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SHORT WAVE
Magazine
SWM

& Scanning Scene

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Reviewed

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January 2003

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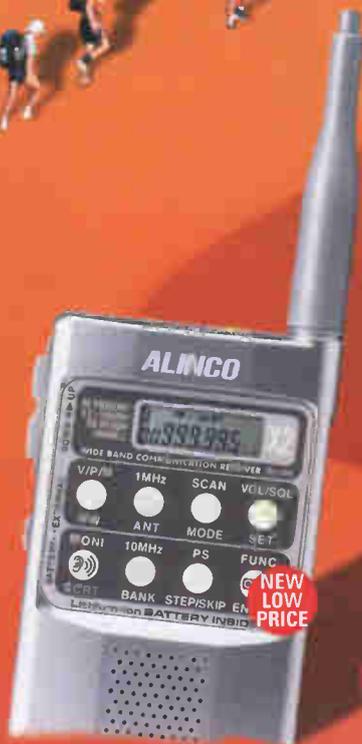
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cover subject:
**2.4GHz video
cameras -
they're
everywhere!**

Pic: Kevin Nice

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- 30 **Introduction to 2.4GHz Video Monitoring**
Long term video and microwave enthusiast Alexander James tells us just how easy it is to extend your hobby to include microwave video monitoring.
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A boxed, scanning solution to 2.4GHz video monitoring, Kevin Nice finds out what the G1MFG receiver offers.
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These days there are many choices of potential power packs. Dave Roberts looks at what is currently available for your portable kit.
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A reflective article from John Wilson this month as he looks back at a busy 2002 and ties up a few loose ends.

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Amateur Bands

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DXTV & FM special

Turn to page 22 where Keith Hamer and Garry Smith welcome you to the fascinating world of long-distance TV and f.m. reception!



ARE YOU WONDERING IF YOU ARE ALONE IN THE HOBBY?
TURN TO PAGE 78 NOW FOR OUR UK RADIO CLUB LISTING
JOIN OTHERS WITH THE SAME INTERESTS!

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- **Ten-Tec's c.w. and s.s.b. receiver kit.**
- **All those usual regular columns.**
- **Keep on top of the world of monitoring with SWM.**
- **and much more...**

**contents subject to change*

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Share your thoughts

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Subscriptions are available at £36 per annum to UK addresses, £43 in Europe and £54 (ROW Airmail). Joint subscriptions to both *Short Wave Magazine* and *Practical Wireless* are available at £61 (UK) £74 (Europe) and £94 (ROW Airmail).

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. The printed circuit boards for SWM projects are available from the SWM PCB Service.

KANGA PRODUCTS, Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: 0115 - 967 0918. Fax: 0870 - 056 8608.

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 £3.25 each and photocopies are £2.50 per article.

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, UK or overseas. Prices include VAT where appropriate.

A complete review listing for SWM/PW is also available from the Editorial Offices for £1 inc P&P.

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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 (01202) 659930. 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 (01202) 659950.

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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



It has been only a few, but very hectic weeks since I wrote my last piece for this Editorial space. In that short time we have moved on to the 2003 volume of SWM whilst I have been travelling around the southern half of the UK celebrating my recent marriage to my partner Leslie. We seem to have crammed much into a short space of time and had a very enjoyable honeymoon in the process.

These happy events and some serious technical problems due to worn out computers here at the editorial offices have combined to make this a challenging magazine to produce. I for one will be glad of a break over Christmas. It'll be good to relax and prepare for the new and exciting year ahead. I wish all of you and your families an enjoyable festive season and peaceful satisfying 2003. I'd also like to thank every one of you for your continued support of the UK's best radio magazine.

sister magazine *PW*. I hope that in addition to operating to facilitate the SWM Listening Contest, we'll end up working lots of you newly licensed M3s too.

I will be announcing the Contest details, rules and entry requirements in a forthcoming issue. So if you're at all tempted, keep a watch for the update - coming soon.

Disaster At The Other Man's Shack

I'm sad to report that Eric Bray, who's minimalist shack was featured back in May's SWM, has recently

suffered a house fire which has rendered his home uninhabitable. Fortunately, nobody was hurt. The cleaning up exercise is underway and hopefully Eric and family will be back in residence soon.

Contest!

For quite a few years now I've wanted to run a listening contest for the readers of *Short Wave Magazine*. There are several difficulties with attempting this kind of activity especially with the potentially large number of entries. At last, 2003 is to be the year this happens, as I've managed to formulate a way to minimise the administrative requirements associated with such an event. To achieve this, it seemed the best way would be to run an event type station so as to generate some extra activity and also have access to all the QSO information in the form of the station log book.

So, to this end, late spring will see the G3SWM callsign on air. That is something that's not happened for quite a while! To add to the interest we will be working h.f. from a remote WAB square for a twelve hour stint. This should allow our station to work into Australasia early on and the Americas and towards the end of the period, plus lots of UK and European stations throughout the day.

There are many details yet to be finalised, but that's the gist of the plan. The station will be manned by myself and members of a local radio club, some of whom will be familiar to regular readers of SWM and



Just In Time

With seconds to go before we go to press, I received notice of forthcoming events at Wimborne based radio club Flight Refuelling Amateur Radio Society from the newly elected Chairman Paul Marsh M0EYT/G7EYT. Paul informs me that the coming year will see lots of good events

organised by FRARS. For starters, 19th January 2003, John - G6AZV will be giving a talk on radio direction finding, concentrating on the topic of 2m fox-hunting. The following week, on the 25th January 2003, Andy G4JNT will be talking about new digital modes available to radio amateurs. For more details, please see www.frars.org.uk

See you next month

2003 Kevin

QSL

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.

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

Dear Ed

I wonder if you could help me with a query. I have a Grundig Satellit 600 and I think the battery which controls the memory for the date and time has gone flat. It's a dryfit type 476.8V 3AH T2A FUSE. Would you have the address of Grundig so that I can write to them to ask if they still make this kind of battery. I've no idea of the age of the radio. It's a lovely radio, but s.s.b. clarification leaves a bit to be desired. For a.m. and f.m. the clarity is excellent, but I'm a utility fan and not really interested in broadcast stations on a.m. or f.m. but I keep it because as a youngster I just couldn't afford such a radio. In my dreams as they say, I remember visiting someone's house and seeing one of these sets and I was just green with envy.

Excellent magazine, but I reckon you need a few more frequencies published in the 'SSB Utilities' column. Also letters to Graham Tanner seem to be censored due to September the 11th. Incidentally Culdrose ops is still on 5.696MHz. Thanks in advance for any help you can give me with my query. Please feel free to publish this if it is good enough.

**Bill Semmens
Penzance**

Hello Bill, the text that you mention on the battery seems to be conflicting to me. I suggest that you contact SWM advertiser Nevada as they are very experienced with Grundig products. Grundig themselves no longer have a

UK office. On the question of censorship, we most definitely don't do that. Unfortunately we don't have space to publish every item we receive. - Ed.

Dear Sir

Thank you for the copy of SWM which I received this morning. Having read the comprehensive list of radio books contained within it, I hope to make a choice shortly. Also, I read with considerable interest your article regarding the history of Roberts Radio. I have a number of Roberts portables which I have collected over the past few years. I am not certain of their age, but they are the original models with teak side panels. The largest ones are model R707, which I am sure you know are powered by two lantern batteries.

The other thing which I found of interest in your article was the reference to the Rees-Mace Company, as I also have a valved table radio which was produced by Rees-Mace Marine, model 'Cameo Senior, RM1'. This radio was given to me by a colleague, who was formerly in the Merchant Navy and had this radio on board ship during his travels. I do not know when the radio was manufactured, but suspect that it was during the period 1945-50. I was also interested to read of the early connection between Roberts Radio and the Rees-Mace Company.

Having looked back at an issue of SWM Vol. 49 issue 3 dated March 1991, which has an article on the Pye 3017A Export model radio and comparing the

specifications of it with the Rees-Mace Marine, it would appear that the two radio sets have identical chassis.

On page 57 of the magazine in the 'SSB Utilities' column, I noticed that Ian McDowell uses a Lowe SRX receiver. I also have one of these radio sets which works reasonably well, but is in need of re-alignment. There seems to be some difficulty obtaining a service manual for this radio and I am told that none exists. Perhaps you may be able to suggest a solution. As this radio uses the Wadley loop tuning system, I am hesitant to interfere with any coil slugs or trimmers without any information!

I hope that the above may be of some interest to you and again thank you for the magazine.

**J.F. Wedge
Oxfordshire**

I'm glad the copy of SWM found you OK. Your comments on the Roberts Radio 70th Anniversary are most interesting, your collection must be fascinating. Roberts Radio have published a Book to commemorate their anniversary which contains many pictures and references to the models produced by the company. You are wise to be wary of making adjustments to your Wadley loop based set as they are notoriously difficult to align without the correct procedure and equipment. Perhaps a reader might suggest a route to having your set aligned, unfortunately I'm not able to suggest a repairer. - Ed.

topqsl

Dear Sir

I feel compelled to write to you regarding a subject which will no doubt cause a large number of heads to 'nod' in agreement. I would like to pass on my annoyance at what I feel to be snobbery of grammar school proportions. To obtain a full licence to operate on the h.f. bands, you need to pass the RAE exam. As this is a **hobby**, can anyone seriously understand why on earth we are expected to have a comprehensive knowledge of circuit applications and many other fine aspects of electrical wizardry?

Has it not occurred to the RAE that they are losing revenue by keeping up the barriers that prevent many sensible people from gaining a full licence? Do they not realise that this is after all just a **hobby** and not a career?

Many people out there find it very hard to fit in a sensible and regular amount of time to devote to a home study course or travel out to a club. That's if there is a club that is local and accessible! Some of us do have families or distractions that slow us down. At the end of the day, all we have to do is keep radio alive by operating a set safely, within guidelines and not causing undue annoyance to others. Surely a more basic course which takes into account good health and safety operation, aerial knowledge and hazards that might affect other users in a good building block?

Most of us find patience and time lacking in this day and age, so of course many people choose not to do the RAE exam. The RA don't have a good distribution system for getting younger people involved and so access is preventing many people, including the disabled, from communicating by amateur radio. Most of us don't know of any nearby radio amateurs to give us encouragement along the way.

