10: MSG-1 17 December 1200 Britain's frosty fields. © EUMETSAT 2003.**

### Frequencies

a.p.t.

NOAA-12 and NOAA-15 transmit a.p.t. on 137.50MHz.

NOAA-17 transmit a.p.t. on 137.62MHz.

during overlap periods, NOAA-12's a.p.t. may be switched off.

h.r.p.t.

NOAA-12 and NOAA-16 transmit h.r.p.t. on 1698.0MHz.

NOAA-14 (faulty) and NOAA-17 transmit on 1707MHz.

NOAA-15 transmits on 1702.5MHz.

FENGYUN-1C and -1D transmit on 1700.5MHz.

WEFAX: METEOSAT-7 (geostationary) transmits WEFAX on 1691 and 1694.5MHz and Primary Data on 1691.0MHz.

MSG-1 at 3.5°W: HRIT (digital) and LRIT (digital) provide routine data via *HotBird-6* from January 2004.

# Maritime

● Compiled by the late Brian Oddy

## Beacons

The band was searched mainly at night during October, November and December because very few beacons are now audible during daylight.

Extremely noisy conditions were encountered at night by **Fred Wilmshurst** in Northampton. Even the Faeroe Is beacon at Myggenaes (MY) on **337.0kHz**, which he can usually receive quite well, was a rarity. Sometimes the idents from two other beacons on the Faeroe Is became audible - (AB) at Akraberg on **381.0** and (NL) at Nolso on **404.0**. However, the Nolso beacon was affected by co-channel interference from two aero beacons in France - (CNE) in Caen and (MRV) in Merville. Despite repeated checks Fred was unable to find any trace of the Greenland beacon (OZN) at Prinz Christian Sund on **372.0kHz**, which he used to hear quite often.

From a southerly direction Fred heard the idents from three beacons along the north coast of Spain - (MA) from Cabo Machicharo on **284.5**; (MY) from Cabo Mayor on **289.5**; also (BA) from Estaca de Bares on **292.5**. Those from beacons along the south coast of Spain were buried in the noise. There is no mention of an audio filter in the list of equipment used by Fred, so perhaps that is the key to the problem?

The most distant beacon signal to reach **Robert Connolly** (Kilkeel, Co. Down) from a southerly direction at night came from La Entallada, Canaries (NA) on **283.5kHz**. He also picked up from the south the beacon ident (MH) from Mahon, Minorca on **293.5** and (FI) from Cala Figuera, Majorca on **294.0**. Several other beacons along the coastline of Spain were also heard by Robert at night - see chart. During daylight he received the ground waves from Cabo Mayor (MY) on **289.5** and Estaca Bares (BA) on **292.5**.

From an easterly direction the night-time brought the ident (KA) on **305.0** from Klaipeda Rear, Lithuania; also those from two beacons in Baltic Russia: (BK) at Balitsk and (BT) at Mys Taran, which share **312.5kHz**. The most distant beacon which Robert heard from a northerly direction at night was (OZN) on **372.0kHz**, which is located on the southern most tip of Greenland at Prinz Christian Sund. The idents from three beacons on the Faeroe Is - (MY) **337.0kHz**; Arkraberg (AB) **381.0** and Nolso (NL) **404.0kHz** - were also heard.

Robert has been in contact with several of his friends who share his interest in the l.w.

maritime radiobeacons and they have kindly agreed to send along their logs on a regular basis so that they can be included in the chart here. They are all members of the Internet Beacon Reflector Group, which mainly covers aero NDBs. However, they have now set up a new group on the Internet specifically for listeners interested in l.w. maritime radiobeacons. Robert hopes their increased support for this column will encourage readers, who have either never submitted logs or who have dropped by the wayside, to submit their logs in future. Readers wishing to contact the new Marine Beacon Reflector Group should look at [http://beaconworld.org.uk/mailman/listinfo/columnlogs\\_beaconworld.org.uk](http://beaconworld.org.uk/mailman/listinfo/columnlogs_beaconworld.org.uk)

The latest (8th) edition of Robert's popular and inexpensive beacon guide extends to about 60 pages and details almost 3000 aero and maritime radiobeacons! It is available in

printed format and can also be obtained as a pdf file for use with *Acrobat Reader* or as an *Excel Workbook*. If you would like an information sheet about his guide please send an s.a.e. with your request to Robert.

Robert has kindly agreed to compile future editions of 'LWMBs'. Please send your logs to: (Robert Connolly, 21 Eleaston Park, Kilkeel, Co. Down, N. Ireland BT34 4DA. - Ed.)

DXers:

- (A) Roelof Bakker, Middelburg, Netherlands.
- (B) Giorgio Casu, San Gavino Monreale, Sardinia.
- (C) Robert Connolly, Kilkeel.
- (D) Peter Conway, Hastings.
- (E) Tracey Gardiner, Grantham.
- (F) Tony Moore, New Marske, Redcar.
- (G) Lionel Roithmeir, Guernsey.
- (H) Pat Vignoud, Chambéry, French Alps.
- (I) Fred Wilmshurst, Northampton.

### Long Wave Maritime Radiobeacon Chart

kHz	C/S	Station Name	Location	DXer
283.5	NA	Punta Lantaila	Canaries	A*,B*,C*,E*,H*
284.5	MA	Cabo Machicharo	NE Spain	A*,B*,C*,D*,E*,F*,H*,I*
285.5	AS	Castellon	Spain	B*,F*
287.0	IA	Llanes Lt	N. Spain	C*
288.0	OR	Punta de Llobregat	S. Spain	C*
289.5	MY	Cabo Mayor	Spain	A,B*,C,D*,E*,F*,G*,H*,I*
290.5	JD	Cabo Salou	S. Spain	A*,B*,H*
291.5	EJ	Nos Eming Lt	Bulgaria	B*
291.5	MN	Malsen Nos	Bulgaria	B*
292.5	BA	Punta Estaca Bares	N. Spain	A,C,D*,E*,F*,H*,I*
293.5	MH	Mahon, Minorca	Balearic Is	A*,B*,C*,D*,F*,G*,H
294.0	FI	Cala Figuera	Majorca	B*,C*,H
295.5	PS	Cabo Penas Lt	N. Spain	A*,B*,C*,E*,H*
296.5	FJ	Cabo Finisterre Lt	NW Spain	A*,B*,C*,H*
297.0	ND	Cabo de la Nao Lt	S. Spain	B*
300.0	GA	Malaga	S. Spain	C*
304.0	D	Rota	SW Spain	A*,C*
305.0	KA	Klaipeda Rear Lt	Lithuania	C*,E*,F*
305.7	DA	Dalatangi Lt	Iceland	A*,F*
309.5	EA	Yevpatoryiskiy Lt	Ukraine	A*,B*,H*
309.5	DD	Odesskiy	Ukraine	A*,B*,H*
309.5	SW	M. Khersonesskiy	Ukraine	A*,B*,H*
309.5	TR	M. Tarkhankutskiy	Ukraine	A*,B*,H*
309.5	WR	Vorontsovskiy	Ukraine	A*,B*
312.5	BK	Balitsk	Balt. Russia	C*
312.5	BT	Mys Taran Lt	Balt. Russia	C*
314.0	SN	Cabo San Sebastian	S. Spain	B*,C*,D
337.0	MY	Myggenaes	Faeroe Is	A,C,D*,E*,F*,H*,I*
372.0	OZN	Prins Chris's Sund	Greenland	A*,C*
381.0	AB	Akraberg	Faeroe Is	A*,C*,D*,E*,F*,H*,I*
404.0	NL	Nolso	Faeroe Is	A*,C*,D*,E*,F*,H*,I*

Note:  
Entries marked \* were logged during darkness.  
All other entries were logged during daylight or at dawn/dusk.

### Equipment Used

**Roelof Bakker**, Middelburg, Netherlands: Active whip and active loop and two tuneable pre-amplifiers which are routed via a phasing network to the main receiver, a Wandell & Goffermann SPM-3 selective level meter. The output from the SPM-3 is down converted to 500Hz. Then follows a Datong FL-3 filter and/or a LC filter with a bandwidth of 25Hz. With exception of the SPM-3 and FL-3, all equipment is home-made.

**Giorgio Casu**, San Gavino Monreale, Sardinia: Wellbrook LF1010 loop. Icom 756 Proll transceiver.

**Robert Connolly**, Kilkeel: Datong AD370 active antenna. JRC NRD-525 receiver, Timewave DSP9+ filter.

**Peter Conway**, Hastings: Rotateable ALA1530 loop 1m above ground. Racal RA1792 receiver: Kenwood TS-940S (250Hz); *Spectran V1*; *Code30*; *RadioRaft v3.21*.

**Tracey Gardiner**, Grantham: Wellbrook LFL1010 active loop indoors. Racal RA1792 receiver with 100Hz crystal filter.

**Tony Moore**, New Marske, Redcar: Datong AD337 active antenna vertical. Lowe HF-225 receiver + Datong FL2 filter.

**Lionel Roithmeir**, Guernsey: Maynard ATL-3 indoor loop or Wellbrook ALA1530 loop outdoors. AOR AR7030 receiver and 300/125Hz filters.

**Pat Vignoud**, Chambéry, French Alps: Wellbrook ALA100 (14m circ) & ALA1530 loops. JRC NRD-545 receiver + NVA-319; Icom R-75 w/DSP & FL-53. MFJ 784-B filter.

**Fred Wilmshurst**, Northampton: Random wire antenna in loft. Global AT-1000 a.t.u. Icom IC-R70 receiver.

# Shack

Web

- **Jerry Glenwright** *clo SWM Editorial Offices, Broadstone*
- **E-mail** [shackweb@pwpublishing.ltd.uk](mailto:shackweb@pwpublishing.ltd.uk)

**H**ello and welcome to ShackWeb. In the past few issues debate has raged (well, there have been a few letters) on the QSL pages from readers who believe h.f. as a broadcast medium is more or less at an end, opposed by others who firmly believe that short wave listening has many years left yet and while newer technology such as the Internet provides a convenient and cheap medium, there's nothing to beat the twirl of a heavy dial as you tune across the bands of an evening pulling far away stations from the ether.

Though my task in *SWM* (and a pleasant one it is too) is to write about radio and the web (and previously about computers in the shack) I adore still (and will always) listening in the conventional sense. Perhaps the sensible option is to enjoy both types of 'transmission'? Our common denominator is the pleasure in monitoring broadcasts of all kinds and arguably how they reach us is secondary.

The Internet is a truly excellent source of information for s.w.l.s and it provides good listening too so this time around I plan to devote the column to detailing some of the best of these web stations and the software necessary for receiving them.

## Let's Listen

There are a variety of listening options, some of which may surprise you. At its most simple, listening to broadcasts across the web is as simple as a station making digital files of its output available for replaying or downloading from their website. That is, you point your browser at the site, choose the audio you want to hear and click it. Generally a new browser window will open and with a tweak of your PC's volume control, the broadcast will issue forth. Alternatively, a right click (control-click on the Mac) will give you the option of downloading to your hard drive from where you can play the file.

This strategy is the one chosen by many speciality radio stations - those catering to audiences who like jazz, big band sounds, rockabilly, stand-up comedy and so on. If you use the excellent *iTunes* on the Mac (and now the PC - Apple has ported it, see [www.apple.com](http://www.apple.com) for download details), there are many preselected radio stations offering everything from country music to the spoken word. Some are excellent, some dire, all are free and fun.

Equally, *Internet Explorer* ([www.microsoft.com/explorer](http://www.microsoft.com/explorer)) and *Netscape*

*Navigator* ([www.netscape.com](http://www.netscape.com)) are shipped with a selection of radio stations and a simple search at [www.google.com](http://www.google.com) will provide a whole lot more that you can access and bookmark for further listening. An excellent place to start searching is [www.radio-locator.com](http://www.radio-locator.com) which provides simple options leading you to many thousands of radio stations - search by country, programming, station ident and so on. Check out [www.virtualltuner.com](http://www.virtualltuner.com) for many more stations.

As well as digital files, some stations - especially broadcasters such as the BBC, Voice of Russia, Voice of America and so on allow you to listen live to their broadcasts, neatly sidestepping the difficulties associated with sunspot and weather anomalies, multipath fading and the dwindling frequencies supported by cash-strapped stations in countries other than the US, Canada and western Europe.

Arguably the world's favourite broadcaster in this category is our own BBC. You can listen to any of the Beeb's domestic output by pointing your browser at [www.bbc.co.uk](http://www.bbc.co.uk), clicking on Radio and selecting a station - Radio 1, 2, 3, 4, 5Live, World Service, etc. Many ex-pats working and living overseas do precisely this in order to stay in touch with the UK. The BBC's stations offer a 'listen again' service for many programmes (though copyright issues occasionally exclude some programmes).

To hear the BBC's output you'll need a

computer with a compatible streaming audio browser plug-in. If that last sentence throws you, don't worry, just read the panel on this page. My own long-time favourite Voice of Russia ([www.vor.ru](http://www.vor.ru)) offers a Real Audio service in many languages - just click the link on the VOR home page - as do many other of the broadcast stations.

One advantage of this kind of listening is that you can hear stations you might otherwise not be able to receive without specialised equipment. For example, the much-heralded DAB broadcasts require a DAB set which, compared with conventional domestic receivers, can be expensive. But for those would like to hear the excellent programming of say, Radio 7, and yet who don't have a DAB radio (or set-top digital box), the Internet provides a simple audio path. Some stations, such as Oneworld, can only be heard at certain times on the web.

There are also many stations other than commercial broadcasters who offer live and recorded radio via the web. As mentioned in

a previous column, some public-spirited emergency services in the USA offer live 'scanner' webcasts where you can listen to the action as it unfolds as though tuned to their frequencies on your scanner. The output can be exciting and interesting, or simply hours of dull routine 'checking in'-type transmissions, but that's what listening to the authorities is all about! Try [www.surfmusic.de/poli.htm](http://www.surfmusic.de/poli.htm) for a long list of fire and police services around the USA and in several other countries.

A lesser-known web audio source is the tunable receiver - a radio connected directly to the Internet (via a PC) which you can access and tune as though you are sitting in front of it. These receivers are provided by s.w.l.s and amateurs who enjoy combining the technologies and are kind-hearted enough to make them available to all.