The RA should consider themselves fortunate that people do study for their elitist exams, the new access course which is normally done in a weekend is, I believe, a step in the right direction, but if we look at the basics of this course, just what is being achieved here? The end product is that new entrants are granted a licence to operate radio - there's nothing any more different here than compared to having a full licence is there? Do you get the impression that someone is pulling the wool over our eyes here?

Now that we have Tony Blair in charge, perhaps he could point a finger at the RA and drop hints at seriously modernising the way they give out full licences? Before I bring this letter to a close, just think about this for a moment, just what is it you are doing when operating a CB radio that is so different from using a h.f. set? Cause for thought I think! A radio is a radio is it not?

Good luck to everyone at SWM, I hope you have a relaxing and happy Christmas. Keep up the excellent work.

**Glen Hoff
Birmingham**

Dear Glen, thank you for your interesting letter in which you raise some pertinent points. I'm sure there are those who agree with your every sentiment. I however, believe that you misunderstand some of the things that you have commented on - though I have to say in the main I agree with the ethos of your thoughts.

*You are quite correct in pointing out that Amateur Radio is a **hobby**, but it is undeniably a **technical hobby**, so is for instance sailing. Both though carry risks if those participating don't know what they are doing. Radio is a complex subject and it is necessary to understand the properties of the medium and the equipment in use to transmit and receive signals. You wouldn't set out to sea in a boat without a certain level of competence - it could well prove to be fatal, both to third parties as well as yourself. Misuse of radio transmitters could well have similar results.*

Back in the early years when the vast majority of radio hobbyists built their own equipment, it was essential that the RAE provided assurance that the danger was minimised. Today, whilst the emphasis has shifted due to less home construction, there remains the very real risk of self harm and potentially fatal interference, being caused by incorrect emissions from amateur equipment.

There is currently much work by both amateurs and professionals relating to the modernisation of the structure of the UK amateur licence structure and the relevant

qualification processes. You only have to look to the recent Foundation Licence successes to sample the benefits of this work.

A foundation licence is, by the way, all needed to access most of the h.f. amateur allocation. Next year and the World Radio Conference 2003 should see more significant changes in amateur radio structuring, reflecting the modern requirement of the hobby. I suggest that you enrol on a Foundation Course near you and obtain an M3 call for now and wait until next year for the positive developments to materialise.

Lastly your comparison of CB and amateur radio is not very relevant and in fact reveals your general misunderstanding. CB sets are limited to a few fixed channels, currently one mode, have low power output and have restrictions place on the antennas allowed. The radio amateur licence in contrast is aimed at promoting experimentation, allows the use of almost half a kilowatt, antennas with significant gain and the use of modes which can if not controlled properly can be the source of massive interference with the associated risks that ensue.

Glen, I hope I have answered fully enough, but if you require any further clarification, please let me know. I'm glad you enjoy SWM, thanks for the good wishes, seasons greetings from me and everyone here at Short Wave Magazine. - Ed.

JFK Aircraft Incident Mystery

by Roger Bunney

Reuters News Service on just after October 22nd relayed helicopter surveillance pictures of a Russian aircraft that had been isolated at JFK, NY airport, behind a fenced enclosure with a large number of police and vehicles and security in attendance. A single gangway was placed to the front doorway and police gathered at the foot awaiting...what? The photograph shows a large portacabin type structure being moved into the immediate area.

Only the helicopter feed was transmitted without specific commentary and pictures cut abruptly after some minutes (a caption indicated JFK). The incident went unreported in the press, TV - unusual in view of recent terrorist incidents and that a Russian aeroplane was involved, an attempted hi-jacking, prisoner exchange? Can any air-orientated reader offer information on this incident?

(left) Russian aircraft behind fenced enclosure, a security force control cabin moves into place.



(right) Unknown security forces lurk near to the single gangway.



Stop Press

Martyn Phillips G3RFX, Hon. Sec. of the Bristol R5GB Group, has informed the SWM Newsdesk that following a personal meeting with Lord Bath back on the 4th November, he has kindly agreed to their Rally taking place at Longleat again next year - this will be on **Sunday 29th June 2003**. Write it in your diary now!

It will, however, be the last Rally to be located at Longleat. The Group are currently looking for a new venue for 2004 and beyond. Meanwhile, it's very definitely all systems go for Longleat 2003! For further details and information, visit the Longleat Rally website at www.longleatrally.co.uk



Change of Date

Please note that the date of the Yeovil QRP Convention has to be changed to **June 8th 2003** as it clashes with the Tiverton Rally. The Rally is being held at Digby Hall, Hound Street, Sherborne, Dorset. Doors open at 1000 and there will be three lectures by notable speakers, also traders, Bring & Buy, good in-house catering, talk-in on S22 by GB2LOW and a free car park. More information from Derek M0WOB on (01935) 414452 or E-mail: m0wob@tiscali.co.uk

Quiz Night

Bangor and District Amateur Radio Society meet on the first Wednesday of every month in 'The Stables',

Groomsport, County Down at 2000. On **Wednesday 8th January 2003** at 2000 they are holding their annual quiz night. This is always a great night out and visitors, visiting teams and new members are all welcome. More information from Mike G14XSF on 0284-277 2383 or club website <http://welcome.to/bdars>

Out-Of-Date

In the SWM Club Listing in November's SWM, we incorrectly stated that the North Staffs Amateur Radio Society G4BEM is still up and running - this club in fact wound up and became part of the **Stoke On Trent Amateur Radio Society G3GBU** a good few years ago. So, for anyone wishing to get in contact with the Stoke On Trent ARS, they need to contact **Albert Allen**

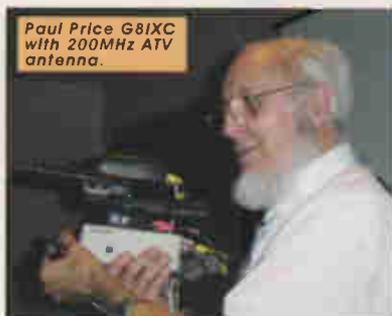
G4DHO about membership. You can also E-mail: g3gbu@qsl.net as well. We apologise for any inconvenience caused by this use of out of date info.

If your club hasn't been included or there is missing or out-of-date information, then please let us know as soon as possible so that we can ensure that the SWM Club List is kept as current as possible. Many thanks.

Chelmsford ATV Antenna Talk

Interest in ATV seems to be growing and the recent talk by **Paul Price G8IXC** on ATV antennas for 1240 and 2400MHz proved very popular with about 70 people attending. Paul showed how antennas could be made for those bands and gave a live demonstration of ATV from a car outside in the car-park. He also demonstrated an ATV station for 2.4GHz based on a cheap Video Sender available from most d.i.y. stores.

The Chelmsford Club meets on the 1st Tuesday of each month at the Marconi Social Club,



Beehive Lane, Great Baddow, Chelmsford. The doors open at 1915 and a bar is available for refreshments.

Future Meetings include: 4th February - VHF/UHF Propagation by Les Barclay G3HTF, 4th March - A talk by the Editor of *Practical Wireless* Rob Mannion G3XFD. The club will also be running another Foundation evening course at Danbury starting on Thursday 6th March.

For information contact the secretary **David Bradley M0BQC** on (01245) 602838, E-mail: cars@g0mwt.org.uk or visit the club website www.g0mwt.org.uk

rallies

New Transceiver

Nevada are pleased to announce the release of the new **Alinco DR-620E** 2m/70cm Mobile Base Transceiver. This is the first amateur dual-band mobile to support optional digital voice communications. A plug-in board (optional) allows use of the advanced 10F3 digital mode with speech compression technology (this may not be legal for use in some countries). Features also include an optional TNC board that supports digi-peat mode, airband and wide f.m. reception, CTCSS/DCS encode and decode plus lots more. Available from Nevada's dealers throughout the UK or direct from Nevada, the DR-620E is priced at £299. More information from Nevada at www.nevada.co.uk or 'phone direct on (02392) 313090.



WRN & CI

At a signing ceremony in Beijing, **China Radio International (CRI)** has renewed and extended its agreement with London-based **World Radio Network (WRN)** for the provision of broadcast transmission services. The new contract for WRN's services was signed by CRI Vice President Mr Xia Jixuan at CRI's headquarters back at the end of October 2002.

WRN and CRI have worked closely since the two broadcasters signed a collaborative agreement in August 1999 to bring CRI's programmes to a wider global audience. Under the auspices of the agreement, WRN established the broadcasting of CRI's daily French, English and German programmes to Western Europe on 1440kHz a.m. via RTL Radio's powerful transmitter based in Luxembourg.

WRN is now undertaking an extensive marketing campaign, on behalf of CRI, to promote these programmes to a potential audience of 500 million Europeans. CRI's English, French, German and Russian programmes are also broadcast on WRN's own global radio networks: WRN English, WRN FranAais, WRN Deutsch and WRN Russkij. Furthermore, WRN placed CRI's daily English and standard Chinese programmes on Spectrum Radio 558AM that broadcasts to listeners in London and South East England.

Mr Karl Mlosga, WRN's Managing Director (left) and Mr Xia Jixuan, CRI Vice President (right) shake hands after signing a new collaborative agreement at the headquarters of CRI in Beijing, China.



February 2: The 18th South Essex Amateur Radio Society are holding their Radio & Computer Rally at The Paddocks, Long Road, Canvey Island, Essex, (The Paddocks are situated at the end of the A130). Admission is £1.50 and doors open at 1030 - features include amateur radio, computer and electronic component exhibitors, there will also be home-made refreshments, free car parking with disabled access, R5GB Morse tests (two passport photos and fee required). More information from www.southessex.ars.btinternet.co.uk or from **Brian G7IIO/M3IIO** on (01268) 756331, E-mail: briang7iio@yahoo.com

February 9: The Harwell ARS Radio & Computing Rally will take place at Didcot Leisure Centre, Mereland Road, Didcot, Oxfordshire. The rally will be signposted from the Milton Interchange on the A34. Talk-in on S22. There will be a car park and admission is £1.50. Doors open at 1030, 1015 for disabled visitors. Trade stands, Bring & Buy, Special Interest Groups, a licensed bar, light refreshments and disabled facilities. More information from **Ann G8NVI** on (01235) 816379 or

ann.stevens@btinternet.com or visit www.hamradio.harwell.com

February 16: The Northern Cross Radio Rally is to be held at Thornes Park Athletics Stadium, Wakefield, W. Yorkshire. The rally is held in one large hall - just out of town on the Horbury Road. Easy access from M1 J39 & J40 - well signposted and with talk-in on 2m and 70cm. Doors open at 1100 (1030 for disabled visitors and Bring & Buy). There will be the usual attractions plus Morse tests on-demand. More details from **John G7JTH** on (01924) 251822, E-mail: g7jth@wdrs.org.uk or visit www.wdrs.org.uk

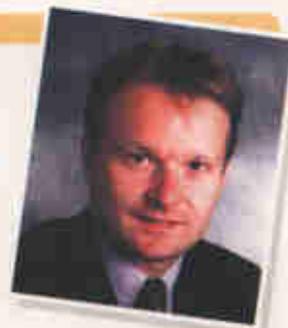
February 16: The Cambridge & District Amateur Radio Club are holding their rally at Britten Arena, Wood Green Animal Shelter, King's Bush Farm, London Road, Godmanchester at 1000. Entrance fee is £2, concessions £1.50. There is enough free parking for 2000 cars, there will also be two bars, a restaurant, animal shelter, water garden and lake. A great day out for all the family. More information at www.cdarc.org.uk

March 8: The Crystal Palace Radio and Electronics Club Spring Radio Fair at St. John's Hall, Sylvan Road, London SE19. Doors open at 1030 till 1330. Traders Tables £5 in advance. Admission is just £1, which includes a free drink. Children under 16 free. Free local parking. Contact **Bob** on (01737) 552170. More details on <http://www.members.aol.com/rfcburns>

March 9: The 9th West Wales Amateur Radio & Computer Rally will be held at Penparcau School, Aberystwyth (as part of National Science Week). Doors open 100 till 1530 and admission is just £1. Good parking facilities with easy access for disabled visitors and traders for all stalls. See GB4FUN Amateur Radio on the Move. Demonstrations on h.f., v.h.f., on the air. Amateur Radio and Computer Traders, Bring & Buy, Clubs and Special Interest Groups, including Motorcycle Display. Catering facilities. Talk-in on S22. More information from organiser **Ray GW7AGG** at home QTH or (01686) 628788, FAX: (01686) 621880 or E-mail: mwmg01@aber.ac.uk

New Sales Manager

icom (UK) has a new Sales manager. **Sam Taylor Nobbs** has been promoted to the post of Sales Manager from within the company and is tasked with developing the sales strategy across all its market places, as well as organising the day-to-day running of the company's sales office. Congratulations Sam!



New Release

Haydon Communications have just released the new QTEK DC-3000 desk top antenna. The QTEK DC-3000 is intended for use with scanners and is a complete desk top antenna for connecting to scanners and short wave receivers. Haydon Communications say it is ideal for use indoors by people who are unable to put up an outside antenna. Haydon say this antenna is ideal for desktop use and is fully adjustable for increased performance.

The antenna is supplied complete with coaxial cable terminated with a BNC plug, making it suitable for most hand-held scanners. Frequency range is 100kHz to 3GHz, collapsed length is 600mm. The antenna features adjustable vertical and horizontal elements. Haydon comment "This is a superb stylish quick answer to antenna problems and is available now, from stock, at £54.95 (+£6 P&P)".

More details from Haydon Communications at **Unit 1, Thurrock Commercial Centre, Purfleet Industrial Park, Aveley, South Ockendon RM15 4YA, Tel: (01708) 862524, FAX: (01708) 868441.**



LM&S



Before detailing the latest reports on reception in the broadcast bands may I wish all listeners and readers a Happy New Year! When making your resolutions for 2003 could you please include the sending of reception reports to me for inclusion in 'LM&S', so that other listeners can benefit from them and add to their enjoyment of this hobby.

The short wave data herein includes some of the frequencies which the international broadcasters are now using for the winter period (27th October 2002 - 30th March 2003). The information is based upon reports of actual reception compiled at the end of October, but there are a number of question marks in the data which have yet to be resolved. Any information that you can offer about those entries, such as overall transmission times, target areas and language(s) involved; also details of any other broadcasts that you receive whilst searching the bands would be very welcome here for inclusion in 'LM&S'. Please post them to me at the above address to arrive here not later than the first week of the month following reception.

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 October.

Whilst on holiday near Coverack on the Lizard Peninsula, S.Cornwall during early October **Simon Hockenhill** (E.Bristol) logged several l.w. stations with his Roberts R617 portable powered by batteries - see chart. During the morning of the 9th he noticed that the long wave transmitter at Clarkestown, Eire on **252kHz** was powered and undergoing some tests. He rated the transmission SINPO 43444 at 1025. Upon returning home Simon checked the band from time to time and he encountered some fairly good conditions, logging Nardor, Morocco on **171** as SINPO 15331 at 0050 on the 13th; Sofia, Bulgaria on **261** as 24222 at 2301 on the 23rd; also Sasnovy, Belarus on **279** as 24442 at 2025 on the 28th.

The sky waves from the Radiotelevisione Italiana (RAI) 10kW outlet at Caltanissetta, Italy on **189kHz** were picked up at 2040 by **Jim Edwards** in Wigan. He says "Russian stations were heard again on **270** and **279kHz** with weak sigs; also heard Russian on **252kHz** - could have been Yerevan, Armenia, but poor under co-channel Tipaza".

An unidentified station on **225kHz** was heard at 2209 on the 12th by **David Stevenson** in Swansea. A male voice, which sounded Turkish, was heard under Polski R-1, suggesting that the station was Van, Turkey (600kW), but reception was very poor and the transmission faded out after half an hour.

Whilst on holiday near Venice in N.Italy **Geriant Gill** (Llanfairfechan) searched the band during darkness, mainly from 1800-2100, between the 29th & 31st. He used his Grundig Yacht Boy 400 portable and compiled an interesting log - see chart. He says "I couldn't hear much from the UK - the long wave frequency for BBC R-4 was too crackly. I could just make out Ouargla, Algeria on there. I had expected to hear more from Turkey on long wave but only heard one channel".

A broadcast from Bod, Romania was heard under DLF via Donebach on **153** at 2225 on the 29th by **Sheila Hughes** in Morden. At best

the transmission rated SINPO 22222 but Sheila was able to hear two ladies talking in Romanian, followed by a young lady singing a ballad and then a further discussion took place.

At 2110 on the 30th **Fred Pallant** (Storrington) noticed that the sky waves from Bechar, Algeria on **153** were causing co-channel interference to DLF via Donebach, thereby suggesting enhanced conditions.

Medium Wave Reports

The sky waves from some of the many m.w. stations in the Middle East, N.Africa, Europe and Scandinavia reached the UK after dark - see chart

The band was searched after dark by **Geriant Gill** during his holiday in Venice. He says "There were stations on all channels, most frequencies had two, sometimes even three stations that could be heard. I've left out some frequencies - they were too 'jumbled' or too faint to be identified properly...some frequencies had to be listened to several times as sometimes they would be indecipherable at say 1830 but by 2000 they would be clearer".

One station that **Geriant** had expected to hear was Rome on **846kHz** (300kW), but much to his surprise he was unable to detect it. However, other high power Italian channels, such as Milano on **900kHz** (600kW) and Rome on **1332kHz** (300kW) were audible. From the UK he obtained good reception of the BBC World Service via Orfordness on **1296kHz** but their transmission on **648kHz** (500kW) suffered severe co-channel interference from RNE-1 via Badajoz, Spain (10kW) which prevented either station being received clearly.

After searching the l.w. & m.w. bands while on holiday in Austria for the broadcasts from stations in the UK (see 'LM&S', SW/M November & December 02), **Peter Pollard** (Rugby) decided to concentrate on reception in this band during October. He spent three afternoons from 1400-1600 and three evenings from 1900-2100 and compiled an interesting list for the chart.

During daylight, the ground waves from some of the UK local radio outlets travelled considerable distances - see chart.

In a very welcome first report **Dick Male** (Yeovil) informed me that the frequency of the BBC Somerset Sound transmitter at Taunton has been changed from **1323kHz** to **1566kHz**. For 14 years listeners to BBC Somerset Sound have endured interference around dawn and dusk, particularly during bad weather in the winter, from the Voice of Russia (VOR) which is relayed by the Wachenbrunn transmitter in Germany on **1323kHz**. Since the change reception from Somerset Sound on **1566kHz** has been very good in Yeovil, rating SINPO 55555. In Stalbridge **Bernard Curtis** has observed that the transmission can now be received clearly at all times. However, reception at night in E.Bristol was not entirely devoid of interference, rating 33433 at 2233.

Short Wave Reports

In the **25MHz (11m)** band Radio France International (RFI) continued to broadcast daily to E/C.Africa throughout October. It is not known here how well their transmission on **25.820** (Fr, Eng 0830-1300) reached that area, but there may well have been some problems when the effects of solar flares disturbed the ionosphere. In the UK reception varied from day to day. Sometimes the effects of solar activity resulted in their transmission being weak or buried in noise and may have made some listeners wonder if the RFI broadcasts would be discontinued when the winter transmission schedules were introduced on October 28. The good news is that RFI service planning engineers still have confidence in the propagation conditions prevailing in this band and the broadcasts will continue.