An excellent example can be found at Random Access Labs

([www.ralabs.com](http://www.ralabs.com)) the web pages of Bob Arnold N2JEU. Bob's site has some great links to interesting marriages of technology as well as a selection of tunable receivers and software to help link your own set to the Internet as a free download. For more web-tunable receivers see also The Listening Post at [www.chilton.com/scripts/radio/R8-receiver](http://www.chilton.com/scripts/radio/R8-receiver), [www.javoradio.com](http://www.javoradio.com) and [www.visualradio.de](http://www.visualradio.de)

So now fire up your computer, dial-up your ISP and tune in the world - good listening!

## Soft Sounds

After electing to listen to one of the major broadcasters such as the BBC on-line, your browser will be checked for the necessary software - essentially a plug-in 'helper' application which plays the digital audio stream the browser receives from the station. If the software isn't present, you'll be prompted to install the required utility from a suitable provider such as Real ([www.real.com](http://www.real.com)). Click and follow the links provided. The basic Real Player software is free, but make sure you choose to download the free option (not always obvious) unless you want a 14-day trial of a commercial package. The free plug-ins have fewer features but they work just fine. Once installed, Real software will make periodic checks for updates which you can install to remain up-to-date with streaming audio techniques.

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It must be that time of the year, as my postbag for December contained about as much as Santa's sack in January - not a lot! What's happened to all you civil v.h.f. airband listeners? I've hardly heard from anyone for a couple of months! Fortunately, early January has brought some interesting mail but nearly all of it is connected with the military.

## UK Airspace Changes

The proposed airspace changes to the Clacton Sector are due to be implemented on 18 March 2004. Unfortunately, the official documents with the details of the changes are not due to be published until February 5, which is too late for my copy deadline, (mid-January). It will once again contain a number of additions, changes and deletions to airways and reporting points. It is known that some swapping of current frequencies is likely to take place but whether the introduction of the first 8.33kHz channel is to be included within this latest round of changes is as I write this, still unknown.

I am though, still hearing stories of ongoing problems with the new 8.33kHz equipment so perhaps there may be another delay? I had hoped to bring you this information in advance of the changes but sadly it appears that I have been thwarted. If I do get any last minute information, I will add it at the end of the column as a stop press item.

## More Changes - TACAN Routes

Firstly, following on from the March and October 2003 changes to UK airspace, (especially to the eastern side of the UK), further changes have now taken place to the Military TACAN Routes at the end of 2003. This has been the most substantial change around of the TACAN routes for many years with new, amended, re-aligned and withdrawn routes all being part of the implementation. The whole country has been affected with the east and southeast being the primary areas of change with what is a much more simplified system.

Some of the main changes are: The major TACAN junction that used to be overhead Mildenhall, (MLD), has been moved 32km to the North and is now centred on Marham, (MAM). This means that the primary route TR1 is moved to the north and now routes from Brize Norton, (BZN) and out over the North Sea to

NAVPI, (formally MC6 and MC16). Coningsby is withdrawn as a major junction. The route TB5 has been withdrawn, with parts of the original route now being replaced by the re-aligned TB1.

The eastern route TB7 has been moved further west so that it is overland rather than over the North Sea. It now routes via Leuchars, (LUK), Leeming, (LEE) and Marham, then to the south via point WD7 to Dover (DVR) and on to the French FIR boundary. One thing that occurred to me was that those of you who spend time at Mildenhall and Lakenheath should in theory be able to identify aircraft on TACAN route TR1, much more easily now it is further north, than when it was directly overhead.

What is most noticeable from these changes is the ongoing programme to change the usage of North Sea airspace and also the much more simplified TACAN route system. I am grateful to **Photavia Press** who have allowed me to include their map of the new TACAN routes, a more detailed version of which will appear in their forthcoming publication *Airwaves 2004*. Just for reference, TACAN used to stand for Tactical Air Navigation and Range but the latest abbreviation is the more simple, TACTical Air Navigation aid.



Map of the new TACAN routes, which will appear in the forthcoming publication *Airwaves 2004*.

Photo courtesy Photavia Press.

## Lakenheath

With thanks to **Dave** and **Steve** here's some news from East Anglia. I am sure that regular readers who monitor the military in this area of the UK will have noticed that Lakenheath has been playing musical frequencies for the past couple of months. I have twice tried to include the updated information in this column only for it to be changed again a week or two later.

The main problem area has been within the Aux frequencies and the associated studs as used by the three based Squadrons and particularly with reference to the Air-to-Air and Operations frequencies. For example, several sources told me that the 492 FS had changed their Aux Stud 11 to 292.525MHz but twice in mid-January I heard the old frequency of 242.375 in use, both times being clearly identified as Aux 11. I'll wait for the situation to stabilise before I include a listing of the Aux frequencies for the three squadrons.

Shown in **Table 1** is what I believe to be the latest listing of the main frequencies. Recent changes include a new ground frequency and 369.075MHz has replaced 367.325MHz as Stud 14 Radar/Par.

## STCICS HF Changes

I am grateful to an anonymous reader who has sent me a December NOTAM, **Table 2**, which refers to some changes that have been made to the primary guard frequencies used by the UK Military STCICS h.f. network. I have not listed this information for some years so it is worth repeating in full, they are permanent changes with effect from the 3

December 2003. (STCICS = The Strike Command Integrated Communications System which provides h.f. voice communications for aircraft up to an approximate range of 1500 nautical miles from the UK coastline).

The actual message is as shown in **Table 2**, and although some of it is obvious, I will translate it:

Channel	MHz
FS	4.742
AL	5.702
DW	9.031
HW	11.247
F	13.257
BE	18.018

All six h.f./u.s.b. frequencies are monitored continuously, with broadcasts of QNH (Air Pressure) broadcast on the hour on Channels, AL, DW, HW and BE. Airfield Colour State Broadcasts at 30 minutes past the hour on the same four Channels. Plus Maritime Patrol

information broadcast on Channels FS and DW at 20 minutes past the hour.

It appears to me that the designator AL for 5.702MHz is a new allocation unless my records are out-of-date. These changes appear to be a rationalisation of the frequencies and the following STCICS frequencies are therefore withdrawn, 6.739, 8.965, 11.205 and 15.031MHz. Whilst being withdrawn from the STCICS Network that does not mean that they are withdrawn completely and may still be used within the UK ASACS discrete environment. The withdrawn frequencies were all used by the UK Fight Watch Centre, callsign 'ARCHITECT'.

Whilst I am on the subject, it occurred to me that it has been a long time since I included a breakdown of the UK military airfield colour codes. These codes can be handy to listen in on h.f. and find out the weather and airfield status at a specific airfield. (Yes, I know you could look it up the weather on the BBC or [www.weather.com](http://www.weather.com) on the Internet). These colour codes apply to Royal Air Force, Royal Navy and USAF airfields, the breakdown is as shown in **Table 3**.

So basically, if a field has a 'colour code BLUE', it should be an excellent day for photographs. But if it has a colour code RED, don't bother getting the camera out of the bag! The bottom listing, Colour code BLACK, indicates that the airfield is not usable for reasons other than the minimum visibility or cloudbase conditions. The word BLACK will precede the actual weather colour code at the time. This would be used for example, when the airfield is closed for security reasons or there is disabled aircraft blocking the runway. With thanks to the RAF *Flight Information Handbook*.

### C-135 Selcalls

The follow up messages to last year's Airband Special, which centred around the C-135, has generated quite a lot of post, (relatively). The general consensus of opinion is, as we suggested, that the KC-135s that have been fitted with the PACER CRAG cockpit modification since the late 90s were retrospectively fitted with Selcall equipment.

I am grateful for a very detailed E-mail from **Andy** and **Martin** who have mentioned that there's a similar repetitive code pattern to these Selcalls as there is with the C-17s (and other transport types). They've suggested that in retrospect the C-135s have had repetitive Selcall blocks allocated to the fleet as a whole, (possibly on the basis of the fiscal allocations of the serials), and that these blocks could be repeated at least four

**Table 1.**

1	AS SQN	Operations
2	231.425	Ground
3	358.675	Tower
4	242.075	Departure Control
5	300.8	NATO Low Fly
6	299.975	London Military
7	275.475	London Mil South
8	249.475	Scottish Military
9	362.125	Safety Officer Flying/Ramrod
10	337.6	Approach Rapcon ICF
11	309.075	Radar/PAR
12	259.05	Radar/PAR
13	290.825	Radar/PAR
14	344.675	Radar/PAR
15	369.075	RADAR/PAR

**Table 2.**

B) 03/12/01 08:00 UTC  
 C) PERM COM (U1444/03)  
 E) THE FOLLOWING STCICS GUARD FREQUENCIES AND BROADCASTS WILL BE OPERATIONAL FOXTROT SIERRA 4742KHZ, ALPHA LIMA 5702KHZ DELTA WHISKY 9031KHZ, HOTEL WHISKEY 11247KHZ FOXTROT 13257KHZ, BRAVO ECHO 18018KHZ FS, AL, DW, AND HW DUAL MONITORED H+00 QNH AL, DW, HW, BE H+30 AFCS AL, DW, HW, BE MPA BROADCAST FS, DW

**Table 3.**

Colour Code	Surface Visibility		Cloudbase of 3/8 Sky Coverage Or More (ft a.g.l.)
	km	nm	
BLUE	8.0	4.3	2500
WHITE	5.0	3.0	1500
GREEN	3.7	2.3	700
YELLOW 1	2.5	1.6	500
YELLOW 2	1.6	1.0	300
AMBER	0.8	0.5	200
RED	>0.8	>0.5	Below 200 or sky obscured
BLACK	As Below		

The word BLACK will precede the actual weather colour code at the time. This, for example, would be used when the airfield is closed for security reasons or there is a disabled aircraft blocking the runway.

times or more. (In other words every aircraft, (over 800), was theoretically allocated a possible Selcall even though it has already been withdrawn from service, and those that have been updated would be allocated Selcalls from the block system as required - Confused?

From the detailed information that **Andy**

and **Martin** have sent me, (which is quite complicated and too much to include here), I can see the logic behind their thinking - it is certainly an interesting theory. Has anyone else done any investigation along these lines?

Well, there's been no update on the 8.33kHz spacing so, I'll see you next month.



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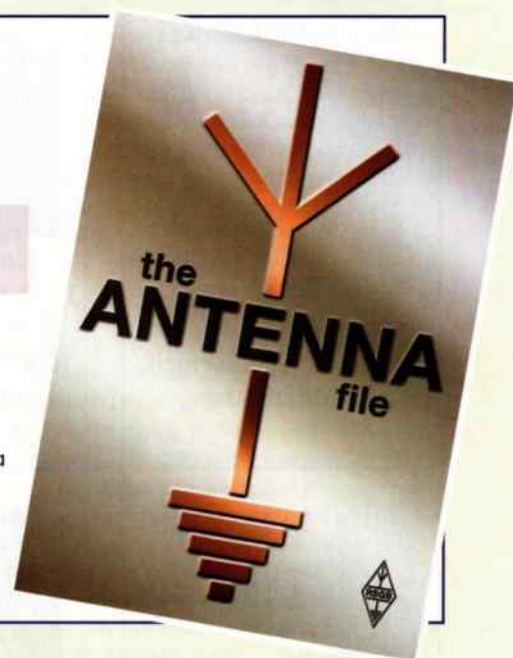
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# SWM UK Radio Club Listing

If you want to meet with others with a radio passion, then please use this guide to assist...

## NORTH WEST

**CHESTER & DRS, G3GIZ.** Meets at the Burley Memorial Hall, Waverton. Details from Chns Wild. Tel: (01244) 683629.  
**HALTON RADIO CLUB, MOBZX.** Meets at the Play Centre, Norton Hill, Windmill Hill, Runcorn. Details from Alan Parker 2E1DSF. Tel: (01928) 790228.  
**MACCLESFIELD WIRELESS SOCIETY, G4MW5.** Meets at the Pack Horse Bowling Club, Abbey Road, Macclesfield. Details from Mrs Hazel Parrott.  
**MID CHESHIRE ARS, G3ZTT.** Meets at the Cotebrook Village Hall, Cotebrook Nr, Tarporley, Cheshire. Details from Niall Reilly G0VOK.  
**NORTH CHESHIRE RC, GOBAA.** Meets at the Morley Green Club, Moberley Road, Wilmslow, Cheshire. Details from Jill Gounley G00ZI. Tel: 0161-485 5036.  
**RADIO OFFICERS ARS, MOROA.** Details from Mr J. Bell G0CMM.  
**UKFM GROUP WESTERN, G83MP.** Meets at the Morley Green Club, Moberley Road, Wilmslow, Cheshire. Details from Gordon Adams G3LEQ. Tel: (01565) 652652, FAX: (01565) 634560.  
**WARRINGTON & DARS, G0WR5.** Meets at the Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington, Cheshire. Details from John Riley G0RPG. Tel: (01925) 762722.  
**WIDNES & RUNCORN ARC, G0FWR.** Meets at the Scout Hut, Castle Road, Halton Castle, Runcorn, Cheshire. Details from Martin Tust G4LUQ. Tel: (01928) 714843.

## CUMBRIA

**EDEN VALLEY RS, G0ANT.** Meets at the BBC Club, Penrith. Details from John Roze G0VMP. Tel: (01931) 716421.  
**FURNESS ARS, G4ARF.** Meets at the Farmers Arms Hotel, Newton-in-Furness. Details from Mr K. Moore M18WA. Tel: (01229) 485691.  
**WHITEHAVEN ARC, M0BEE.** Details from Mr N. Williams M0CRM.