The second item of good news is that Deutsche

Long Wave Chart

Freq kHz	Station	Country	Power (kW)	Listener
153	Bechar	Algeria	1000	A*,G*,J*
153	Donebach DLF	Germany	500	A,C,D,E*,G*,H*,J,J
153	Bod	Romania	1200	A*,B*,E*,J*
162	Allouis	France	2000	A*,B*,F,G*,H*,I,J
171	Nador Medi-1	Morocco	2000	A*,C*,D*,F
171	B'shakovo etc	Russia	1200	A*,B*,C*,G*,J*,J
177	Oranienburg	Germany	500	A*,B*,C*,E*,G*,H*,J*,J
180	Polati	Turkey	1200	B*
183	Saarouis	Germany	2000	A*,B*,E,G*,H*,J,J
189	Gufuskalar	W.Iceland	150	A*
189	Caltanissetta	Italy	10	A*
198	Ouargla	Algeria	1000	B*
198	Droitwich BBC	UK	500	EF*,H*,I,J
207	Munich DLF	Germany	500	A*,B*,D,G*,H*,J*,J*
207	Eidar	E.Iceland	100	A*
207	Azilal	Morocco	900	G*
216	Roumoules RMC	S.France	1400	A*,B*,C,E,F*,G*,H*,I*,J*
225	Polskie R-1	Poland	?	A*,B*,C*,E*,G*,H*,I*,J*
225	Van TRT-1	Turkey	600	I*
234	Beidweiler	Luxembourg	2000	A*,B*,G*,H*,J*,J
243	Kalundborg	Denmark	300	A*,B*,C,E*,G*,H*,J*
252	Tipaza	Algeria	1500	A*,B*,C,D,E*,F*,G*,H*,J*,J
261	Sofia	Bulgaria	60	C*
261	Burg(R.Ropa)	Germany	85	A*,G*,J
261	Taldom Moscow	Russia	2500	A*,B*,G*
270	Topolna	Czech Rep	1500	A*,B*,G*,H*,J*
279	Sasnovy	Belarus	500	A*,B*,C*,E*,G*,J*,J*

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

Listeners:-

- (A) Jim Edwards, Wigan
- (B) Geraint Gill, while in Venice, N.Italy
- (C) Simon Hockenhill, E.Bristol
- (D) Simon Hockenhill, while near Coverack, S.Cornwall
- (E) Sheila Hughes, Morden
- (F) Bob Norman, Chard
- (G) Fred Pallant, Storrington
- (H) Peter Pollard, Rugby
- (I) David Stevenson, Swansea
- (J) Fred Wilmthurst, Northampton

Tropical Bands Chart

Freq MHz	Station	Country	UTC	DXer	Freq MHz	Station	Country	UTC	DXer
3.200	TWR Manzini	Swaziland	0415	C	4.850	CHP 1	China	2210	C
3.205	R Ribeirao	Brazil	0010	C	4.850	R R Khatma	India	1645	C
3.230	SABC Meyerton	S Africa	2026	C,J	4.890	R Doh	India	1717	C,J
3.240	TWR Manzini	Swaziland	0420	C	4.895	R Amazonas, Lumbina	Brazil	2335	C
3.255	BBC via Meyerton	S Africa	2024	C,J	4.925	R Resouza, Baxmatia	Brazil	0045	C
3.270	Namibian BC, Windhoek	Namibia	2335	A	4.935	RIL Lucknow	India	1816	C,J
3.279	La Voz del Napo	Ecuador	0955	C	4.935	R Khatma via Prag	Brazil	0025	C,G
3.315	AIR Bhagal	India	0040	A,C	4.935	R Colaba, Bannana	Brazil	0025	A,C
3.320	SABC (RSG) Meyerton	S Africa	2024	A,C,J	4.935	RCC East, S. Nairobi	Kenya	1835	J
3.365	GBC R-2	Ghana	2207	C	4.935	RFL via Gabon	via Gabon	0535	C
3.365	AIR Delhi	India	1825	C	4.935	R P. Moresby	Pap N Guinea	1850	C
3.900	Hulun Buir	China	2300	C	4.935	R PB A. C. Grande	Brazil	0425	C
3.915	BBC via Kranji	Singapore	2110	C,H,M	4.935	R R Khatma	India	1745	C,J
3.955	R Korea via Skelton	England	2110	C,H,M	4.935	RCPBS 1, Beijing	China	2348	A,C,F
3.955	R Taipei via Skelton	England	2110	C,H,M	4.935	R La Oroya	Peru	0350	C
3.965	RFI Paris	France	2110	C,H,M	4.910	AIR Jarpur	India	1654	C,J
3.975	R Budapest	Hungary	2110	C,H,M	4.915	R Anhanguera	Brazil	0055	A,C,G
3.985	Nexus, Milan	Italy	2110	C,H,M	4.915	GBC-1, Accra	Ghana	2007	A,C,J,M
3.985	China R.Int via SRI	Sri Lanka	0625	C	4.920	PBS Xizang	China	0025	A,C
3.995	DW via Julich?	Germany	1900	A,H,I	4.920	R Quito, Quito	Ecuador	0405	C
3.995	BBC via Skelton	UK	2110	D	4.920	AIR Chennai	India	0056	A,C
4.005	Vatican R	Vatican	1900	D,F,I,L,M	4.925	R S Miguel, Ribeiralia	Bolivia	2330	C
4.190	CNR Minority Sci	China	2255	C	4.930	R Costena Ebenezer	Honduras	0245	C
4.650	R Santa Ana	Bolivia	2320	C	4.935	R Capikaba, Vitoria	Brazil	0415	C
4.750	Hulun Buir AM	China	2350	C	4.940	AIR Guwahati	India	1825	C,J
4.750	Xizang BS, Lhasa	China	2240	A,M	4.950	R Nacional, Mulvenos	Angola	0545	C
4.755	R Edin CP, Curitiba	Brazil	0010	G	4.950	AIR Srinagar	India	1820	A,C,J
4.760	AIR Pont Aven	India	0040	A,C,J	4.950	VDA via Sao Tome	Sao Tome	2015	C,J,K,L
4.765	R Rurs, Sakayam	Brazil	0315	C,G	4.955	R Cultura, Campos	Brazil	0033	C,G
4.770	FRM, Katsina	Nigeria	2145	C,M	4.960	R Cima	Dominion Rep.	0100	C
4.775	R Lumbina, Bannana	Brazil	0030	C	4.960	AIR Ranchi	India	1800	C
4.775	AIR Bhagal	India	1755	C,J	4.960	VDA via Sao Tome	Sao Tome	0540	C
4.790	AIR Chennai	India	0045	C,G	4.965	Christian Voice	Zambia	1835	C,J
4.790	Arava, Islamabad R	Pakistan	1718	A,J	4.970	AIR Shillong	India	1755	C
4.800	CPBS 2 Beijing	China	2130	A,C,M	4.975	R Uganda, Kampala	Uganda	1832	C,J
4.800	R Buenas Nuevas	Guatemala	0230	C	4.980	Ecós del Torbes	Venezuela	0020	C
4.800	AIR Hyderabad	India	1718	A,C,J	4.985	R Brazil Central	Brazil	0030	A,C
4.800	LNBS Maseru	Lesotho	2245	G	4.990	Hunan 1, Changsha	China	2325	C
4.805	R Nac Amazonas	Brazil	2330	C	4.990	AIR Itanagar	India	1750	C
4.815	R Difusora, Londrina	Brazil	0345	C	5.005	R Nepal, Kathmandu	Nepal	0015	A,C,J
4.820	R Botswana, Gaborone	Botswana	1845	C	5.009	R Cristal Int	Dominican Rep	0205	C
4.820	Xizang, Lhasa	China	2004	A,C,J,M	5.009	R TV Malagasy	Madagascar	1835	C
4.820	La Voz Evangelica	Honduras	0420	C,G	5.010	Guangxi 2, Nanning	China	2305	C
4.820	AIR Calcutta	India	1825	C	5.010	AIR Thirupuram	India	1840	A,C
4.825	R Cancao Nova	Brazil	0705	C	5.025	R Rebelde, Bauta	Cuba	0625	C
4.830	R Tachira	Venezuela	0020	C,G	5.025	R Uganda, Kampala	Uganda	2200	C,M
4.832	R Litoral, La Ceiba	Honduras	0255	C	5.030	R Burkina	Burkina Faso	2220	C
4.835	RTM Bamako	Mali	2112	A,C,J,M	5.030	AWR Latin America	Costa Rica	0200	G
4.840	AIR Bombay	India	1815	C,J	5.030	RTM Kuching	Sarawak	2205	A,C,J
4.845	RTM Kuala Lumpur	Malaysia	1530	J	5.033	R Bangui	C Africa	1845	J
4.845	ORTM Nouakchott	Mauritania	2116	A,C,I,J,M	5.035	R Aparecida	Brazil	0002	A,C
					5.040	Jeypre	India	1835	C
					5.050	AIR Aizawl	India	0100	A,C
					5.050	R Tanzania	Tanzania	1820	C,J
					5.100	R Liberia, Totota	Liberia	2225	C

Welle (DW) returned to this band from October 28. It seems likely that their daily broadcast to Asia on **25.740** (Ger 0800-1400) will be received clearly there and probably in Australia and New Zealand too. Reception reports from listeners in those areas would be very welcome here for inclusion in 'LM&S'.

The following SINPO ratings were quoted by listeners in the UK for the DW transmissions: **43333** at 0805 by **Bob Norman** in Chard; **25342** at 0920 in Storrington; **45334** at 0930 in

Stalbridge; **44444** at 1030 in Morden; **35523** (with pronounced echo) at 1050 in E. Bristol; **34333** at 1310 by **Thomas Williams** in Truro.

Those for RFI on **25.820** were **55444** at 0910 in Stalbridge; **35343** at 0937 in Storrington; **22132** at 0950 by **Vic Prier** in Seaton; **44444** at 1025 in Morden; **34333** at 1050 in Truro; **35422** at 1055 in E. Bristol; **44344** at 1100 in Rugby; **42223** at 1130 in Chard; **25522** at 1140 near Coverack; **25433** at 1210 by **Fred Wilmshurst** in Northampton; **35323** at 1247 by **Ian Evans** in

DXers:-

- (A) Robert Connolly, Killeel.
(B) Bernard Curtis, Stalbridge.
(C) Jim Edwards, Wigan.
(D) Ian Evans, Ebbw Vale, Gwent.
(E) Stan Evans, Herstmonceux.
(F) Bill Griffith, W.London.
(G) David Hall, Morpeth.
(H) Simon Hockenhuil, E Bristol.
(I) Bob Norman, Chard.
(J) Fred Pallant, Storrington.
(K) Clare Pinder, Appleby.
(L) Peter Pollard, Rugby.
(M) Vic Prier, Seaton.

Listeners -

- (A) Robert Connolly, Killeel.
(B) Bernard Curtis, Stalbridge.
(C) Simon Hockenhuil, E Bristol.
(D) Simon Hockenhuil, while nr Coverack, S.Cornwall.
(E) Sheila Hughes, Morden.
(F) Dick Male, Yeovil.
(G) Bob Norman, Chard.
(H) Peter Pollard, Rugby.
(I) David Stevenson, Swansea.
(J) Fred Wilmshurst, Northampton.

Local Radio Chart

Freq kHz	Station	ILR BBC	e.m.r.p (kW)	Listener	Freq kHz	Station	ILR BBC	e.m.r.p (kW)	Listener
558	Spectrum, London	B	0.80	C,D,H,I*,J	1305	Premier via ?	I	0.50	J
585	R Solway	B	2.00	A	1305	Touch AM, Newport	I	0.20	G
603	C.G. Litt'brne	I	0.10	E,H,I*,J	1323	Capital G, Southwick	I	0.50	C*
630	R Bedfordshire(3CR)	B	0.20	C,E,H,J	1332	CI Gold 1332 Pt'bo	I	0.60	A,H,J
630	R Cornwall	B	2.00	A,I	1359	CI Gold 1359, C'try	I	0.27	A,G,H,J
657	R Clwyd	B	2.00	A,I	1368	R Lincolnshire	B	2.00	J
657	R Cornwall	B	0.50	A,I	1368	Southern Counties R	B	0.50	H,I
666	CI Gold 666, Exeter	I	0.34	C,D,G*,J,J	1377	Asian Sd, Rochdale	I	0.10	A
666	R York	B	0.80	A,H	1413	R Gloucester via ?	B	?	G,H,J
729	BBC Essex	B	0.20	C,E,H,J	1413	Fresh AM, Skipton	I	0.10	A
738	Hereford/Worcester	B	0.037	C,H,I,J	1431	CI Gold, Reading	I	0.14	H,J
756	R Cumbria	B	1.00	A	1449	Asian Net Peterbro	B	0.15	A,H,J
756	The Magic 756 Powys	I	0.63	A,C,H,I,J	1458	R Cumbria	B	0.50	A
765	BBC Essex	B	0.50	C,E,H,J	1458	R Devon	B	2.00	A,D,G,I
774	R Kent	B	0.70	E,H,J	1458	Sunrise, London	I	50.00	H,J
774	R Leeds	B	0.50	A	1458	Asian Net Langley	B	5.00	J
774	CI Gold 774, Glos	I	0.14	H	1485	CI Gold, Newbury	I	1.00	H,J
792	CI Gold 792 Bedford	I	0.27	H,J	1485	R Merseyside	B	1.20	A
792	R Foyle	B	1.00	A	1485	Southern Counties R	B	1.00	D
801	R Devon	B	2.00	A,C,D,G,I	1503	R Stoke-on-Trent	B	1.00	A,H
828	CI Gold 828, Luton	I	0.20	H,J	1521	CI Gold, Reigate	I	0.64	E,J
828	Magic 828, Leeds	I	0.12	A	1530	Big AM, W Yorks	I	0.74	A
828	CI G 828 Bournemouth	I	0.27	D,G	1530	CI Gold, Worcester	I	0.52	J
837	R Cumbria/Furness	B	1.50	A	1548	R Bristol	B	5.00	D,G,I
837	Asian Net Leicester	B	0.45	A,C,G,H,J	1548	Capital G, London	I	97.50	H
855	R Devon	B	1.00	I	1548	Magic08, Liverpool	I	4.40	A
855	R Lancashire	B	1.50	A	1557	R Lancashire	B	0.25	A
855	Shine 855, Ludlow	I	0.15	C,G,H,I*,J	1557	CI Gold 1557, N hant	I	0.76	H,J
873	R Norfolk, W Lynn	B	0.30	H,J	1557	Capital G, So'ton	I	0.50	C*
936	Brunel CG, W Wilts	I	0.18	H,I,J	1566	CountySnd, Guildford	I	0.50	G,H
936	Fresh AM, Hawes	I	1.00	A	1566	SomersetSnd, Taunton	B	0.63	B,C*,FG
945	CI Gold GEM, Derby	I	0.20	H,J	1584	R Nottingham	B	1.00	H,J
945	Capital G, Bexhill	I	0.75	A,D	1584	R Shropshire	B	0.50	A
954	CI Gold 954 via ?	I	?	A,C,D					
954	CI Gold 954, Torquay	I	0.32	G,I					
954	CI Gold 954, H ford	I	0.16	J					
963	Asian Sd, E Lancs	I	0.80	A					
963	Liberty R, Hackney	I	1.00	C,E,H,J					
972	Liberty R, Southall	I	1.00	A,C,E,G,H,J					
990	R Devon, E.Devon	B	1.00	A,C,D,G,I					
990	CI G, Wolverhampton	I	0.09	H,J					
999	C Gold GEM Nott'ham	I	0.25	H,J					
999	Magic 9-99 P'stn	I	0.80	A					
999	R Salent	B	1.00	D					
999	Valley R, Aberdare	I	0.300	G,I					
1017	CI G, WABC, Sh'shire	I	0.70	A,C,G,H,I*,J					
1026	R Cambridgeshire	B	0.50	C,H,J					
1026	Downtown R, Belfast	I	1.70	A					
1026	R Jersey	B	1.00	C,D,G,I					
1035	RTL C'try(Ritz)1035	I	1.00	E,H,I,J					
1035	N Sound 2, Aberdeen	I	0.78	A					
1116	R Derby	B	1.20	A,H,I*,J					
1116	R Guernsey	B	0.50	D,G,I					
1116	Valley R, Ebbw Vale	I	0.50	A,C					
1152	LBC 1152 AM	I	23.50	H,I,J					
1152	Pc Ly 1152, Manch'r	I	1.50	A					
1152	CI G, Plymouth 1152	I	0.32	D					
1152	CI G, Birmingham	I	3.00	G,H					
1161	R Bedfordshire(3CR)	B	0.10	H,J					
1161	Brunel CI G, Swindon	I	0.16	A					
1161	Magic 1161, Goxhill	I	0.35	A					
1170	Magic 1170, Stockton	I	0.32	A					
1170	Capital G, Portsm'th	I	0.50	A					
1170	Swansea Snd, Swansea	I	0.58	C,G,I					
1170	1170AM, High Wycombe	I	0.25	J					
1242	Capital G, Maidstone	I	0.32	E					
1260	Brunel CG, Bristol	I	1.60	G,I					
1260	Marcher G, Wrexham	I	0.64	A					
1260	SabrasSnd, Leicester	I	0.29	H,J					
1296	Radio XL Birmingham	I	5.00	A,H,I,J					
1305	Magic AM, Barnsley	I	0.15	A					

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



Ebbw Vale. The effects of solar activity were also evident in the **21MHz (13m)** band. Sometimes R.Australia's early morning broadcast to Pacific areas via Shepparton on **21.725** (Eng 0200-0900) reached the UK. It was rated 24323 at 0840 in Herstonceux. Their transmission to Asia via Shepparton on **21.820** (Eng 0900-1400) was heard here more often, but reception varied from day to day. During good conditions it was rated 44444 at 1020 by **David Hall** in Morpeth. On another occasion it was noted as 24222 at 1133 in Rugby.

Also mentioned in the reports were BSKSA Riyadh, Saudi Arabia **21.705** (Ar to Eur 0600-1200), rated 53544 at 0800 in Seaton & 44444 at 1015 by **Rhoderick Illman** in Oxted; BSKSA **21.495** (Ar to SE.Asia 0900-1200) 43343 at 1013 in Oxted; BSKSA **21.505** (Ar to N.Africa 0900-1200) 44444 at 1014 in Oxted; Swiss R.Int via Sottens **21.770** (Eng, It, Ger, Fr to Near East, Africa 0830-1030) 44333 at 0845 by **Stan Evans** in Herstonceux; R.Pakistan, Islamabad **21.465** (Ur, Eng to Eur 0700-1010) 24322 at 0830 in Seaton & 55445 at 0910 in Stalbridge; R.Prague, Czech Rep **21.745** (Eng to E.Africa, S.Asia 1000-1030) 44444 at 1000 in Morden; RFI via Allouis **21.620** (Fr to Africa 0900-1300) 35522 at 1040 in E.Bristol; DW via Wertachtal, Germany **21.780** (Eng to Africa 1100-1145) 34434 at 1100 by **Gerald Guest** in Dudley; DW via Wertachtal **21.840** (Ger to Africa 0900?-1400?) 35522 at 1108 in E.Bristol; UAE R.Dubai **21.595** (Ar, Eng to Eur) 42232 at 1401 in

Ebbw Vale; BBC via Ascension Is **21.470** (Eng to S.Africa 1300-1900) 22222 at 1520 in Truro.

Since the introduction of the winter schedules the following broadcasters have been noted in the **18MHz (15m)** band: R.Norway Int. Oslo **18.950** (Norw to ?), rated 45434 at 0935 in Stalbridge; R.Sweden, Stockholm **18.960** (Sw? to N.America 1130-1200?), Eng to N.America 1230-1300, 1330-1400, 1430-1500) 55555 at 1335 in Herstonceux & 44444 at 1430 in Truro; Family R, WYFR via Okeechobee FL, USA **18.980** (Eng to Eur, Africa 1600-1945) 54444 at 1630 in Morden; Christian Science Herald via WSHB Cypress Creek **18.910** (Eng to E/C.Africa ?-1957) 33222 at 1920 in Rugby.

In the **17MHz (16m)** band R.Australia's early morning broadcast to Pacific & Western N.America via Shepparton? on **17.580** (Eng 0000-0800) was rated 33332 at 0733 in Oxted. Their transmission to SE.Asia via Shepparton on **17.750** (Eng 0030-0400, 0530-0800, 0830-0900, 0930-1100) was noted as 21132 at 0750 in Seaton & 33343 at 1010 in Rugby.

After mid-day R.Ukraine Int, Kiev **17.760** (Eng to Eur 1200-1330) was logged as 43333 at 1210 in Morden; R.Nederlands via Bonaire, Ned.Antilles **17.605** (Eng to C/W.Africa 1830-2025) as 43334 at 1830 in Stalbridge; BBC via Ascension Is **17.830** (Eng to W.Africa 0700-2100) as 32222 at 1840 in Ebbw Vale.

During some mornings R.New Zealand has been reaching the UK in the **15MHz (19m)** band. Their early morning broadcast to Pacific areas on

Listeners -

- (A) Bernard Curtis, Stalbridge
 (B) Geraint Gill, white nr Venice, N.Italy
 (C) Simon Hockenhill, E Bristol
 (D) Simon Hockenhill, nr Coverack, S.Cornwall
 (E) Sheila Hughes, Morden
 (F) Bob Norman, Chard
 (G) Peter Pollard, Rugby
 (H) Harry Richards, Barton on Humber.
 (I) David Stevenson, Swansea.
 (J) Fred Wilmshurst, Northampton.