## GREATER MANCHESTER

**BURY RS, G3BRS.** Meets at the Mosses Centre, Cecil Street, Bury, Lancs BL9 0SB. Details from Steve Gilbert G3OAG. Tel: 0161-881 1850.  
**DOUGLAS VALLEY ARS, G3BPK.** Meets at the Wigan Sea Cadet HQ, Training Ship Sceptre, Brookhouse Terrace, off Warrington Lane, Wigan. Details from Mr D. Snape G4GWG. Tel: (01942) 211397.  
**ECCLES & DARS, G3GXJ.** Meets at the Eccles Liberal Club, Wellington Road, Eccles, Manchester. Details from Chns Hanson G8KRG. Tel: 0161-773 7899.  
**THE MANCHESTER WIRELESS SOCIETY, G5MS.** Meets at the Simpson Memorial Community Hall, Moston Lane, Moston, Manchester. Details from Ian M0IPR. Tel: 0161-288 730 or visit www.g5ms.com  
**OLDHAM ARC, G4ORC, G1ORC.** Meets at the Royston Air Training Corps, Park Lane, Royston, Oldham. Details from Michael Crossley M1CVL. Tel: (01706) 367454.  
**OLDER HILLS ARS, G0UQA.** Meets at the Oulder Community School, Hudsons Walk, Oulder Hill, Rochdale. Details from Carolyn Hope G7WFF. Tel: (01706) 522687.  
**ROCHDALE & DARS (RADARS), G0ROC.** Meets at the Barnfield & Fieldhouse, Cricket Club, Barnfield Village. Details from John Cannell G70AI. Tel: (01706) 376204.  
**SOUTH MANCHESTER RAD & COMP CL, G3PVA.** Meets at the Sale Cricket Club, Dawe Road, Sale, Cheshire. Details from Chns Ward G4H0N. Tel: 0161-483 5174.  
**STOCKPORT RS, G6UQ, G8SR5.** Meets at the T.S. Hawkins, Stockport Sea Cadets HQ, Pearmill Ind. Est., Stockport Road, West Hope, Lower Breabury, Stockport. Details from David Simcock M1JANT. Tel: 0161-456 7832.  
**TRAFFORD ARC, G0TRC, G1TRC.** Meets at the Watch House, Cruising Club, Canal Bank, Stretford, Manchester M32 8WE. Details from Roger May G4YLQ. Tel: (01457) 866675.  
**TRAFFORD RADIO GROUP, G0TRG.** Meets at 17th Stretford Scouts HQ, Barton Road, Stretford, Manchester. Details from Jon Mossman G7JKK. Tel: 0161-865 5609.  
**WEST MANCHESTER RC, G4MWC.** Meets at the Astley & Tydesley Miners Welfare Club, Meany Road, Astley, Tydesley, Manchester. Details from Jeffrey Moran M0BGU. Tel: (01204) 497694.  
**WGAN & DARC, G0HRW.** Details from Mr D.H. Barkley G0DPI. Tel: (01942) 237162.

## ISLE OF MAN

**ISLE OF MAN ARS, G3DFLH.** Meets in the Sea Cadets Hall, Tromode Road, Tromode, Douglas. Details from Dave Walton M0B0X. Tel: (01624) 816308.

## LANCASHIRE

**BURNLEY & DARS, RS87674.** Meets at Barden High School, Barden Lane, Burnley, Lancashire. Details from Bill Scriver G0BQC.  
**CENTRAL LANCAS ARC, G0FDX.** Meets at the Priory Club, Broadfield Drive, Leyland, Lancs. Details from Steve Shearing M1AJC.  
**DARWEN ARC, G4JS.** Meets at the Darwen Catholic Club, Wellington Fold, Darwen, Lancashire. Details from Len Jackson G0NPJ.  
**FISTS CW CLUB, G0IPX.** Details from Mr E. Longden G3ZQS. Tel: (01254) 703948.  
**FYLDE ARS, RS53939.** Meets at the A.N.T. Flying Clubhouse, Blackpool Airport. Details from Ken Randall G3RFH. Tel: (01253) 407952.  
**MORECAMBE BAY ARS, G4YBS.** Meets at the Timpli

Sports & Social Club, Outmos Lane, Morecambe, Lancs. Details from Brian Watson G0RDH. Tel: (01524) 424522.  
**PRESTON ARS, G3KUJ.** Meets at the Lonsdale Club, Fulwood Hall Lane, Fulwood, Preston. Details from Enc Eastwood G1WQC. Tel: (01772) 686708.  
**ROLLS-ROYCE ARC, G3RR.** Meets at the Club Room, Rolls-Royce Sports Ground, Barnoldswick. Details from Mr J.A. York G3KYJ.  
**ROSSENDALE ARS, G1RR5.** Meets at the Old Fire Station, Burnley Road, Rawtenstall, Rossendale, Lancs BB4 8EW. Details from Ken Slaughter. Tel: (01706) 830306.  
**THORNTON CLEVELYS ARS, G4ATH.** Meets at the Frank Townsend Centre, Beach Road, Thornton Clevelys, Lancs. Details from Mr J.E. Duddington G4BFH. Tel: (01253) 853554.

## MERSEYSIDE

**LIVERPOOL & DARS, G3AHD.** Meets at the Churchill Conservative Club, Church Road, Wavertree, Liverpool L15. Details from David G. Parr G0BDEY.  
**SOUTH WIRRAL CONTEST GROUP, G3CSA.** Details from Mr T.B. Saggerson G4WSE. Tel: 0151-339 0842.  
**SOUTHPORT & DARC, G2OA.** Meets at St. Marks Church Hall, Scarsbrock, Lancs. Details from Don Atkins M1BUL.  
**WIRRAL & DARC, G4MGR.** Meets at the Irby Cricket Club, Mill Hill Road, Wirral. Details from Tom G4BKF. E-mail: secretary@wadarc.com Tel: (07505) 291850.  
**WIRRAL ARS, G3NWR, M1ARC.** Meets at the Club Room, Ivy Farm, Arrows Park Road, Wirral L49 5LW. Details from Alan Upton G3UZU. Tel: 0151-677 3266.

## NORTH EAST CLEVELAND

**EAST CLEVELAND ARC, G4CRD.** Meets at the Committee Room of The New, New Marske Institute Club, Gurney Street, Cleveland TS11 BEG. Details from Malcolm Brass G4YMB. Tel: (01287) 638119.  
**STOCKTON & DARG, G4XGX.** Meets at the Billingham Community Centre, Billingham, Cleveland. Details from David J. London G0VGB. Tel: (01642) 896395.

## CO DURHAM

**BISHOP AUCKLAND RC, G4TTF.** Meets at the Stanley Village Hall, Rear High Road, Stanley, Crook, Co. Durham. Details from Mark Hill G0GFG. Tel: (01388) 745353.  
**DERWENTSIDE ARC, G4PFF.** Meets at the Steel Club, 36 Medomsford Road, Consett, Co. Durham. Details from Mr G. Darby G7GUJ. Tel: 0191-370 2032.  
**GREAT LUMLEY AR & ES, G4ELZ.** Meets at the Community Centre, Great Lumley, Chester-le-Street, Co. Durham. Details from Nancy Bone G7UUR. Tel: 0191-477 0036, mobile (07990) 760920.  
**PETERLEE RADIO CLUB, G0KVI.** Details from Andrew Pennell G0NSK.

## HUMBERSIDE

**EAST YORKSHIRE ARS, G0ECR.** Meets at the Northern Foods Sports & Social Club, Millhouse Woods Lane, Cottingham, E. Yorks. Details from David Taylor G4EBT. Tel: (01482) 876702.  
**GOOLE R & ES, G0OLE.** Meets at the West Park Pavilion, Goole, South Humberside.  
**GRIMSBY ARS, G3CNX.** Meets at Cromwell Social Club, Cromwell Road, Grimsby, South Humberside. Details from Mr G.J. Smith G4EBK. Tel: (01472) 887720.  
**HORNSEA ARS, G4EKT.** Meets at The Mill, Alwick Road, Hornsea, North Humberside. Details from Jeff Southwell G4GIV. Tel: (01964) 533331.  
**HULL & DARS, G3AMW.** Meets at the SWL Centre, Club Room, Goathland Close, Walton Street, Hull. Details from Mr R. Hatton.  
**RAYWELL PARK SCOUTS ARS, G4CMT.** Details from Mr A.D. Russell M0AUX.  
**SCUNTHORPE STEEL ARC, G4FLH.** Details from Alistair Butler M1ECF.

## NORTH YORKSHIRE

**DARLEY ARC, G0FOS.**  
**HAMBLETON ARS, G0JQA.** Meets at the Mencap Centre, Northallerton, N. Yorks. Details from Ian Brickwood G0JQA. Tel: (01609) 775598.  
**QUEEN MARY AROC, G6QM.** Meets at Blazefield, Pateley Bridge, Harrogate, North Yorks HG3 5DR. Details from Frank Hams G4IEY. Tel: (01242) 236715.  
**RIPON & DARS, G4JSM.** Meets at The Bunker, rear of Ripon Town Hall, North Yorkshire. Details from Nigel Drumm M1BDZ. Tel: (01423) 884733.  
**ROYAL SIGNALS SCARBOROUGH ARC, G0RCS.** Details from Mr A.W.W. Timme G3CWW. Tel: (01484) 842330.  
**SCARBOROUGH ARS, G4BP.** Meets at the Scarborough Cnet Club, Pavilion, North Marine Road, Scarborough, North Yorks YO12 2TJ. Details from Mr D.P. Tipper G3JBR. Tel: (01723) 377296.  
**SCARBOROUGH SE GRP, G0XOO.** Details from Roy Clayton G4SSH. Tel: (01723) 862924.  
**THE VINTAGE & MILITARY ARS, RS183536.** Details from H.A. Aspnall.  
**YORK ARS, G3HWW.** Meets at the Guppy's Enterprise Club, 17 Nunney Lane, York. Details from Keith Cass G3WVO. Tel: (01904) 422084.  
**YORK RADIO CLUB (AMATEUR) G4YRC.** Meets at the Bishopthorpe Social Club, Bishopthorpe Main Street, York. Details from Gareth Foster G1DRG. Tel: (01904) 421392.

## NORTHUMBRIA

**NORTHUMBRIA ARC, G4AAX.** Meets at the Old Telephone

Exchange, Cresswell Road, Ellington, Morpeth, Northumberland. Details from Mr D. Stansfield G0EVV. Tel: (01670) 513026.

## SOUTH YORKSHIRE

**FINNINGLEY ARS, G7HAH.** Details from John Fennell G4HOY. Tel: (01427) 872522.  
**MALTBY & DARS, G4SHM.** Meets at the Centenary Hall, Clifford Road, Hellaby, Rotherham. Details from Keith Johnson G1PQW. Tel: (01709) 798098.  
**MEXBOROUGH & DARS, G4BTS.** Meets at the Harrop Hall, Mexborough, South Yorks. Details from Mr R.T. Sheppard G0KSK. Tel: (01709) 586329.  
**SHEFFIELD ARC, G0INF, NRAE/RAE tuition provided.** Meets at the Sheffield University Staff Club, 197 Brook Hill, Sheffield. Details from Mrs Irene Glossop G0SFH.

## TYNE & WEAR

**HOUGHTON-LE-SPRING ARC, G3NMD.** Meets at the Dumbyre Royal British Legion, Dumbyre, Fencehouses, Tyne & Wear DH4 6LJ. Details from Foster Angles G0ABF. Tel: 0191-584 4673.  
**SOUTH TYNESIDE ARS, G3OXXQ.** Meets at the Boldon Scout Hut, Grey Horse Car Park, Front Street, Boldon. Details from William Wilson M0BWI. Tel: 0191-421 9921.  
**TYNEMOUTH ARC G0NWM.** Meets at the Linskill Centre, Linskill Terrace, North Shields, Tyne & Wear. Details from Mr G.N. Thompson G0SBN.  
**TYNESIDE ARS, G3ZQW.** Meets at the St Teresa's Club, 200b Heaton Road, Newcastle-upon-Tyne NE6 5HP. Details from Mr J. Pickersgill G0DZG. Tel: 0191-265 1718.

## WEST YORKSHIRE

**DENBY DALE & DARS, G4CDD, G8KMK.** Meets at the Pie Hall, Denby Dale, West Yorkshire. Details from Mr J.P. Morley G4FSQ.  
**HALIFAX & DARS, G2UG.** Details from Mr S.P. Ortmyer G4RAW. Tel: (01422) 203062.  
**KEIGHLEY ARS, G0KRS.** Meets at the Cnet Club, Ingrow, Keighley, West Yorkshire. Details from Mr I. Townson M1BGY. Tel: (01274) 723951.  
**LEEDS & DARS, G4LAD.** Meets at The Radio Shack, Yarnbury (Horsforth), RUFC Grounds, Brownbarne Lane, Horsforth, Leeds LS18 5HB. Details from Mr E. Howden G0IBU.  
**NORTH WAKEFIELD RC, G4NOK.** Meets at the East Ardsley Cricket Club, Nr. Wakefield. Details from Mrs Olga Parker 2E1ASV. Tel: 0113-253 9087.  
**OTLEY ARS, G3XNO.** Meets at The RA0B Club, Westgate, Otley, West Yorkshire. Details from Jack Worsnop G0SNV. Tel: (01274) 636197.  
**PONTEFRACCT & DARC, G3FYQ.** Meets at the Carleton Community Centre, Pontefract, West Yorkshire. Details from Colin Wilkinson G0NQE. Tel: (01977) 677006.  
**SPEN VALLEY ARS, G3SVX.** Meets at the Old Bank WMC, Mirfield, West Yorkshire. Details from Mr J.R. Wilde G0F0I. Tel: (01274) 875038.  
**WAKEFIELD & DARS, G3WRS.** Meets at the Ossett Community Centre, Prospect Road, Ossett, W. Yorks. Details from Ian Roberts. Tel: (01924) 216502.  
**WAKEFIELD RPRP GP, G0KNR.** Details from Mike Charton G0XZ.  
**WHITE ROSE ARS, G3XPE.** Meets at the Moorston RUFC, Moss Valley, KINGS Lane, Leeds LS17 7NT. Details from Mr M. Wilson G7SDW. Tel: 0113-273 6039.

## MIDLANDS

**BEDEFORDSHIRE**  
**DUNSTABLE DOWNS RC, G4DCC.** Meets at the Cheus House, 77 High Street South, Dunstable, Beds LU6 3SF. Details from Phil Sealard G8XTW. Tel: (01525) 384419.  
**SHEFFORD & DARS, G3FJE.** Meets at the Church Hall, Ampton, Shefford, Beds. Details from John West. Tel: (01462) 812739.  
**ST SWITHUN'S ARC, M0AVJ.** Meets at St. Swithun's Church, Rectory Rooms, Sandy, Beds. Details from Kelynn Darton G0WOD. Tel: (01767) 683179.