Medium Wave Chart

Freq kHz	Station	Country	Power (kW)	Listener	Freq kHz	Station	Country	Power (kW)	Listener
526	Vatican R	Italy	5	I*	1152	Cluj	Roumania	950	B*
531	Ain Beida	Algeria	600/300	C*	1152	RNE5 via ?	Spain	10	I*
531	Berg	Germany	20	I*	1170	Beli Kriz	Slovenia	300	B*
531	RNE5 via ?	Spain	?	D,J*	1179	SER via ?	Spain	?	C*,G*,I*
531	Beromunster	Switzerland	500	B*	1179	Solvesborg	Sweden	600	D*,G*,H*,J*
540	Wavre-Oversej(VRT)	Belgium	150/50	C,D,E,G*,J*,J	1181	Kuume	Belgium	5	I*
540	Solt	Hungary	2000	B*	1188	Marcali(VOA/RF)	Hungary	500	B*,D,H,J*
549	Les Trembles	Algeria	600	C*,G*	1197	Munch(VOA)	Germany	300	B*,D,H,J*
549	Sasnovy	Belarus	1000	I*	1201	Argin via ?	UK	?	G*,I,J
549	Thurnau (DLF)	Germany	200	G*,I*,J	1202	Antonia	France	100	B*,C*,D*,G*,H*,I*,J*
549	Pristina	Yugoslavia	100	B*	1202	Prace	Albania	500	B*
558	RNE5 via ?	Spain	?	G*,I*	1211	Vigor via ?	UK	?	B*,F*,G*,H,I,J
567	Tullamore(RTE1)	Eire	500	C,D,E*,F*,G*,I*,J*	1211	Vienna	Bulgaria	500	B*,C*
567	Bologna	Italy	20	B*	1211	COPE via ?	Spain	?	G*,I*
576	Mulhaciter(SDR)	Germany	500	C*,I,J*	1211	COPE via ?	Slovakia	40	C*
576	Barcelona(RNE5)	Spain	50	B*,I*	1211	COPE via ?	UK	?	G*,I,J
585	Pans(FIP)	France	8	C	1211	COPE via ?	France	150	B*,G*
585	Madrid(RNE1)	Spain	200	C*,D*,G*,I*,J*	1211	COPE via ?	Netherlands	10	D*,G*
585	Dumfriess(BBCScott)	UK	2	F*	1261	COPE via ?	Spain	?	I*
594	Frankfurt(HR)	Germany	1000/400	B*,G*,I*,J*	1261	COPE via ?	Germany	600	G*,I*,J*,J*
594	Dujda-1	Morocco	100	C*,D,G*	1278	D...	France	10	C*,D,E*,I*,J*
603	Lyons	France	300	C*,D,G*,I*	1278	St...	France	300	B*
612	Sarajevo	Bosnia	100	B*	1287	St...	Spain	10	C*,J*
612	Athlone(RTE2)	Eire	100	C,D,E*,G*,I*,J*	1296	St...	UK	10	G*,J*
621	Wavre (RTBF)	Belgium	80	B*,C,D,G*,I*,J*	1296	St...	UK	500	B*,I*
621	RNE1 via ?	Spain	10	C*,I*	1305	RNE5 via ?	Spain	?	G*,I*
630	Vigra	Norway	100	I*	1314	R Due via ?	Spain	?	B*
630	Tunis-Djeda	Tunisia	600	B*,D,G*	1314	Kutsov	Bulgaria	1200	C*,D*,G*,I*,J*
639	Praha(Libice)	Czech	1500	B*,G*,J*	1323	Vorbrunn (VOR)	Germany	800/150	B*,G*,G*,J*
648	RNE1 via ?	Spain	?	C*,F*	1332	Rome	Italy	300	B*,G*
648	Orfordness(BBC)	UK	50	C,D*,E*,G*,I,J	1332	Rome	Italy	100	C*,D,G*,I,J
657	Venezia	Italy	20	B*	1350	Madrid(RNE-FSI)	Spain	600	J*
657	Madrid(RNE5)	Spain	20	C*,G*,I*,J*	1358	Foxdale(Manx R)	Is of Man	20	D,J*
657	Windsor(BBC/West)	UK	2	C*,G*,I*,J*	1358	Venice	Italy	20	B*
666	Maastricht(SWR)	Germany	150	I*,J*	1377	Lille	France	300	B*,D,G*,I*,J
675	R10 FM	Holland	120	C*,G*,H*,I*,J	1386	Bolshakovo	Russia	1200	B*,C*,E*,G*,H*,J*
675	Ramallah	Israel	100	B*	1395	Filake	Albania	500	B*,I*
684	Sevillat(RNE1)	Spain	500	C*,F*,G*,J*	1395	Lop c (Biz Nieuw)	Netherlands	120/40	J*
693	Zehlendorf(Maga R)	Germany	?	B*	1404	Brest	France	20	D,G*,I*,J
693	Droitwich(BBC)	UK	150	F*,G*,I,J	1422	Heusweiler(DLF)	Germany	1200/600	B*,G*,H,J
702	TWR via Monte Carlo	Monaco	300	D	1440	Mamach(RTL)	Luxembourg	1200	B*,G*,H*,I*,J
702	Slovensto 1 via ?	Slovakia	?	D	1440	Dammam	Saudi Arabia	1600	C*
711	Rennes (R Bleu)	France	300	C,D,F*,G*,I*,J*	1449	RAI via ?	Italy	?	B*
720	Langenberg	Germany	200	B*	1449	Redmoss(BBC)	UK	2	C*,G*
720	Lisnagarvey(BBC4)	N Ireland	10	I*	1458	Filake	Albania	500	B*,F*
720	Crystal Palace BBC4	UK	0.75	C,E,G*,J	1467	Monte Carlo(TWR)	Monaco	1000/400	B*,E*,G*,J*
729	Corf(RTF1)	Eire	10	F*	1476	Wien-Bisamberg	Austria	600	B*,G*,I*,J*
729	RNE1 via ?	Spain	?	D,G*,J*	1494	Clermont-Ferrand	France	20	I*,J
738	Paris	France	4	J*	1503	RNE5 via ?	Spain	?	I*
738	Barcelona(RNE1)	Spain	500	B*,G*,I*,J*	1512	Wolvenstem	Belgium	300	G*,H*,I*,J
747	Petric	Bulgaria	500	B*	1521	Kranj (Cratic)	Slovakia	300	B*,G*,J*
747	Flevo(NOS-1)	Holland	400	C,E,F*,G*,J*	1530	Castellan R	Italy	1500	B*,G*,J*
747	Cadiz(RNE5)	Spain	10	I*	1539	Mannfingen(ERF)	Germany	300/300	B*,D*,G*,I*,J
756	Brainschwang(DLF)	Germany	800/200	B*,G*,J*	1548	Maia	Moldova	500	B*
756	Bilbao(EI)	Spain	5	I*,J*	1557	Nice	France	300	B*,C*,D*,I*
765	Sottens	Switzerland	500	B*,F*,G*,I*	1556	Bandar Abbas	Iran	100	B*
774	RNE1 via ?	Spain	?	F*,G*,I*,J*	1575	Genova	Italy	50	C*
783	Leipzig(MDR)	Germany	100	F*,J*	1575	SER via ?	Spain	5	G*,I*
783	Barcelona(COPE)	Spain	50	B*,I*	1584	SER via ?	Spain	2	I*
792	Limoges	France	300	B*,C*,G*,I*,J*	1602	SER via ?	Spain	?	G*,I*
792	Sevillat(SER)	Spain	20	I*	1602	Vitoria(EI)	Spain	10	J*
801	Munich-Morning	Germany	300	B*	1611	Vatican R	Italy	15	B*,D*,G*,I*,J
801	RNE1 via ?	Spain	?	C*,G*,I*					

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

15.340 (Eng 0500-0700) was rated 44433 at 0650 in Herstmonceux. Later, their broadcast to NZ peacekeepers in Bougainville, the Solomon Is and E.Timor on **15.175** (Eng 1100-1300) was rated 22222 at 1112 in Truro & 35433 at 1115 in E.Bristol.

R.Australia has been received in the UK on the following frequencies from Shepparton: **15.240** (Eng to Asia 0000-0900), rated 34333 at 0741 in Oxted, 43323 at 0740 in Seaton & 44334 at 0850 in Stalbridge; **15.415** (Eng to E/SE.Asia 0600-0900), rated 44333 at 0600 in Morpeth, 44433 at 0725 in Herstmonceux & 34333 at 0741 in Oxted.

Also mentioned in the reports were the BBC via Skelton, UK **15.485** (Eng to W/SW.Eur 0700-1600) 54444 at 1145 in Morden & 34333 at 1451 in Oxted; R.Ext.Espana via Noblejas, Spain **15.585** (Sp to Eur 0900-1700?) 55555 at 1146 in Rugby; WWCR Nashville, USA **15.825** (Eng to N.America, Eur 1000?-2200) 55445 at 1340 in Stalbridge & 35444 at 1502 in Northampton; WEWN Vandiver, USA **15.745** (Eng to Eur 1000-1700) 42343 at 1557 in Ebbw Vale; Voice of Greece, Athens **15.630** (Gr to M.East, Eur 1200-1850) 45444 at 1602 in Storrington & 44434 at 1609 in Ebbw Vale.

The occupants of the **13MHz (22m)** band now include the BBC via Cyprus **13.660** (Ar to M.East), rated 34333 at 1112 in Oxted; Vatican R, Italy **13.765** (Eng to Africa 1730-1800) 44444 at 1735 in Morden; All India R. (AIR) via Bangalore **13.620** (Ar to M.East 1730-1945) 45434 at 1810 in Ebbw Vale; R.Nederlands via Flevo **13.700** (Eng to Africa 1830-2025) 43333 at 1830 in Stalbridge; R.Canada Int via Sackville **13.650** (Fr, Eng to Eur, Africa 2000-2159) 32232 at 2100 in Dudley; VOA via Botswana? **13.710** (Eng to Africa 2000?-2200?) 35443 at 2035 in Storrington; R.Australia via Darwin **13.620** (Eng to SE.Asia 2200-0000) 45544 at 2205 in Herstmonceux & 44444 at 2230 by **Bill Griffith** in W.London.