## CAMBRIDGESHIRE

**CAMBRIDGE & DARC, G2XV.** Meets at the Colendge Community College, Radegeund Road, Cambidge. Details from Ron Huntsman G3KBR. Tel: (01223) 501712.  
**DUXFORD ARS, G82IWM.** Meets at Building 177, Imperial War Museum, Duxford Airfield, Cambs. Details from Mrs B.L. Pope. Tel: (01279) 656149.  
**GTR PETERBOROUGH ARC, G4EHV.** Meets at the 6th Form Building, Stangground College, Farce Road, Fletton, Peterborough. Details from Alan D. Ralph G8XLH.  
**HUNTINGDONSHIRE ARS, G0HSR.** Meets at the Medway Centre, Medway Road, Huntingdon. Details from David Leach G7DIU. Tel: (01480) 431333.  
**MARCH & DRAS, G3PMH.** Meets at the British Legion Club, Rookswold Road, March, Cambs PE15 8DP. Details from Mr J. Braithwaite G3PWK. Tel: (01353) 698885.  
**PETERBOROUGH R & ES, G3DQW.** Details from Mr V. Edwards G8NGZ.  
**WISBECH AR & ELEC. CLUB, M5ARC, G4PQL, G8NED.** Meets at RAFA Club, Old Market, Wisbech. Details from Alan Bingleland M0DUQ. www.warec.org.uk

## DERBYSHIRE

**BOLSOVER ARS, G4RSB.** Meets at the Blue Bell, High Street, Bolsover, Derbys. Details from Colin Morris G0RXT. Tel: (01246) 822856.  
**BUXTON RA, G4SPA.** Meets at the Leewood Hotel, Burton. Details from Derek Carson G4IHO. Tel: (01298) 25506.

**DERBY & DARS, G2DJ.** Meets at Carlton Road United Reform Church, Carlton Road, Littleover, Derby. Details from Martin Shardlow G3SZL. Tel: (01332) 556875.  
**EREWASH VALLEY ARC, G0PCX.** Meets at The Sitwell Arms Public House (between Horseyley Woodhouse and Woodside). Details from Peter Russell M0AQJ.  
**MOUNT ST. MARY'S ARC, G4MSM.** Meets at the College, Spinkhill, Sheffield. Details from Rev. P. McArdle G0DAG. Tel: (01248) 812230.  
**NOTTS & DERBY BORDER ARC, G4NID.** Meets at Marpool United Reform Church, Chapel Street, Marpool, Ilkerton. Details from Graham Bromley G4UTN. Tel: (01773) 834308.  
**NUNSFIELD HOUSE ARG, G3EEO.** Meets at the Nunsfield House, Boulton Lane, Alvaston, Derby. Details from William F. Smith G7PJJ.  
**STH DERBYS & ASHBY W ARG, G0SRC.** Meets at the Moira Replian Centre, 17 Ashby Road, Moira, Wadincote, Derbyshire DE12 6DJ. Details from Mrs B. Wallye. Tel: (01283) 760822.  
**STH NORMANTON, ALFRETON & DARC, G0CPO.** Meets at the New St. Community Centre, New Street, South Normanton, Derbyshire. Details from Peter Gething M0CQLQ. Tel: 0115-955 5766.

## GLOUCESTERSHIRE

**CHELTENHAM AR ASSN, G5BK.** Meets at the Prestbury Library, Prestbury, Cheltenham. Details from Ivan Wilson G4BGW. Tel: (01452) 731956.  
**CHELTENHAM CLUSTER SUPP GP, G87DXC.** Details from Mr A.M. Davies G0HDB. Tel: (01684) 72178.  
**GLOUCESTER AR & ES, G4AAY.** Meets at the Churchdown School, Churchdown. Details from Mr A.J. Martin. Tel: (01452) 618930.  
**SMITHS INDUSTRIES RS, G4MEN.** Meets at the Sports & Social Club, Evesham Road, Bishops Cleeve, Cheltenham GL52 4SF. Details from A.J. Hooper G1JMF.  
**STROUD RS, G4SRS.** Meets at the Minchampton Youth Centre, Nr. Stroud. Details from Mr S.G. Spencer G31LO.  
**WHITE NOISE LISTENING GOWNL.** Details from Adnan Deane G7KGC.

## HEREFORD & WORCESTER

**BROMSGROVE & DARC, G3VGG.** Meets at the Avoncroft Arts Centre, Bromsgrove, Worcs. Details from Mr J.F. Burford G4OAZ.  
**BROMSGROVE ARS, G4TUI.** Meets at the Likely End WMC, Bromsgrove, Worcs. Details from Barry Taylor G0TPG. Tel: (01527) 542266.  
**DROTWITH ARC, G4PYO.** Meets in the Community Hall, Dotwich Spa, Worcs. Details from Hector Wragg M1BIV. Tel: (01905) 794399.  
**HEREFORD ARS, G3YDD.** Meets at the Civil Defence HQ, Magistrates Court, Gaol Street, Hereford. Details from Tims Bndglan-Taylor G0JWW. Tel: (01432) 279435.  
**KIDDERMINSTER & DARS, G0KRC.** Meets at the Sutton Arms, Sutton Park Road, Kidderminster, Worcs. Details from Mr A.W. Saunders G0OZB. Tel: (01299) 400172.  
**MALVERN HILLS ARC, G4MHC.** Meets on the second Tuesday of the month at the Town Club, Great Malvern. Details from Mike G3TGD. Tel: (01905) 830752, E-mail: mike@allensons.net.co.uk  
**REDDITCH RC, G4AACZ.** Meets at the WRVS Centre, Ludlow Road, Redditch, Worcs. Details from Mr R.J. Mutton G3EVT. Tel: (01789) 762041.  
**VALLE OF EVESHAM RAC, GOERA.** Meets at the BBC Club, High Street, Evesham, Worcs. Details from Mr A.C. Lindsay G4NRN. Tel: (01386) 41508.

## LEICESTERSHIRE

**1F ATC, G7MCD.** Details from Sqn. Cmdr. Adnan Uttig G1WZQ.  
**BEAUMANOR ARC, G3BMR**  
**DEMONTFORT UNIVERSITY, G3SDC.** Open to past & present students. Details from Mr R.G. Tittenngton. Tel: 0116-257 7059.  
**HINKLEY AR & ES, G3VLG.** Meets at the United Services Club, St. Mary's Road, Hinkley. Details from Mr R.A. Bennett G8BFF. Tel: (01455) 846493.  
**LEICESTER RS, G3LRS.** Meets at Gireos Cottage, Groby Road, Leicester LE3 9QJ. Details from Mr S.P. Hay G3HYH. Tel: 0116-224 2598.  
**LOUGHBOROUGH & DARC, G3RAL.** Meets at Hind Leys College, Shephed, Loughborough, Leics. Details from Sains Walker G1ETZ. Tel: (01509) 504319.  
**MELTON MOWBRAY ARS, G4FOX.** Meets at the St. John Ambulance Hall, Asfordby Hill, Melton Mowbray, Leics. Details from Mr R. Winters G3NVK. Tel: (01664) 63369.  
**NATIONAL SPACE CENTRE ARS, M1NSC.** Details from Mr J. Heath G7HIA.  
**TAMWORTH ARS, G8TRS.** Details from Mr A.J. Dyson G0UHW. Tel: (01827) 830437.  
**WELLAND VALLEY ARS, G4WVR.** Meets at The Village Hall, The Green, Great Bowden, Leics. Details from The Secretary.

## LINCOLNSHIRE

**FIVE BELLS GROUP, G4SIV.** Details from Mr B.K. Tattall G4ODA.  
**GRANTHAM RC, G0GRG.** Meets at the Kontak Social Club, Barrowby Road, Grantham, Lincs. Details from the Secretary. Tel: (01476) 857436.  
**LINC0LN SHORT WAVE CLUB, G5FZ.** Meets at The Railway Club, Triton Road, Lincoln. Details from Mrs Pam Rose G4ST0. Tel: (01427) 788356.  
**RAF CONINGSBY ARC, G3LQS.** Meets at Essex Block, RAF Coningsby. Details from Peter Hanson G0NVY.  
**RAF WADDINGTON ARC, G0RAF.** Meets at Pyewine Inn, Fossebank, Saxby Road, Lincoln. Details from Robert Pickles G3VCA. Tel: (01522) 528708.

**SPALDING & DARS, G4SDP.** Meets at The Did Fire Station, Spalding, Lincs. Details from Raymond Pearson GBELV. Tel: (01775) 711953, Web: www.sdars.org.uk **SPILSBY ARS, RS91468.** Details from Clive Ironmonger G6HYF. Tel: (01790) 752712.

## NORTANTS

**KETTERING & DARS, G5KN.** Meets at The Ilacs Public House, 39 Church Street, Isham, Kettering, Northants NN14 1HD. Details from Fay Banwell G6AKS. Tel: (01536) 390954.  
**MID NORTANTS AR EXP, GOING.** Details from Lonei Parker G5LP.  
**NORTHAMPTON RC, G3GW.** Meets at the British Timken, Social & Athletic Club, Cotswold Avenue, Duston, Northampton. Details from Norman Miller G0GBZ. Tel: (01273) 349188.  
**NORTHAMPTON SCOUT ARG, G6NDS.** Meets at Overstone Scout Activity Centre, Northampton. Details from Ian Rvett G6WPU.  
**PARALLEL LINES CG, G4LUP.** Details from Mr P.S. Lidsay G4CLA.

## NOTTINGHAMSHIRE

**ARC OF NOTTINGHAM, G3EWF.** Meets at the Haywood Road Community Association, Haywood Road, Mapperley Road, Nottingham NG3 6AD. Details from Ron Hague G4XOU. Tel: 0115-919 9177.  
**DUKERIES ARS, G4XTL.** Meets at Ambleside Community Centre, Ambleside, New Olerton, Notts. Details from Colin Foster G7DEX.  
**HUCKNALL ROLLS ROYCE ARC, G5RR.** Meets at the Hucknall Rolls Royce Sports & Social Club, Watnall Road, Hucknall, Nottingham. Details from Mr P. Hart G4JSM.  
**MANFIELD ARS, G3GQC.** Meets at the Debdale Park Sports & Recreation Club, Debdale Lane, Mansfield Woodhouse, Notts. Details from David Peat G0RDP. Tel: (01623) 631931.  
**NORTH NOTTS DATA GROUP, G0WNN.** Details from Tony Jenkins G8TFB.  
**SIEMENS ARC, G8ZX, G8HG.** Meets at the GPT Sports Ground, Beeston, Nottinghamshire. Details from Chns Archer G4VFK. Tel: 0115-943 3387.  
**SOUTH NOTTS ARC, G0OAU.** Meets at the Fairham Community College, Farnborough Road, Clifton, Nottingham NG11 9AE. Details from Gary Bishop G0WUG. Tel: (01509) 672846.  
**WORKSOP ARS, G3RCW.** Meets at the Club House, 59-61 West Street, Worksop, Nottingham S80 1JP. Details from Terry Calvert G4GBS. Tel: (01302) 743130.  
**SHROPSHIRE OSWESTRY & DARC, G4TTO, G1ORA.** Meets at the Sweeney Hall Hotel, Sweeney, Oswestry. Details from Ant Astley GWOAJA. Tel: (01691) B60545.  
**SALOP ARS, G3SRT, M1AXW.** Meets at the Telepost Club, Railway Lane, Abbey Forgeate, Shrewsbury. Details from John Bumford G0GTN. Tel: (01743) 249943. E-mail: john.bumford@virgin.net  
**TELFORD & DARS, G3ZME.** Meets at the Dawley Bank Community Centre, Dawley, Telford, Shropshire. Details from Mr M. Vincent G3UKV. Tel: (01952) 255416.

## STAFFORDSHIRE

**BURTON-ON-TRENT & DARS, G3NFC.** Meets at the Staphelin Institute, Main Street, Staphelin, Burton-on-Trent, Staffs. Details from Mr M.W. Cotten G4HBY.  
**CANNOCK CHASE ARS, G6SW.** Meets at the Four Crosses Inn, Watling Street, Hatherton, Cannock. Details from Arnold Matthews G3FZW. Tel: (01543) 262495.  
**CHAD RC, G4CAR.** Meets at the Swinford Officers Club, Swinfin, Lichfield, Staffs. Details from Bernard Jayne G8BFL. Tel: (01543) 268569.  
**LICHFIELD ARS, G3WAS.** Meets at the Queens Head, Sandford Street, Lichfield. Details from Roger Smethers G3NLY. Tel: (01543) 672762.  
**MOORLANDS & DARS, G4NHT, G1MAD.** Meets at the Creda Works, Blythe Bridge, Stoke-on-Trent, Staffs ST11 9LJ. Details from Mr B.J. Butcher G4HKX. Tel: (01782) 395793.  
**NEWCASTLE-ULYME SCOUT AR COM GR, G7UQG**  
**STOKE-ON-TRENT ARS, G3GBU.** Meets at the '45' Club, 92 Lancaster Road, Newcastle-under-Lyme, Staffs. Details from Albert Allen G4DHO. Tel: (01782) 638801.  
**SUTTON COLDFIELD RS, G3RSC.** Meets at the Rugby Club, Walmsley Road, Sutton Coldfield, West Midlands. Details from Paul G. Turner G7MWO. Tel: 0121-350 4263.  
**WARWICKSHIRE AVON VALLEY ARA, MORAD.** Details from Mr Peter Bradham G0WJU. Tel: (01905) 724531.  
**MID WARWICKSHIRE ARS, G3UON.** Meets at the St. John Ambulance HQ, 61 Emcote Road, Warwick. Details from Bernard Pittaway. Tel: (01926) 420913.  
**RUGBY ATS, G4APD.** Details from Tony Humphres G0OLS. Tel: (01455) 552683.  
**STRATFORD-UPON-AVON & DARS, G0SOA.** Meets at the Home Guard Club, Tiddingham, Stratford-upon-Avon, Warks. Details from Ron Horsley G0MRH. Tel: (07970) 148204.