R.Australia has also been reaching the UK in the **11MHz (25m)** band. During the afternoon their transmission to Asia from Shepparton on **11.660** (Eng 1330-1700) was rated 44444 at 1340 in Morpeth, 44334 at 1400 in Stalbridge & 34322 at 1428 in E.Bristol.

Other broadcasters taking advantage of the propagation conditions in this band during the day include BSKSA Riyadh, Saudi Arabia **11.935** (Ar to M.East 0900-1200), rated 24333 at 1004 in Oxted; BBC via Woofferton, UK **12.095** (Eng to Eur 0500-1900) 44444 at 1035 in Oxted; R.Kuwait via Kabd **11.990** (Eng to Eur, N.America 1800-2100) 55444 at 1800 in Ebbw Vale & 45544 at 1830 in Herstmonceux; R.Nederlands via Madagascar **11.655** (Eng to Africa 1730-2025) 54434 at 1820 in Stalbridge, 33323 at 1920 in Truro & 32222 at 2014 in Rugby; All India R. (AIR) via Bangalore **11.620** (Eng to Africa 1745-1945) 42232 at 1900 in Seaton; Israel R, Jerusalem **11.605** (Eng to Eur, N.America 2000-2025) 44444 at 2000 in Dudley; VOIRI Tehran, Iran **11.695** (Eng to S.Africa 1930-2030) 44444 at 2012 in Rugby; VOA via Ascension Is? **11.855** (Eng to W.Africa 2000-2030) SIO 444 at 2014 by **Francis Hearne** in N.Bristol; WWCR Nashville, USA **12.160** (Eng to N.America, Eur 1200-0000) 34444 at 2125 in Herstmonceux & 44333 at 2225 in Morden; Voz Cristiana, Santiago, Chile **11.745** (Port to S.America 2100?-0400?) 54554 at 2300 in W.London.

Good reception from many areas has been evident in the **9MHz (31m)** band. R.Australia's broadcasts have been received in the UK on two frequencies from Shepparton: **9.475** (Eng to Asia 1330-1858), rated 34333 at 1420 in Truro; **9.500** (Eng to Asia 1900-2130), noted as 54444 at 1900 in Stalbridge & 33343 at 1927 in Storrington.

Also mentioned in the reports were DW via Antigua **9.690** (Ger to Oceania 0600?-1000?), rated 44434 at 0703 in Oxted; WTJC Newport NC, USA **9.370** (Eng to N.America 24hrs) 54444 at 0905 in Stalbridge; R.Nederlands via Bonaire, Ned.Antilles **9.790** (Eng to Asia, Far East, Pacific 0930-1130) 35533 at 0937 near Coverack; R.Nederlands via Wertachtal, Germany **9.860** (Eng to Eur 1130-1300) 55555 in Herstmonceux; R.Mediterranee Int [Medi-1], Morocco **9.575** (Ar, Fr to N.Africa, S.Eur 0500-0400) 43444 at 1459 in Oxted; All India R. (AIR) via Bangalore **9.950** (Eng to Eur 1745-1945) 44544 at 1813 in Ebbw Vale;

R.Thailand, Udon Thani **9.535** (Eng to Eur 1900-2000) 44444 at 1930 in Morden; Israel R, Jerusalem **9.435** (Eng to Eur, N.America 2000-2025) 44444 at 2002 in Rugby; VOA via Woofferton, UK **9.760** (Eng to E.Eur, M.East 2100-2200) 35544 in Herstmonceux; R.Canada Int via Sackville **9.770** (Fr, Eng to W.Eur, Africa 2000-2200) 44334 at 2100 in Dudley; R.Cairo, Egypt **9.990** (Eng to Eur 2115-2245) 44344 at 2130 by **Clare Pinder** in Appleby; R.Nederlands via Bonaire, Ned.Antilles **9.845** (Eng to N.America 2330-0525) 33333 at 2330 in Truro; WBCQ Monticello, Maine USA **9.335** (Eng to N.America 2200-0500) 33333 at 0245 in Morpeth.

The **7MHz (41m)** band is used by some broadcasters to reach listeners in Europe. They include All India R. (AIR) via Bangalore **7.410** (Hind, Eng 1745-2230), rated 44334 at 1902 in Rugby; Sudwestfunk via Rohrdorf **7.265** (Ger 24hrs) 44444 at 0759 in Oxted, 35444 at 1355 in Northampton & 54434 at 2028 in Ebbw Vale; R.Slovakia Int. **7.345** (Eng 1930-2000) 54444 at 1949 in Rugby; R.Budapest, Hungary **7.135** (Eng 2000-2030) 44444 at 2000 in Morden; R.Canada Int via Skelton, UK **7.235** (Fr, Eng 2000-2200) 44344 at 2015 in Ebbw Vale & 53443 at 2105 in Herstmonceux; Voice of Greece, Athens **9.475** (Gr 7-2057?) 44333 at 2040 in Truro; Voice of Russia **7.340** (Eng 2100-2200) 43444 at 2100 in Truro & 54444 at 2110 in Stalbridge; World Harvest Radio (WHRI) via Maine, USA **7.580** (Eng 0500-1000, also to M.East) 44343 at 0105 in Morpeth.

The **6MHz (49m)** band carries many broadcasts for listeners in Europe. Those noted in the reports came from Deutschland R, Berlin **6.005** (Ger 24hrs), rated 44344 at 0705 in Oxted & 44423 at 1645 in Seaton; Bayerischer Rundfunk, Germany **6.085** (Ger 24hrs) 54444 at 0751 in Oxted & 45544 at 2150 in Northampton; R.Nederlands via Julich, Germany **6.045** (Eng 1130-1330) 55555 at 1152 in Rugby; R.Slovakia Int. **6.055** (Eng 1930-2000) 33444 at 1948 in Rugby; R.Canada Int via UK? **5.995** (Fr, Eng 2000-2200) 44444 at 2000 in Appleby, SIO 444 at 2024 in N.Bristol & 44334 at 2100 in Dudley; R.Canada Int via Horby, Sweden **5.850** (Eng 2100-2200) 54444 at 2110 in Herstmonceux; R.Prague, Cz.Rep **5.930** (Eng 2100-2127) 43334 at 2125 in Stalbridge; R.Ukraine Int, Kiev **5.905** (Eng 2200-2300) 44444 at 2215 in Morden; R.Yugoslavia, Belgrade **6.100** (Eng 2200-2230) 44444 at 2215 by Ian Pakeman in Folkestone.

Whilst beaming to other areas VOA via Morocco? **6.040** (Eng to N.Africa, M.East 1700-1900) rated 44534 at 1820 in E.Bristol; BBC via Antigua, W.Indies **5.975** (Eng to C/N.America 2200-0500) was 44444 at 0040 in Morpeth.

List of Equipment Used

LM&S for November, #December 2002; *January 2003.

- ## Wane Brinley, Walsingham Spa Roberts R867 or Sangean ATS803A + r.w.
- * Robert Connolly, Killeel, Co Down. JRC NRD-525 + Timewave DS9+ filter + Datong AD370 active antenna.
- ## Bernard Curtis, Stalbridge. Realistic DX-400 + rod or r.w. in loft.
- ## Jim Edwards, Wigan. JRC NRD-535 or Drake RBE + 60m N/S wire attached to guttering on a block of flats.
- ## Ian Evans, Ebbw Vale. Sangean ATS-818 or Eddystone 888A + RF Systems EMF in loft.
- ## Stan Evans, Herstmonceux. Kenwood R-2000 + Balun + 11m wire in loft.
- * Geraint Gill, while near Venice, N.Italy. Grundig Yacht Boy 400.
- * Bill Griffith, W.London. JRC NRD-535 + 25m wire.
- ## Bill Griffith, while in Tarragona, Spain: Sony ICF-SW55 + 15m wire.
- ## Gerald Guest, Dudley. Roberts RC818 + r.w.
- ## David Hall, Morpeth. ADR AR7030 or Ten-Tec RX350 + Global AT-2000 + 13m wire
- ## Francis Hearne, N.Bristol. Sharp WOT370 + r.w.
- ## Simon Hockenhill, E.Bristol. Battery powered Roberts R876 or Bush TR130 + built-in antennas or AKD HF-3 + 4m wire.
- * Simon Hockenhill, while near Coverack, S.Cornwall. Battery powered Roberts R617 + built-in antennas
- ## Robert Hughes, Liverpool. ADR AR7030 + 15m indoor wire or Drake RBE + RF Systems MTA on roof.
- ## Sheila Hughes, Morden. Sony ICF-7600DS + home-built loop or Panasonic DR48 + 16m inverted L
- ## Rhoderick Illman, Oxted. Kenwood R-5000 + r.w. or AN-1, Sony ICF-7600DS
- * Dick Male, Yeovil. Not stated.
- ## Eddie McKeown, Newry. Grundig Yacht Boy 400 or Sangean ATS-818
- * Bob Norman, Chard. Kenwood R-5000 + r.w. in loft
- ## Bob Norman, while in Taunton. Grundig Yacht Boy 400 + r.w.
- * Ian Pakeman, Folkestone. Sangean ATS-818 + 7m wire.
- ## Fred Pallant, Storrington. Trio R-2000 + Howes CTUB a.t.u. + r.w.
- ## Clair Pinder, Appleby. JRC NRD-525 + a.t.u. + r.w.
- * Peter Pollard, Rugby. Sony ICF-2001D + r.w.
- ## Peter Pollard, while in Saalbach & Gossau, Austria. Sony ICF-2001D.
- ## Vic Prier, Seaton, Devon: Fairhaven RD500VX + Datong AD270 active dipole with helical elements erected at 10m above water balcony
- ## Harry Richards, Barton-upon-Humber. Grundig Satellit 700 + AD270 or r.w. or Grundig Yacht Boy 400 in Morden MH4000
- ## David Stevenson, Swansea. Steeplestone MBR-7 or Matsui portable
- ## Ernie Strong, Ramsey, Cambs. AKD HF3 or Yaesu FRG-8800 + a.t.u. + 30m wire.
- ## Thomas Williams, Truro. Grundig Yacht Boy 400 or Gundig Yacht Boy 206 or Sharp R55A + r.w.
- ## Fred Wilmshurst, Northampton. Icom IC-R70 + Global AT-1000 + r.w. in loft.



The SINPO code is used for broadcast station reports, here is an explanation of the code.