## WEST MIDLANDS

**ALDRIDGE & BARR BEACON ARC, GONEQ.** Meets at the Aldridge Central Hall Community Centre, Middlemore Lane, Aldridge WS9 BAN. Details from Mr C.J. Baker G0NOL. Tel: (01922) 636162.  
**COVENTRY ARS, G2ASF.** Meets at the Binley Church Hall, Blnkrow Road, Coventry. Details from John Beech G8SEQ. Tel: (01203) 673999.  
**DUDLEY ARC, G4DAR.** Meets at the Community Centre, Seagrave, Central Library, St. James Road, Dudley. Details from Tony Lucas G4LVA. Tel: (01384) 277925.  
**HILLCREST ARS, G0SPM.** Meets at The College, Simms Lane, Netherdon, Dudley, West Midlands. Details from Stuart Viney. Tel: (01384) 232457.  
**KYNOCH R & TVS, G3HPP.** Meets at the Club Workshop, IMI Ltd., Sportsfield, Perry Bar, Birmingham. Details from Mr G. Nicholls. Tel: (01922) 635376.  
**MILAND ARS, G3MAR.** Meets at Unit 22, 60 Regent

Place, Hockley, Birmingham (jewellery quarter). Details from John A. Crane G0LAI. Tel: 0121-628 7632.  
**SANDWELL AMATEUR RADIO CLUB, G0CWC.** Meets at Sandwell ARC, Broadway, Oldbury, Warley, West Midlands B68 9DP. Details from Stuart Collins M0BT0. Tel: 0121-561 4663.  
**SIERRA HOTEL ARCCG, G0OBS.** Details from Warwick M. Hall G4WMM.  
**SOLIHULL ARS, G3GEI.** Meets at The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. Details from Paul Gaskin G8AYV. Tel: 0121-783 2996.  
**SOUTH BIRMINGHAM ARS, G3OHM.** Meets at Hampstead House, Fairfax Road, West Heath, Birmingham. Details from The SBRS Secretary.  
**STOURBRIDGE & DRS, G6OI, G6SRS.** Meets at the Old Swinford Hospital/School, Stourbridge, West Midlands. Details from Tom Edwards.  
**WEST BROMWICH CENTRAL RC, G4WBC.** Meets at The Sandwell Public House, High Street, West Bromwich, West Midlands. Details from Ian Leitch G0PAL. Tel: 0121-561 2884.  
**WEST MIDLANDS POLICE ARC, G0COP, G1WMP.** Details from Steven Jones G6LRL.  
**WILLENHALL & DARS, G4ETW.** Meets at The Liberal Club, Villiers Street, Wilenhall, West Midlands. Details from Dave Bradbury. Tel: (01902) 411252.  
**WOLVERHAMPTON ARS, G6TA.** Meets at the Electricity Board Sports Club, St. Marks Road, Chapel Ash, Wolverhampton. Details from Mrs J. Smith. Tel: (01902) 751936.  
**WORDSLY RC, G4WRA.** Meets at the Brick Maker's Arms, Mount Pleasant, Brierley Hill, West Midlands. Details from Andy Evans G1PKZ.

## LONDON & CENTRAL

**ARBORFIELD ARC, G3IHH.** Details from Mrs E.W. Harding ZE1AUQ.  
**BRACKNELL AEC, G4BRA.** Meets at the Coopers Hill Community Centre, Bagshot Road, Bracknell, Berks. Details from John Ellerton G3NCN.  
**BURNHAM BEECHES RC, G3WIR.** Meets at the Farnham Common Village Hall, Victoria Road, Farnham Common, Bucks. Details from Mrs Eileen Chislett G6EEL. Tel: (01628) 625720.  
**MAIDENHEAD & DARC, G3WVK.** Meets at the Red Cross Hall, The Crescent, Maidenhead, Berkshire. Details from Neil Savin G0SVN. Tel: (01628) 626210.  
**NEUBURY & DARS, G5XY.** Meets at the Rugby Club, Monk's Lane, Newbury. Details from Max Maxwell G7DXC. Tel: (01635) 253233.  
**READING ARC, G3ULT.** Meets at the Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. Details from Marnoch Standen G0JMS. Tel: 0118-972 3504.

## BUCKINGHAMSHIRE

**AYLESBURY VALE RS, G4VRS.** Meets at the Harwick Village Hall, Aylesbury, Bucks. Details from Mr L.J. Cropley G0OFC.  
**CHESHAM & DARS, G3MDG, G1MDG.** Meets at the White Hill Centre, Chesham, Bucks. Details from Mr J.J. Thirwell G0VFW. Tel: (01442) 832169.  
**CHILTERN ARC, G3CAR.** Details from Roy Page G4YAN. Tel: (01494) 534216.  
**MILTON KEYNES ARS, G3HIU.** Meets at Bletchley Park Museum (The Green Room, B Block Annex), Wilton Avenue, Bletchley, Milton Keynes. Details from Mrs J. Battersby M1EPL (Secretary) on (01908) 565636 or Frank Collins M0RPM (Chairman) on (01234) 713148  
**MILTON KEYNES SCOUT ARS, G0SMK.** Meets at The Quarries, M.K. Scout Campsite, Cosgrove. Details from Mr P.A. Orchard G0RYZ. Tel: (01908) 648186.

## GREATER LONDON

**ADDISCOMBE ARC, G4ALE.** Meets at the Lion Inn, Pawnsdon Road, Croydon. Details from Mr Q.G. Collier G3WRR. Tel: 0208-653 6948.  
**BARKING R & ES, G3XBF.** Meets at the Parkside Community Centre. Details from Bill Chewter G0IQK. Tel: (01708) 474443.  
**BROMLEY & DARS, RS89030.** Meets at the Victory Social Club, Kechill Gardens, Hayes, Bromley. Details from Alan G. Messenger G0TLK.  
**CLIFTON ARS, G3GHN.** Meets at the Kidbrooke House, Community Centre, 90 Mycenae Road, London SE3 7SE. Details from Mr J. Veaney G7BKX.  
**CRYSTAL PALACE & DRC, G3VCP.** Meets at the All Saints Church, Parish Rooms, Beulah Hill, London. Details from Bob Blums G30OU. Tel: (01737) 552170.  
**DARENTH VALLEY RADIO, G0KDV.** Meets at the Crockenhill Village Hall, Swanley, Kent. Details from Mr K.W. Halls G8VJG. Tel: (01322) 663022.  
**ECHFORD ARS, G3JUE.** Meets at The Community Centre, St. Martin's Court, Kingston Crescent, Ashford, Middlesex. Details from Robin Hewes G3TDL. Tel: (01784) 456513.  
**EDGWARE & DRS, G3ASR.** Meets at the Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware, Middlesex. Details from Stephen Slater G0PQB. Tel: 0208-953 2164.  
**HAVERING & DARS, G4HRC.** Meets at the Fairlytes Arts Centre, 51 Billet Lane, Hornchurch, Essex.  
**RS OF HARROW, G3EFX.** Meets at the Harrow Arts Centre, Uxbridge Road, Hatch End, Middlesex. Details from Mr C. Fnel G4AUF. Tel: (01895) 621310.  
**SILVERTHORNE RC, G3SRA, G2HR, G8CSA.** Meets at the Chingford Adult Education and Community Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. Details from Dave Chnsty G0KHC. Tel: 0208-504 2831.  
**MITCHAM & DISTRICT ARS.** Meets at the AIC Hut, Commonside West, Mitcham, Surrey CR4 4HB. Details from Mr M. Knott G0WCR.  
**SOUTHGATE RC, G3SFG.** Meets at the Winchmore Hill Cricket Club, Firs Lane, London N21 3ER. Details from Mr D.F. Berry G4DFB.  
**ST. DUNSTONS COLLEGE ARS, G4SDC.** Details from Sam Kennard G40HK. Tel: 0181-690 1274.  
**SURREY RADIO CONTACT CLUB, G3SRC.** Meets at the

T.S. Terra Nova, 34 The Waldrons, Croydon, Surrey. Details from Maurice Fagg G4DDY. Tel: 0208-669 1480.  
**WEST LONDON ARS, RS95599.** Details from Robin Cluj G0VJI.  
**WHITTON ARG, G0MIN.** Meets at the Whitton Community Centre, Percy Road, Whitton. Details from Ian Clabon G0OFN. Tel: 0208-894 9131.

## HERTFORDSHIRE

**BISHOPS STORTFORD ARS, G5ZG.** Meets at the Royal British Legion Club, Windhill, Bishop's Stortford, Herts. Details from Tony Judge G0PQF. Tel: (01279) 506933.  
**DACORUM ARTS, G7RIH, G0WH.** Meets at the Guide Meeting Rooms (next to the Royal British Legion), Queensway, Hemel Hempstead. Details from Ian Hamilton G0TCD. Tel: (01442) 211925.  
**HODDESDON RADIO CLUB, G0TSN.** Meets at the Rye Park Conservative Club, Rye Road, Hoddesdon, Herts. Details from Don Platt G3JNJ. Tel: 0208-292 3678.  
**MIMRAM CONTEST GP, M0ABC.** Details from Alan Holdsworth G80U. Tel: (01707) 392950.  
**RADIO SCOUTING TEAM, G0BZST.** Meets at Tolmers Scout Camp, Tolmers Road, Cuffey, Herts EN6 4JS. Details from Mill Livens G2CKB. Tel: (01992) 558493.  
**STEVENAGE & DARS, G3SAD.** Meets at the Stevenage Day Centre, Chells Way, Stevenage, Herts SG2 0LT. Details from Peter Bell 2E1CRK. Tel: (01462) 674505.  
**VERULAM ARC, G3VER, G8VER.** Meets at the RAF Association HQ, New Kent Road, St. Albans, Herts. Details from Walter Crane G3PMF. Tel: (01923) 262190.  
**WELWYN & HATFIELD ARC, G3WGC.** Meets at the Royal Naval Association, Black Fan Road, Welwyn Garden City, Herts. Details from Dean Jackson G7PKF. Tel: (07973) 560649.

## SURREY

**BENTLEY ARC, G0VZS.** Details from Derek Gilbert G0NFA.  
**CATERHAM RG, G0SCR.** Details from Mr P.N. Lewis G4APL.  
**COULSDON AMATEUR TRANS. SOC., G4FUR.** Meets at St. Swithuns Church Hall, Grovelands Road, Purley, Surrey. Details from Andy Bners G0KZT. Tel: (01737) 552139.  
**DORKING & DRS, G3CZU, G7DOR.** Details from John Greenwell G3AEZ. Tel: (01306) 631236.  
**FARNBOROUGH & DRS, G4FRS.** Meets at The Community Centre, Meudon Avenue, Farnborough, Hants. Details from Mr M. Hearsey G8ATK. Tel: (01252) 715765.  
**GUILDFORD & DRS, G6GS.** Meets at the Guildford Model Engineers HQ, Stoke Park, Guildford, Surrey. Details from Stella Whitboom G0SWE.  
**KINGSTON & DARS, G3KIN.** Details from Mrs Mary Ashdown G0BVQ.  
**REIGATE ATS, G5LKL, G7RAT.** Details from Mr A.C. Embling G1LNT. Tel: (01883) 344723.  
**SUTTON & CHEAM RS, G2XP, G7SAC.** Meets at the Sutton United Football Club, Borough Sports Ground, Gander Green Lane, Sutton, Surrey. Details from John Puttock G0BWW. Tel: 0208-644 9945.  
**THAMES VALLEY ARS, G3TVS.** Meets at the Thames Ditton Library, Watts Road, Gigg's Hill, Thames Ditton, Surrey. Details from Cdr. J. Pegler G3ENI. Tel: (01483) 284279.  
**WIMBLEDON & DARS, G3WIM.** Meets at St. Andrews Church Hall, Herbert Road, Wimbledon, London. Details from Mr Reg Blackwell M1EEK. Tel: 0208-696 9857.

## SOUTH & SOUTH EAST EAST SUSSEX

**BRIGHTON RADIO CLUB, G4GQR.** Meets at Vallance Community Centre, Sackville Road, Junction of Connaught Road, Hove. Details from Hon. Sec G0RNS. Tel: (01273) 699104.  
**CROWBOROUGH OARS, G0CVR.** Meets at the Plough & Horses, Walshes Road, Jarvis Brook. Details from Mrs M. Clark. Tel: (01892) 663666.  
**EAST SUSSEX AMATEUR TV GROUP, RS178475.** was G8VCV. Details from Keith Ellis G8HGM. Tel: (01323) 702220.  
**SOUTHDOWN ARS, G3WQK.** Details from Jim Harns G4DRV. Tel: (01323) 728479.  
**THE QRZ ARG OF SUSSEX, G83VX.** Meets at the Coach Station, Wartling Road, Eastbourne. Details from Stuart Constable M0CHW. Tel: (01435) 863020.

## HAMPSHIRE

**ANDOVER ARC, G0ARC.** Meets at the Village Hall, Wildhem, Andover, Hants. Details from Mr R.S. Coleman G0WYD.  
**BASINGSTOKE ARC, G3TCR, G8JYN.** Meets at the GEMS Social Club, Lister Road, Basingstoke, Hants. Details from Bob Brown M0CJJ.  
**FAREHAM & DARC, G3VEF.** Meets at the Portchester Community Centre, Westlands Grove, Portchester, Hants. Details from Andrew Sinclair G0AMS. Tel: (01329) 235397.  
**HIGHFIELD PARK RC, G4WD.** Meets at Highfield Park RC, National Air Traffic Service, Highfield Park, Heckfield, Hants RG2 7 0LD. Tel: (01734) 225019.  
**HORDEAN & DARC, G4FB5.** Meets at Lovedean Village Hall, Lovedean Lane, Lovedean, Hants. Details from Stuart Swain G0FYX. Tel: (01705) 472846.  
**ITCHEM VALLEY ARC, G0VWR.** Meets at the Scout Hut, Brickfield Lane, Chandlers Ford, Eastleigh, Hants. Details from Sheila Williams G0VNI. Tel: (01703) B13827.  
**SONY BROADCAST ARC, G4SZC.** Accredited C&G RAE centre. Meets at Sony Sports & Social Club, Priestley Road, Basingstoke. Details from Stephen Harding G4JGS. Tel: (01256) 55011.  
**SOUTH HAMPSHIRE INT. TELE SOC., G3DIT.** Meets at R3V's QTH, space is limited. Details from Rev. T.R. Mortimer G3JZV. Tel: (02392) 649254.  
**SUBMARINE ARC, G3BZU.** Meets at HMS Collingwood, Newgate Lane, Fareham, Hants P014 1AS. Details from Mr W.S. Blyth G0PPH. Tel: (01329) 232386.  
**THREE COUNTIES ARC, G4WWR.** Meets at the Bramshott

Pansh Inst. & Club, Headley Road, Liphook, Hants. Details from Damian Kamm G7RFX. Tel: (01428) 724456.  
**WATERSIDE ARS, G4JYN.** Meets at the Applemore Scout HQ, Applemore, Hythe, Southampton. Details from Tony Horton G0LKG. Tel: (01703) 841794.

## ISLE OF WIGHT

**BRICKFIELDS ARS, G0BAR.** Meets at Brickfields Horse Country Centre, Newnham Road, Binstead, Isle of Wight. Details from Mr Pebody.  
**ISLE OF WIGHT RS, G3SKY.** Meets at The Old Cafe, Whitecliff Bay, Holiday Park, Bembridge. Details from Alan Reeves G4ZFQ. Tel: (01963) 294309.

## OXFORDSHIRE

**BANBURY ARS, G0BRA.** Meets at St. John's Church Social Club, South Bar, Banbury, Oxon. Details from Mr R.S. Marsden G1YSY. Tel/FAX: (061295) 253509.  
**HARWELL ARS, G3PRA.** Meets at The Social Club, Harwell Laboratory, Didcot, Oxon. Tel: (01235) 223250.  
**OXFORD & DARS, G5LLO.** Meets at the Grove House Club, Grove Street, Summertown, Oxford. Details from Mr D. Walker G3BLS. Tel: (01865) 247311.  
**VALE OF WHITE HORSE ARS, G5RP, G4VWH, G6VWH.** Meets at The Fox, Steventon. Details from Ian White G3SEK. Tel: (01235) 531559.

## WEST SUSSEX

**CHICHESTER ARC, G2NM.** Meets at the St. Pancras Hall, Chichester. Details from Graham Swann G0WSD.  
**CRAWLEY ARC, G3WSC.** Meets at the Tilgate Forest Rec. Centre, Hut 1B, Tilgate Forest, Crawley, West Sussex. Details from Mr J.S. Spence G0FFI.  
**HORSHAM ARC, G4HRS.** Meets at the Guide Hall, Denne Road, Horsham, West Sussex. Details from Alister Watt G3ZBU. Tel: (01403) 253432.  
**MID SUSSEX ARS, G3ZMS.** Meets at Marle Place, Leylands Road, Burgess Hill, West Sussex. Details from Mr C. Childs 2E1DPC. Tel: (01444) 244689.  
**T.S. VINDICATRIX ASN, G0WVB.** Details from Don Still G0OCC.  
**WORTHING & DARC, G3W0R.** Meets at the Lancing Parish Hall, South Street, Lancing, West Sussex.  
**WORTHING & DISTRICT VIDEO RG, G83VR.** Details from the Treasurer. Tel: (01903) 211919 (w).

## WILTSHIRE

**CHIPPENHAM & DARS, G3VRE.** Meets at the Sea Cadet HQ, Chippenheim. Details from Jon Ainge G4LGZ. Tel: (01249) 462610.  
**SWINDON & DARC, G3FEC.** Meets at the Eastcott Community Centre, Savenake St., Swindon. Details from Den Forrester M0ACM.  
**TROWBRIDGE & DARC, G2BQY.** Meets at the Southwick Village Hall, Southwick, Trowbridge, Wilts. Details from Ian Carter G0GRI. Tel: (01225) 64698.

## SOUTH WEST & CHANNEL ISLANDS AVON

**BRISTOL ARC, G3TAD.** Meets at the Lodgeside Club, Lodge Road, Kingswood, Bristol. Details from Dave Brendey G7BYN.  
**GORDANO ARG, G6GRG.** Meets at The Ship, Redcliffe Bay, Portishead, Avon. Details from Mr R.T. White G8SPC. Tel: (01275) B74001.  
**NORTH BRISTOL ARC, G4GCT.** Meets at the Self Help Enterprise, 7 Braemar Close, Northville, Bristol. Details from David Coxon G0GHH. Tel: (01275) 790448.  
**SEVERNSIDE TV GROUP, G83ZZ.** Meets at NBARC, Filton, Bristol. Details from Paul Stevenson G8YMM. Tel: 0117-965 5386.  
**SHEREHAMPTON ARC, G4AHG.** Meets at the TS Enterprise Sea Cadet Unit, Station Road, Shirehampton, Details from Mr R.G. Ford G4GTD. Tel: 0117-985 8253.  
**SOUTH BRISTOL ARC, G4WAH.** Meets at the Whitchurch Folk House, East Dundry Road, Bnstol. Details from Mr L.F. Baker. Tel: (01275) 834282.  
**THORNBURY & SOUTH GLOS ARC, G4ABC.** Meets at the United Reform Church Hall, Rock Street, Thornbury, Bristol. Details from Stan Greenhill G0RMY. Tel: (01454) 413177.  
**WESTON-SUPER-MARE RS, G4WSM.** Meets at the Woodsping Hotel, High Street, Worle, Weston-Super-Mare. Details from Stephen Cole G3YOL. Tel: (01934) B43144.

## CORNWALL & SCILLY IS

**CORNISH RAC, G4CRC.** Meets at the Perran-ar-Worthal Village Hall, Perranwell, Nr Truro, Cornwall. Details from Mrs Cheryl Hammett 2E1ADQ. Tel: (01726) 882758.  
**NEWQUAY & DARS, G4ADV.** Meets at the Treviglas School, Newquay. Details from Mrs Maggie Reed G0KEM. Tel: (01726) 882752.  
**POLDHU ARC, G82GM.** Meets at the Club House, Poldhu Cove, Mullion, Cornwall TR12 7JB. Details from Mrs Carolyn Rule M0ADA. Tel: (01326) 240144.  
**SALTASH & DARC, G4GXK, G8SAL.** Meets at the Toc H Hall, Warraton Road, Saltash, Cornwall. Details from Brian Giles. Tel: (01734) 844321.  
**ST AUSTELL ARC, G0EOC.** Meets at Potlar School. Details from Reg Pears G4TRV. Tel: (01726) 72951.

## DEVON

**APPLEDORE & DARC, G2FKO.** Meets at the Appledore Football Club. Details from Mr B. Jewell M0BRB.  
**AXE VALE ARC, G8CA, G7AXE.** Meets at the George Hotel, Axminster, Devon. Details from Pat Cross G0GHH. Tel: (01297) 37576.  
**DARTMOUTH RADIO CLUB, G1RCD, G0DRC.** Meets at the Yelverton War Memorial Village Hall, Meavy Lane, Yelverton, Devon. Details from Ron Middleton G7LLG. Tel: (01822) 82586.  
**EXETER ARS, G4ARE.** Meets at the Moose Centre, Spinning Path Lane, Blackboy Road, Exeter. Details from Ray Donno G3YBK.  
**EXMOUTH ARC, G0XRC.** Meets at The Scout Hut, Marplot Hill, Exmouth.



**NORMAN LOCKYER OBSERVATORY ARG, GOAXC.** Meets at the Norman Lockyer Observatory, Salcombe Hill, Sidmouth. Details from Ron Hamson GONOC. Tel: (01395) 515349.  
**NTE (PAIGNTON) ARS, GOOSH.** Meets at Paignton Community College, Upper School, Waterleat Road, Paignton. Details from Rod Maude GOSWM. Tel: (01803) 521066.  
**TORBAY ARS, G3NJA.** Meets at the Highweek Family & Social Club, Highweek, Newton Abbot, Devon. Details from John Olway G3RMA. Tel: (01803) 556425.  
**UNIVERSITY OFPLYMOUTH ARS, GOUOP.** Details from Alan Santillo G0XAW.

**DORSSET**

**BLACKMORRE VALE ARS, G4R8V.** Meets at Shaftesbury Club for Young People, Coppice Street, Shaftesbury, Dorset SP7 BPF. Details from Mr A. Marnott GOGFL. Tel: (01258) 860741.  
**BOURNEMOUTH RS, G2BR5.** Meets at the Kinson Community Centre, Kinson, Bournemouth, Dorset. Details from Chns R. Ellis M5AGG, Broken Ridge, Fir Tree Close, St. Leonards, Ringwood, Hants BH24 2QW. Tel: (01202) 893126.  
**CHRISTCHURCH ARS, GOMUD.** Meets at the Siemens Plessey Sports & Social Club, Grange Road, Somerford, Christchurch, Dorset. Details from Mr K.P. Hams G7WSN. Tel: (01202) 484892.  
**FLIGHT REFUELLING ARS, G4RFR.** Meets at the Flight Refuelling Social Club, Merley, Wimbome, Dorset. Details from Martin Axon 2E1DFZ. Tel: (01202) 693334.  
**POOLE RS, G4PRS.** Meets at the Bournemouth & Poole CFE, Constitution Hill Site, Poole, Dorset. Details from Phil Mayer GOKYL. Tel: (01202) 700903.  
**PORTLAND ARC, GOVOP/G7VQP.** Meets at Clifton Hotel, Grove Road, Portland. Details from Kerry Morns G1WIK. Tel: (01305) 788591.  
**SOUTH DORSET RS, G3SDS.** Meets at the Church Hall, Chickery, Weymouth, Dorset. Details from John Rose MOBQQ. Tel: (01305) 832057.  
**SWANAGE & PURBECK ARC, MOBLI.** Meets at Kings Arms, Langton Matravers, Dorset. Details from Peter Wakefield M1WCH/M3WCH. Tel: (01929) 424413.  
**WESSEX AMATEUR WIRELESS CLUB, G1WAW.** Details from Ken Powell G1NCG. Tel: (01202) 549376.  
**JERSEY**  
**JERSEY ARS, G13DV.** Meets at the German Signal Station, Rue Baal, La Moye, St. Brelade. Details from Mrs Anne Mourant MJOBIU. Tel: (01534) 734948.

**SOMERSET**

**PRESTON COMMUNITY SCHOOL ARC, G0PCS.** Details from Craig Douglas G0HJD. Tel: (01935) 71131.  
**TAUNTON & DARS, G3XZW.** Meets at The Memorial Hall, Trull, Taunton. Details from David Rosewam MOCIF.  
**WEST SOMERSET ARC, G00WX.** Meets at the West Somerset Community College, Minehead, Somerset. Details from Alan Elliott G7RSU. Tel: (01643) 707207.  
**WINCANTON ARC, G0WRA.** Meets at King Arthur's Community School, West Hill, Wincanton. Details from Mr G.A. Fingerhut G0ENW. Tel: (01963) 370506.  
**YEOVIL & DARC, G3CMH, G8YEO.** Meets at the British Red Cross HQ, 72 Grove Avenue, Yeovil, Somerset. Details from George Davis G3ICO. Tel: (01935) 425669.

**ESSEX**

**BRAINTREE & DISTRICT AMATEUR RADIO SOCIETY, G3GX.** Meets at the Braintree Hockey Club, Church Street, Bocking, Braintree. Details from John M5AJB. Tel: (01787) 460947.  
**CHELMSFORD ARS, GOMWT.** Meets at the Marconi Social Club, Beehive Lane, Chelmsford, Essex. Details from David Bradley M0BQC. Tel: (01245) 602838. E-mail: cars@gomwt.org.uk  
**CLACTON RADIO CLUB, G3CRC.** Details from Mr D. Fitzpatrick MOCHL.  
**COLCHESTER ARS, G3VCO.** Meets at the Colchester Institute, Sheepen Road, Colchester. Details from Frank R. Howe G3FUJ. Tel: (01206) 851189.  
**DENGIE HUNDRED ARS, G0UTT, G7SDH.** Meets at the Henry Samuel Hall, Maryland, Essex. Details from Mrs Christine Wade. Tel: (01621) 727986.  
**HARLOW & DARS, G6UT.** Meets at the Mark Hall Barn, First Avenue, Harlow, Essex. Details from Len Brackstone G7UJF. Tel: (01279) 832700. FAX: (01279) 864973.  
**HARMICH ARG, G0GRH.** Meets at the Park Pavilion, Barrack Lane, Harwich. Details from Eugene Kraft G4FTF.  
**LOUGHTON & EPPING FOREST ARS, G4ONP.** Details from Marc Litchman G0TCC. Tel: 0208-502 1645/(07803) 023501.  
**SOUTH ESSEX ARS, G4RSE.** Meets at the Paddocks, Long Road, Canvey Island, Essex. Details from Mrs Betty Maynard G6LUO. Tel: (01268) 695474.  
**SOUTHEND & DRC, G5QK.** Meets at the Alexandra Yacht Club, Clifton Parade, Southend-on-Sea, Essex. Details from Alan Radley G0TTM. Tel: (01268) 741229.  
**STANFORD-LE-HOPE & DARC, G4SLH.** Meets at the St Joseph Parish Rooms, Scratton Road, Stanford-le-Hope, Essex. Details from Ken Thompson G4PAD. Tel: (01375) 671238.  
**VANGE ARS, G3YCW.** Meets at the Barnstable Community Centre, Basildon, Essex. Details from Mrs D. Thompson. Tel: (01268) 552606.

**KENT**

**BREDHURST RX & TX SOC., G0BRC.** Meets at Rock Avenue Working Mens Club, Rock Avenue, Gillingham, Kent. Details from Mr T.M. Wheeler G7MIM.  
**CRAY VALLEY RS, G3RCV, G1RCV.** Meets at the Progress Hall, Admiral Seymour Road, Eitham, London SE9. Details from Richard Perzyna G8ITB. Tel: (01689) 602948.  
**DOVER RADIO CLUB, G3YMD.** Meets at the Dover Grammar School for Boys, Astor Avenue, Dover, Jim

Cairns M18KI. Tel: (01304) 852773.  
**EAST KENT RADIO SOCIETY, GOEKR.** Meets at St. Bartholomew's Church Hall, Heme Bay. Details from Paul Nicholson G3VJF. Tel: (01227) 743070, FAX: (01227) 742288.  
**HASTINGS ELEC. & RC, G6HH, G1HHH, G6LL.** Meets at West Hill Community Centre, Croft Road, Hastings, East Sussex. Details from Mr J. Boothroyd GOMTJ. Tel: (01233) 732656.  
**HILDERSTONE ARS, G0HR5.** Meets at Hilderstone A.E.C., Broadstairs, Kent. Details from Mr G. Shaw M0AQA.  
**HOME COUNTIES ATV GRP, G6HCT.** Meets at the Binfield Club, Binfield (near M4/J10). Details from Mr A. Brooker G4WGZ.  
**MAIDSTONE YMCA ARS, G3TRF.** Meets at YMCA Sports Centre, Melrose Close, Maidstone, Kent. Details from Colin Wilson G0VAR. Tel: (01622) 736636.  
**MEDWAY ARTS, G5MW, G8MVA.** Meets at Tunbury Hall, Catkin Close, Tunbury Avenue, Waiderslade, Chatham. Details from Mr J. Hale G3PTH.  
**NORTH KENT RS, G4CW.** Meets at The Pop-in-Parlour, Graham Road, Bexleyheath, Kent. Details from Mr A.V. Fnbns GBMLQ. Tel: (01474) 365694.  
**SWALE ARX, G4SRC, G6SRC.** Meets at the Ivy Leaf Club, Dover Street, Sittingbourne, Kent. Details from Gordon Powell M0AKA. Tel: (01795) 665559.  
**THE MORSE CLUB, GX00XE.** Meets at The Five Wents Memorial Hall, Swanley/Hextable Road. Details from Ken M3CZA. Tel: 0208-306 3544.  
**WEST KENT ARS, G3WKS.** Meets at the St. Marks School Hall, Tunbridge Wells, Kent. Details from Malcolm Sheppard G4FWG. Tel: (01892) 652272.

**NORFOLK**

**ANGLIA TELEVISION ARS, G0TVX.** Meets at Anglia TV, Norwich NR1 3JG. Details from Jim Bacon G3YLA. Tel: (01603) 615151.  
**GREAT YARMOUTH RS, G3YRC.** Meets at the Bradwell Community Centre, Bradwell, Great Yarmouth, Norfolk. Details from Mr A.D. Besford G3PNU.  
**GRESHAM'S SCHOOL ARC, G3XPX.** Details from Rev. R. N. Myerscough G3PXO.  
**KINGS LYNN ARC, G3XYZ.** Details From Derek Franklin G0MQL.  
**NORFOLK ARS, G4ARN.** Meets at Norwich Aviation Centre, Norwich Airport. Details from John Wadman G0VZD. Tel: (01953) 604769.  
**NORTH NORFOLK ARG, G2BMC.** Details from Tony Smith G4FAI. E-mail: g4ai@connectfree.co.uk

**SUFFOLK**

**BURY ST. EDMUNDS ARS, G2TO.** Meets at the Culford School Culford, Bury St. Edmunds, Suffolk. Details from George Woods G3LPT.  
**FELIXSTOWE & DARS, G4ZFR.** Meets at the Orwell Park School, Nacton, Near Ipswich. Details from Paul Whiting G4YQC. Tel: (01473) 642595.  
**FRAMLINGHAM COLLEGE ARC, MOCBB.** Tel: (0172B) 727232.  
**IPSWICH RADIO CLUB, G4IRC.** Meets at the Golden Hind, Nacton Road, (3rd Wednesdays at The Hollies, Bucklesham Straight Road), Ipswich. Details from Keith Gaunt G7CIY. Tel: (01394) 420226.  
**LEISTON ARC, G0TUQ.** Meets at Leiston Town Athletic Assn., Victory Road, Leiston, Suffolk. Details from Paul Cattermole M3MIG. Tel: (01728) 746044.  
**LOWESTOFT DR5, G3JRM.** Meets at The George Barrow Hotel, Oulton Road, Lowestoft. Details from Phil Holdon G0JSG. Tel: (01502) 585448.  
**MARTLESHAM RS, G4MRX.** Meets at the BT Laboratories, Martlesham Heath, Ipswich, Suffolk. Details from Darren Hatcher. Tel: (01473) 644475.  
**SUDBURY & DRA, G0SMY, G7SRA.** Meets at the Old School, Wells Hall Road, Great Comard, Sudbury, Suffolk. Details from Bryan Pantan G1TWY.  
**SUFFOLK DATA GROUP, G8WXM.** Details from Peter Pryke G8HUE. Tel: (01473) 631313.

**NORTH WALES**

**CLWYO**

**CONWAY VALLEY ARC, GW6TM.** Meets at the Studio, Penrhos Road, Colwyn Bay, Clwyd. Details from Mr R.V. Evans GW6PMC. Tel: (01745) 855068.  
**HALYUN & DARS, GW3HRG.** Details from Mr D. Austin GW1XHG.  
**NORTH WALES RS, GW0NWR.** Meets at the Old YMCA, Queen's Drive, Colwyn Bay, Clwyd. Details from Ted Shipton GW0DSJ. Tel: (01745) 336939.  
**WREXHAM ARS, GW4WXM.** Meets at the Community Centre, Maesgwyn Road, Wrexham. Details from Mr P. Moran GW0WER.

**GWYNEDD**

**MEIRION ARS, GW4LP.** Meets at the Royal Ship Hotel, Dolgellau, Gwynedd. Details from Genevieve Chasseve GW4URU. Tel: (01341) 421028.  
**PORTHMADOG & DARS, GW0MVI.** Meets at The Yacht Club, The Harbour, Porthmadog, Gwynedd. Details from Mr G. Cadwaladr MW1DFN.  
**THE DRAGON ARC, GW4TTA.** Meets at the Ebenezer Church Hall, Lon Foel Graig, Llanfairpwll, Isle of Anglesey. Details from Stewart Rolfe GW0ETF. Tel: (01248) 362229.

**POWYS**

**POWYS ARC, GW4HVN.** Meets at the ATC HQ, Park Lane, Newtown, Powys. Details from Mrs Jean Brown 2W1CEZ. Tel: (01686) 640814.

**SOUTH WALES**

**OYFID**

**ABERPOETH YMCA, GW4SZV.** Meets at the Hut B17, The Airfield, Aberpoeth. Details from Mr G. Carruther GW4HGJ. Tel: (01239) 811205.  
**ABERSYSTWYTH & DARS, GW0ARA.** Meets at the Scout Hut, Plasencg Avenue, Abersystwyt. Details from John Woodward GW6IDK. Tel: (01970) 890657.

**CARMARTHEN ARS, GW4YCT.** Meets at The Aelwyd Care Home, Carmarthenshire County Council, Tregynw Road, Llangunor, Carmarthen SA31 3BS. Details from Mr W.D. Hughes GW4ZXL. Tel: (01267) 231359.  
**CLEDDAU ARS, GW0SYG.** Details from Trevor Perry GW4XQK. Tel: (01646) 600725.  
**LLANELLI ARS, GW0EZX.** Meets in the Furnace Community Hall, Furnace Square, Llanelli. Details from Roy Jones GW0XZK. Tel: (01554) B20207.  
**PEMBROKESHORE RS, GW0EJ.** Meets at Furzy Park Community Centre, Furzy Park, Haverfordwest, Pembrokeshire. Details from Ian M. Jones MW0CAB. Tel: (01437) 763028.

**GWENT**

**ABERGAVENNY RS, GW4GFL.** Meets at the Hill Residential College, Pen-y-Pound, Abergavenny, Gwent. Details from Glyn Hughes GW0DQY. Tel: (01633) 483186.  
**BLACKWOOD & DARS, GW6GW.** Meets at the Oakdale Comprehensive School, Oakdale, Blackwood, Gwent. Details from John Evans GW8ITJ. Tel: (01495) 225178.  
**EBBW VALE COLLEGE RS, GW0IIV.** Meets at the Gwent Teriyaki College, Ebbw Vale Campus, College Road, Ebbw Vale, Gwent. Details from Mr T. Hayden GW0HCN. Tel: (01495) 305192.  
**NEWPORT ARS, GW4EZW.** Meets at the Brynglas Community Centre, Brynglas Road, Newport, Gwent. Details from Paul Nicholls.  
**PONTYPPOOL ARS, GW3RHN.** Meets at the Settlement, Rockhill Road, Pontypool, Gwent. Details from Graham Smith GW0OLZ.

**MID-GLAMORGAN**

**BRIDGEND & DARC, GW4LNP.** Meets at the Club Bynmenyn, Bynmenyn, Bridgend. Details from Alun Hulmes. Tel: (01656) 721574.  
**HOOVER (MERTHYR) ARC, GW3RDB.** Meets at the Hoover Sports Pavilion, Hoover Ltd., Pentrebach, Mertyr Ydylid, Mid Glamorgan. Details Robert Cummings GW0RVG.  
**MID GLAMORGAN ARC, MW0CNA.** Meets at Aberkenfig Sports & Social Club. Details from Meryn Carey GW4VSE. Tel: (01856) 734668.

**SOUTH GLAMORGAN**

**BARRY ARS, GW3VKL.** Meets at Sully Sports & Leisure Club, South Road, Sully, S. Glamorgan. Details from Richard Mortimore GW48VJ. Tel: (01446) 738756.  
**HIGHFIELDS ARC, GW4LFO.** Meets at the Highfields Physically Handicapped Centre, Allensbank Road, Cardiff. Tel: (01222) 561542.

**WEST GLAMORGAN**

**PORT TALBOT (BS PLC) ARS, GW3EOP.** Meets at the British Steel PLC Sports & Social Club, Margam, Port Talbot, West Glamorgan. Details from Mr J. Chinnock MW0AAGE.  
**SWANSEA ARS, GW4CC.** Meets at the Applied Sciences Building, Swansea University. Details from Frank Burrow GW8BME. Tel: (01792) 390233

**SCOTLAND WEST & WESTERN ISLES**

**CENTRAL REGION**

**FALKIRK & DARS, G0MOCR.** Meets in the 62nd Forth Valley Scouts Hall, Denny Road, Larbert, Nr. Falkirk. Details from Brian J. Waddell GM4XQJ. QTHR or E-mail: gm4xqj@btinternet.com  
**STIRLING & DARS, GM6BNX.** Meets at Bandeath Industrial Estate, Thross, Nr. Stirling. Details from John Sherry GMOAZC. Tel: (01324) 824709.

**DUMFRIES & GALLOWAY**

**WIGTOWNSHIRE ARC, GM4RIV.** Meets at the Aird Unit, Stranraer Academy, Stranraer, (entrance from Cairnport Road). Details from Neil Macdonald GM4LQS.

**STRATHCLYDE**

**AYR ARC, GMOAYR.** Meets at the University of Paisley, University Campus, Beech Grove, Ayr KAB OHN. Details from John Shankland MM1JAS. Tel: (01292) 445599.  
**CENTRAL SCOTLAND FM GROUP, RS38728.** Details from Thomas Stalker GM7TJU. Tel: (01698) B16793.  
**DALRY ARG, MMOARG.** Meets at The Turf, In Dalry Court, Hill Street, Dalry. Details from Alex McKeenan MMOA0M. Tel: (01294) B23295.  
**DUNOON & DARS, GMOODC.** Meets at the Edward Street Community Centre, Edward Street, Dunoon. Details from A.B. Horton GMOBUL. Tel: (01369) B40217.  
**HELENSBURGH ARC, GM4HEL.** Details from G. Capstick GM7OAF. Tel: (01436) 675922.  
**INVERCLYDE ARG, GMOGNK.** Meets at the Cardwell Bar, Cardwell Road, Gourcock, Strathclyde. Details from Andrew Givens GM3YOR. Tel: (01475) 638226.  
**KILMARNOCK & LOUDOUN ARC, GMOADX.** Meets at the Hurford Community Centre, Cessnock Road, Hurford. Details from Steve Campbell GM4O0SS. Tel: (01560) 483800.  
**LARGS & DARS, GMOVKG.** Details from Mr J. Clough GMMOMD. Tel: (01475) 569584.  
**LORN ARS, GMOLRA.** Details from T. Olsen GMOEQW. Tel: (01866) 2580.  
**MID LANARK ARS, GM3PKX.** Meets at the Newarthill Community Ed. Cent., High Street, Newarthill, Motherwell, Lanarkshire MLI 5GU. Details from John Neary GMOXFK. Tel: (01698) B22860.  
**MILTON OF CAMPSIE ARS, GMMOCM.** Meets at The Red Cross Hall, Kirkintilloch. Details from John MacKenzie GMOJHU. Tel: (01360) 312954.  
**PAISLEY ARC, GMP0YM.** Meets at the Paisley YMCA Hall, 5 New Street, Paisley PA1 1XU. Details from John Quigley GM0TQA. Tel: 0141-889 8860.  
**SCOTTISH DIGITAL COMMS. GRP, GM1TVSR.** Details from Stuart Clink GM1VBE. Tel: (01698) 884B03.  
**WEST OF SCOTLAND ARS, GS4AGG.** Meets at the Multi Cultural Centre, 21 Rose Street, Glasgow.

Details from Hon. Sec.

**SCOTLAND EAST & HIGHLANDS**

**BORDER5**

**BORDERS ARS, GMOBR5.** Meets at the St. John Ambulance Hall, Berwick-upon-Tweed. Details from A.M. McCreadie GMOBPY. Tel: (018907) 50492.  
**GALASHIELS & DARS, GM4EYQ.** Meets at the Focus Centre, Galashiels. Details from Jim Keddie GM7LUJ.  
**KELSO ARS, GM4HKS.** Meets at the Abbey Row Community Centre, Kelso. Details from Margaret Chalmers GMOALX. Tel: (01573) 226372.

**FIFE**

**GLENROTHES & DARC, GM4GRC.** Meets at the Football Pavilion, Station Road, Thornton, Fife. Details from Alexander Adam GMOFVD. Tel: (01592) 874374.  
**GRAMPIAN**  
**ABERDEEN ARS, GM3BSQ.** Meets at the Red Cross HQ, 22 Queens Road, Aberdeen. Details from Robert Duncan. Tel: (01224) 896142.  
**BANFF & DARC, GMP0CY.** Meets at the Princess Royal Park Football Ground, Conference Room (Deveronvale F.C.), Banff. Details from Steve Roberts GM4HWS. Tel: (01888) 551377.  
**MORAY FIRTH ARS, GM3TKV.** Meets at the Grant Arms Hotel, Fochabers. Details from Geoff Crowley GM7SJC. Tel: (01542) 882B1B.

**HIGHLAND REGION**

**FORT WILLIAM ARG, GMOFRG.** Details from R. Johnston GM1YGV. Tel: (01397) 703046.  
**INVERNESS ARC, GM4TFP.** Meets at The Emergency Operations Centre, Inverness (except July and August). Details from R.F. Goodall GMOOGZ. Tel: (01463) B1701.

**LOTHIAN**

**COCKENZIE & PORT SETON ARC, RS177035.** Meets at the Thornree Inn, Louisa Bar, Old Cockenzie High Street, Cockenzie, E. Lothian. Details from Mr Bob Glasgow GM4UZY. Tel: (01875) B11723.  
**LOTHIANS RS, GM3HAM.** Meets at the Orwell Lodge Hotel, Poiwarth Terrace, Edinburgh EH11 1NH. Details from Thomas G. Main, Sec.

**ORKNEY**

**ORKNEY ARC, RS181749.** Details from Mrs Terry Penna. Tel: (01856) 741233.

**SHETLAND ISLANDS**

**LERWICK RC, GM3ZET.** Meets at the Islesburgh Community Centre, King Herald Street, Lerwick, Shetland. Details from Ian C. Millar GM7RDK. Tel: (01950) 460306.

**TAYSIDE REGION**

**DUNDEE ARC, GMAAAF.** Details from the Dundee College, Graham Street Annex, Dundee. Details from Martin Higgins MM0DUJN, c/o Dundee ARC, 80 Duns Crescent, Dundee D04 0RZ  
**PERTH & DARC, GM4EAF.** Meets at the Perth Sports & Social Club, 1B Leonard Street, Perth. Details from Ron Harkess GM3THI. Tel: (01738) 643435.  
**STRATHMORE & DARC, GM3GBZ.** Meets at 2231 Sqdn ATC, 1 Lochside Road, Forfar. Details from Graham Scattergood MM0BSX. Tel: (01307) 468824.

**N. IRELAND**

**CO. ANTRIM**

**ANTRIM & DARS.** Meets at the Clotworthy Arts Centre in the Castle Grounds in Antrim. Details from David Hutchinson G14FUM or visit [www.gn45w.co.uk](http://www.gn45w.co.uk)  
**BALLYMENA RC, G13FFF.** Meets at 70 Nursery Road, Gracehill, Ballymena, Co. Antrim. Details from Jeffery Clarke G14HCN. Tel: (01266) 659769.  
**CARRICKFERGUS ARG, GI0LIX.** Meets at the Downshire Community School, Downshire Road, Carrickfergus. Details from John Branagh G13YRL. Tel: (01960) 367208.  
**GLENGORMLEY ELECTRONICS ARS, GNOXVZ.** Meets at the Knocknogh Lodge, 236 Upper Road, Greenisland, Co. Antrim. Details from James Hoye GI0BJH. E-mail: giojhb@ntlworld.com  
**LIGAN VALLEY ARS, G14GTY.** Meets at the Harmony Hall Arts Centre, Harmony Hill, Lisburn, Co. Antrim. Details from Ron McCaughey G14NTO.  
**ROYAL NAVY (ULSTER) ARC, GI0URN.** Club affiliated to the Royal Navy Amateur Radio Society. Details from Alex Miller G14SFV.

**CO ARMAGH**

**ARMAGH & DARC, G10AAD.** Meets at County Armagh Golf Club, 7 Newry Road, Armagh City. Details from John A. Murphy. Tel: 0283-752 2153.

**CO. DOWN**

**BANGOR & DARS, G13XRQ.** Meets at The Stables, Groomsport, Co. Down. Details from Terry Barnes GI3USS. Tel: 0289-147 3948.  
**NEWRY & MOURNE ARC, G14MBO.** Meets at the Shamrock Social Club, Newry.  
**ULSTER DX ARG, M10UDX.** Details from Mr P.G. Mercer G14VIV.

**CO. FERMANAGH**

**LOUGH ERNE AMATEUR RADIO CLUB G10LEC.** Meets at the Railway Hotel, Forthill Street, Enniskillen, Co. Fermanagh. Details from Herbie Graham G1BJPO. Tel: 02866 387761.

**TYRONE**

**THE FOYLE & DARS, M10AKU.** Meets at 159 Victoria Road, Brady, Co. Tyrone. Details from Trevor Campbell G1XXGA. Tel: 0287-134 5405.

# International Radio Clubs

## AMSAT-UK (G0AUK)

Information from Jim Heck G3WGM, Badgers, Letton Close, Blandford, Dorset BH11 7SS. E-mail: g3wgm@amsat.org or visit [www.uk.amsat.org](http://www.uk.amsat.org)

## British Amateur Radio Teledata Group (BARTG - G4ATG, GB2ATG)

Contact Membership Secretary Andrew Thomas G8GNI, M5AEX, Dame School House, 103 High Street, Stany Stratford, Buckinghamshire MK11 1AT, E-mail: members@bartg.demon.co.uk or visit [www.bartg.demon.co.uk](http://www.bartg.demon.co.uk)

## British Amateur Television Club (BATC - RS38114)

Enquiries to Dave Lawton G0ANO, 'Grenehurst', Pinewood Road, High Wymcombe, Bucks HP12 4DD. Tel: (01494) 528899. E-mail: memsec@batc.org.uk or visit [www.batc.org.uk](http://www.batc.org.uk)

## British DX Club (BDXC-UK)

Enquiries to Club Secretary Colin Wright, 126 Bargery Road, London SE6 2LR. E-mail: secretary@bdxc.org.uk or visit [www.bdxc.org.uk](http://www.bdxc.org.uk)

## Danish Shortwave Club

Information from Treasurer Bent Nielsen, Egekrogen 14, DK-3500 Vaerloese, Denmark or visit [www.dswci.org](http://www.dswci.org)

## International Listeners' Association (RS88763)

Details from Trevor Morgan GW4OXB, 1 Jersey Street, Haford, Swansea SA1 2HF. E-mail: gw4oxb2net.nl.com

## International Short Wave League (ISWL - G4BJC)



Information from Honorary Secretary Bill Mackie G-9137/G4AIE, 23 College Park, Horncastle, Lincs LN9 6RE. E-mail: bill.mackie@zetnet.co.uk or visit [www.iswl.org.uk](http://www.iswl.org.uk)

## Military Wireless Amateur Radio Society (G0PTZ)

Further details from John Taylor-Cram, 7 Hart Plain Avenue, Cowplain, Waterlooville, Hampshire PO8 8RP. Tel: 0239-225 0463.

## Radio Amateurs Involid and Blind Club (RAIBC - G4IBC, G8OIBC, GB1IBC)

Enquiries to Honorary

Treasurer/Membership Secretary Mrs Shelagh Chambers, 78 Durlay Avenue, Pinner, Middlesex HA5 1JH. Tel: 0208-868 2516.

## Radio Amateur Old Timers' Association

Enquiries to Membership Secretary Ted Rule, G3FEW, 15 Norwich Road, Lenwade, Norwich NR9 5SH. Tel: (01603) 872309. E-mail: edit@raota.fsnet.co.uk or visit [www.raota.supanet.com/](http://www.raota.supanet.com/)

## Remote Imaging Group (RS88803)

Further details from the Membership Secretary John Din, 59 Woodend Road, Coalpit Heath, Bristol BS36 2LH. FAX: (01454) 887880. E-mail: membership@rig.org.uk

## Royal Air Force Amateur Radio Society (RAFARS - G8FC, G8RAF)

Details from the Administrator, HQ RAFARS, RAF Cosford, Wolverhampton WV7 3EX. Tel: (01902) 372722, E-mail: administrator@rafars.org

## Royal Navy Amateur Radio Society

(RNARS - GB3RN, G3CRS, G1BZU)  
Enquiries to Secretary Philip Manning G1LKJ/M3LKJ, 1 Waverley Gardens, Ash Vale, Surrey GU12 5JP. Tel: (01252) 334929, E-mail: g1lkj@amsat.org or visit [www.rnars.org.uk](http://www.rnars.org.uk)



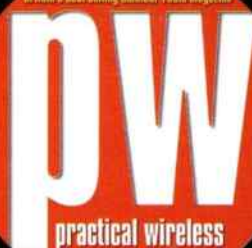
## Royal Signals Amateur Radio Society (RSARS - G4RS)

More information from General Secretary, HQ RSARS, Cole Block, Blandford Camp, Dorset DT1 8RH. Tel: (01258) 482814, E-mail: gensec@rsars.org.uk or visit [www.rsars.org.uk](http://www.rsars.org.uk)



**The Medium Wave Circle**  
Details from c/o C. Rooms, 59 Moat Lane, Luton LU3 1UU.

E-mail: [contact@mwcircle.org](mailto:contact@mwcircle.org)



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### REVIEWED

- John Goodall G0SKR gets 'back to basics' with the new Yaesu dual-band mobile FT-7800 transceiver
- The FD-01 Frequency Counter Kit from Cumbria Designs is tested by Tex Swann G1TEX/M3NGS



### BUILD

- Tony Nailor G4CFY shares his design for building The PW Whitcombe - a 70 - 28MHz down-converter

### FEATURE

- Join Henryk Kotowski SMOJHF on his DXpedition to Bozca Ada Island in the Aegean Sea off Turkey

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# Scanning

Scene

● **Dave Roerts** *clo SWM Editorial Offices, Broadstone*  
● **E-mail** *scanning@pwpublishing.ltd.uk*

It is likely that you'll be reading this at the end of February in the middle of a heatwave. Some people will be paddling in the sea or in lakes in public parks. Well that may be the case, but I'm writing this at the beginning of January and let me tell you - it's snowy here! The temperature is just on freezing and more snow is forecast. And yes, I'm sat here listening to the council snow ploughs and gritting trucks on 87MHz.

Having said that, most days I like to go out for a hike and I'm never seen out of the house without a scanner receiver somewhere about my person. I also tend to take an amateur v.h.f./u.h.f. set too just in case I get into difficulties on the cliff or the hills. Sure, I have a mobile 'phone but coverage is very patchy around the area where I live so radio communications are a priority, as is the ability to hear accurate local weather forecasts from the Coastguard and, like now as I write this, the chatter of the snow plough crews.

These days almost every radio is fitted with a liquid crystal display (l.c.d.) that gives frequency, power, mode, function and other information. In extremely cold temperatures, these things may display rubbish or start to 'go slow'. If you let the l.c.d. get very cold (say minus six, seven or lower) for anything more than a few minutes it may never recover. Yes, l.c.d.s are very susceptible to temperature, that's why you see them utilised in thermometers.

First discovered in 1888 by an Austrian called Friedrich Reinitzer who melted a material called Cholesteryl Benzoate, which is similar to cholesterol that we have heard so much of recently. He observed its properties over a temperature range as it cooled. Eighty years later RCA made the first l.c.d. and since then they have become the industry standard for presenting information to users of electronic equipment, particularly portable gear. The Brits had a great deal of input too, Merc made the first stable l.c.d.d along with, what is now Qinetiq.

Basically l.c.d.s like to be kept fairly warm and you can pretty much guarantee that most manufacturer's l.c.d. will be frozen at about -10°C. If you have to use the equipment in the open for any time consider turning on the backlight of the display and this should add a vital degree or two that may prevent display problems.

Now, of course, turning on the backlight shortens battery life. Batteries don't like the cold either! Most cells lose a mass of power when they get below freezing. For cold weather operation use Lithium-ion or Nickel MetalHydride (NiMh) batteries. They don't particularly like the cold but they have better

performance characteristics at low temperatures than the other options.

For most of us it will be sufficient to keep the radio in use in an inside pocket so that the body warmth will keep it operational. This is when a earpiece or small clip-on speaker will come in handy.

The very worst thing that you can do with any piece of electronic equipment is to keep hauling it from warm to cold temperatures and vice versa. Condensation will form within the equipment, which can cause terminal damage. Either keep the radio cool or make sure that the set is completely warm for a few hours before allowing it to get cold again.

This information all comes from bitter experience. There's nothing more annoying than trying to operate a radio in sub-zero temperatures when your fingers are steadily numbing and the display is showing absolute garbage.

## Antenna Antics

Change in temperature can affect scanner users in other ways too. I recently purchased an 'on-glass' dual-band antenna for my truck. The reviews of this particular antenna seemed good enough and I didn't want to start drilling holes in an expensive vehicle. Plus, the on-glass antenna has the advantage of looking very discrete.

The unit arrived complete with mounting instructions and a small spirit cleaning pad to ensure that the glass surfaces were free of dirt and grease, etc. before mounting. I followed the instructions to the letter and mounted the antenna.

All was well for two weeks while I drove around on local journeys. Then came a big trip. A 1000km drive in high winds and rain with sub zero temperatures thrown in as well. It was dark and when I arrived at the end of my journey, gasping for a beer, only to find the antenna was gone. The outside bit had fallen off! Probably some poor soul on a motorbike had been speared on the way but I didn't hear his cries over the mega watt CD player!

I called the supplier and mentioned that the antenna was no more and they kindly sent me another unit, free of charge. Very good service. Again, I cleaned the glass with hot clean water and then dried it off with a nice clean white cloth. I deployed the spirit pad and then dried that off. I felt confident this time but after 390km, yes that's right, it fell off.

This time I had taken the precaution of attaching it to the built-in roof rack with fishing line so all was not lost. I then contacted a windscreen replacement company The man glued on the antenna using a glue pad and some bonding material. He said that it's

guaranteed not to fall off but I'm leaving the fishing line on just in case...

Despite all this drama the antenna is very good for scanning. Not particularly sensitive at low frequencies but at 120MHz and higher it's more than adequate and it has the advantage of being ultra discrete.

## New Channel Line-up

There seems to have been some sort of shake-up in the Communications Department of the St. John Ambulance organisation. These volunteers provide valuable first aid cover at many events throughout Britain. Overseas branches also exist. They have used two-way radio kit for generations and now their frequency allocations are in a state of change.

The frequencies 169.025 and 169.3625MHz are on notice to quit and are not to be used after the 31 March this year. After this date Ofcom (the new regulatory body) will allocate two new frequencies to them.

Some other frequencies, previously in use, are no longer licensed to St John Ambulance either. This is how their new channel line-up looks.

Channel No.	Displays	MHz
1	SJA 1	173.0500
2	SJA 2	169.3125
3	SJA 3	164.0625
4	SJA 4	173.0625
5	SJA 5	164.0500
6	SJA 6	173.0875
7	SJA 7	169.0875
8	NSJ 1	National channel to be allocated
9	NSJ 2	As above

The CTCSS tone in use on all the above channels is 186.2Hz.

It seems that in their ambulances St. John teams use Icom F12, Maxon SL55 or Maxon SL70 u.h.f. sets on the following frequencies:

Channel No.	Displays	MHz
1	USJ1	449.3125
2	USJ2	449.400
3	USJ3	449.475

And these are their low band channels:

Channel No.	Displays	MHz
1	LSJ1	77.6875
2	LSJ2	86.3375
3	LSJ3	86.3500
4	LSJ4	86.3625
5	LSJ5	86.375

I'm not sure whether St. John use these frequencies on f.m. but as you'll notice some of them seem to be also allocated to mountain rescue and other similar services.

The St. John volunteers aren't exactly short of frequency allocations and this illustrates government's new realisation that volunteer services may be the only way to deploy the large numbers of emergency personnel needed in case of a major terrorist incident.

And with that cheery thought I'll leave you... until next month.

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- Digital timer with LCD display
- Tape counter
- Headphone socket
- AC adaptor
- Size 260w x 67h x 180d