Signal Strength	5	excellent
	4	good
	3	fair
	2	poor
	1	barely audible
Interference	5	nil
	4	slight
	3	moderate
	2	severe
	1	extreme
Noise	5	nil
	4	slight
	3	moderate
	2	severe
	1	extreme
Propagation Disturbance	5	nil
	4	slight
	3	moderate
	2	severe
	1	extreme
Overall Merit	5	excellent
	4	good
	3	fair
	2	poor
	1	unusable

AR8200 Mark3 RECEIVER

EVOLUTION PRODUCES THE VERY BEST

Evolution had led to the **NEW AR8200 MK3** and provides excellent full coverage all mode receive including USB, LSB, AM, NFM, WFM with multiple IF bandwidths. Frequency coverage is **530kHz - 3GHz** with minimum acceptable input of 100kHz. Supplied with NiMH rechargeable batteries, charger, car lead, whip aerial, MW aerial and comprehensive illustrated operating manual.



The MK3 changes are in the following areas:

1. As the RF components have been changed, there is a positive performance advantage with sensitivity and strong signal handling increasing on some frequencies.
2. The frequency coverage has been extended to 3GHz.
3. The AR8200 MK3 is supplied with 1500mAh NiMH batteries (in place of NiCads) for extended operation.
4. The LCD illumination may be switched to AUTO so that the illumination will automatically switch-on (for just a few seconds) when the squelch opens, ideal for noting the active frequencies at night time. Many options are available including SLOT CARDS for CTCSS, analogue voice inverting, external memory, recording / playback, tone eliminator, computer interface lead, reaction tune lead, soft case, free PC software from the AOR web site.

£439.00 inc VAT.



AR8600 Mark2 RECEIVER

TRANSPORTABLE RADIO - GO ANYWHERE

The **AR8600 MK2** is an amazingly versatile receiver which can be used mobile, base or trans-portable... powered from an external 12V d.c. power supply, 12V vehicle or from an optional internally fitted NiCad battery pack.



The upper **frequency range has been extended to 3000MHz (3.0GHz)**, lower band sensitivity has been increased (now officially covering to 100kHz) with an **enhancement to short wave performance** by the addition of further bandpass filters and revision to IF filters. Generating enthusiastic reports by the day, just ask any owner. **£719.00 inc VAT.**

★★★★ **AR5000+3** awarded four stars by both the authoritative **Passport To World Band Radio and World Radio & TV Handbook**



AR5000

High performance, top quality build and true wide coverage all mode receive. The "+3" version offers even more with synchronous AM, AFC and Noise Blanker. Popular with government agencies throughout the world. **AR5000c** Frequency coherent version for commercial applications, special order. **Commercial & government operators** have selected the AR5000, AR5000+3 and AR5000c in great numbers over recent years resulting in the model being recognised within their organisations in the same manner as many household brand names & products. For counterintelligence surveillance, the AR5000 (often partnered with the SDU5500) forms the cornerstone of modern day monitoring. System training often revolves around the AR5000 which leads to even wider implementation across departments. Transform **your** hobby to a commercial grade listening post with the AR5000, **the professional choice.**

10kHz - 2600 MHz all mode receive with no gaps, tuning steps from 1Hz, built in TCXO.

AR5000 £1599.00 inc VAT.

Full details may be viewed on the **AOR web site** www.aoruk.com

AOR DIRECT AERIALS

Items in this column are available directly from AOR UK LTD, please place your order using any of the following methods:

- SSL credit card order facility from our web site https://aoruk-com.secureserve.co.uk/c_card.htm
- Phone, fax or post your credit card details
- Post a cheque or postal order (payable to AOR UK LTD)

Items are usually available from stock for immediate despatch, however please allow up to 28 days for delivery dependant upon demand, all delays greater than one week will be notified. Prices include VAT @ 17.5%. **E&OE.**

The **LA350** is a compact active loop aerial specifically designed to provide good reception when away from the main monitoring location or when large external aerials are not practical. **SEE THE DETAILED REVIEW IN THE NOVEMBER 2002 SWM.**

Compact, but achieving high performance, featuring an internal high-gain amplifier (13.5dB) and excellent overall strong signal handling (high IP³ +30dBm).

Very compact being constructed of metal loops and providing a quality finish, still the LA350 remains only half the diameter of other well known loop aerials.

Supplied with two loops, 3.0 - 9.0 & 9.0 - 30MHz **£199.00 carriage £5.00**

- **350L** Optional element 0.2 - 0.54 MHz for LA350, **£49.00**
- **350M** Optional element 0.54 - 1.6 MHz for LA350, **£49.00**

Carriage on optional elements £2.50 if ordered separately

DA3000 16 element discone aerial. Usable coverage is 25 MHz to 2,000 MHz (2GHz). Supplied with 15m of coaxial cable and terminated in a BNC plug. **£69.00 carriage £5.00**

SA7000 Twin element 'passive' ultra wide band receive aerial 30 kHz to 2,000 MHz (2 GHz). Supplied with 15m of coaxial cable and terminated in a BNC plug. **£99.00 carriage £5.00**

The **WL500** is a **new product**, the name is derived from its application of short wave **Window Loop.**

Following on from the success of the LA350 loop aerial (see above), the WL500 provides a **solution to those operators who need a good compact aerial for travelling around.** The loop is constructed of flexible cable braced by a centre pole which splits in to two sections so that it can be easily stored away. When setup, the loop forms a diamond shape with an approximate diameter of 60cm. The loop covers 3.5 to 30MHz with a range switch mounted at the termination point of the loop (switching at 10MHz). A length of screened cable is supplied which is terminated in PHONO plugs to connect the loop to the control box. The control unit provides preselection and amplification terminated in a BNC socket for connection to the receiver. Excellent strong signal characteristics are achieved, typically 16dB gain with an IP³ of +14.5dBm. The control unit can be powered from an internal 9V PP3 battery (current consumption is around 16mA), alternatively external 12V DC may be used (PSU applied). While the WL500 will operate below 3.5MHz, performance on the lower bands can be enhanced by the addition of the **optional 500LM bar element.** The bar has a selector switch for LW or MW operation and connects to the control box in place of the short wave loop.

WL500 £149.00 carriage £5.00.

500LM £49.00 carriage £2.50 extra if ordered separately.

AOR (UK) LTD 4E East Mill, Bridgefoot, Belper, Derbyshire, DE56 2UA England



Tel: 01773 880788 Fax: 01773 880780

info@aoruk.com www.aoruk.com **E&OE**

■ Martin Peters, c/o SWM EDITORIAL OFFICES, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW.

■ E-MAIL: martin.peters@pwpublishing.ltd.uk

Bandscan Europe

It's not often I can report on the re-launch of an external short wave service. However, Belgrade-based Radio Yugoslavia has done just that with their recent resumption of broadcasts to overseas listeners. Having no suitable facilities of its own, Serbia has signed a deal whereby programmes are radiated from neighbouring Bosnia's short wave transmitter site at Bijeljina.

Radio Yugoslavia's broadcasts to Europe:

UTC	MHz
0100-0130	7.115 (not Sunday)
0200-0230	7.130
1930-2000	6.100
2200-2230	6.100

Radio Yugoslavia continues to broadcast news on-demand over the Internet. Click on www.pwpublishing.ltd.uk/swm/bandscan for a link to this and other sites of relevance to this month's piece.

Now On Air

Talking of launches - but on a smaller scale - our very own Reading 107fm took to the air October 22nd. Despite running only 100W, the station enjoys a considerable coverage area thanks to the high elevation antenna site, just west of the town.

The transmitter has already been stolen once, a few weeks ahead of the on-air date. Another attempt was made to steal the replacement just hours before launch. No doubt the liberated equipment will be gracing the airwaves of some inner city before long.

RSL For Reading

The Independent Television Commission (ITC) has invited applications for a local television Restricted Service Licence (RSL) for Reading. The service will broadcast on channel 62 and should be received by up to 100,000 viewers.

TV RSLs are generally awarded for a term of four years, but are subject to the continuing availability of the channel. Applications must be lodged with the ITC mid-January with the award expected by the end of March.

Liberty To Close

In London, Liberty 963/972kHz is to close down in July. The licence for the Greater London area was re-advertised and Liberty lost out to Club Asia, who made a compelling case for the provision of a format designed to appeal to the young Asian population who it demonstrated were currently an under-served group in the capital. The station already broadcasts over Sky - channel 895. Get your Liberty QSLs and car stickers while you can.

New Package

Up at the BBC, things are moving apace on a number of fronts. Freeview, the new free-to-air digital terrestrial TV package, was launched on October 30th and is being heavily trailed on BBC1 with assistance from the fabulous rubber face-mask promo.

There are around 22 TV and eight radio channels on offer. The line-up includes BBC7 - a speech-based radio channel embracing comedy, drama and a kid's zone. BBC7 was set to launch December 15.

BBC Choice is to disappear with BBC Three being slated for launch early in the year. The channel is targeting 25 to 34 year olds with a mix of entertainment, news, current affairs and education. Around 80% of airtime will be devoted to programmes especially commissioned for the channel and almost all programming will originate in the UK.

So it looks as if digital broadcasting may finally gain the upper hand with UK audiences. Digital cable and satellite are well established with DAB radio and digital terrestrial TV about to enter the main-stream arena.

Digital Introduction

Our next leap of faith is earmarked for the looming introduction of digital long, medium and short wave transmissions. Digital Radio Mondiale (DRM) are the consortium that devised the transmission standard and are largely responsible for its promotion to consumers, who may well be suffering from digital fatigue. For an in-depth look at DRM just refer to the excellent article in the July 2002 issue of SWM.

Test transmissions have been extremely encouraging and now, if you want to join in with the experiment, you can. The hardware you require includes a good communications receiver with access to the intermediate frequency (i.f.) chain, and a computer with sound card. You'll also need an adapter which converts the receiver's i.f. to 12kHz, a frequency within the capabilities of the sound card.

Finally, you want appropriate decoding software - available from DRM at a cost of around £40. Now, call me a cheapskate, but if I were pioneering a new transmission system and seeking out committed volunteers to dig inside their radios and give up their time to take part and report on tests, I would be giving the software away. Perhaps there are other issues at work here. Go to the DRM web site if you want to register.

Prototype Receiver

At the recent International Broadcasting Convention in Amsterdam, DRM unveiled a prototype receiver and announced their intention to produce a mass-market receiver some time in 2004.

Incidentally, one consequence of entering the digital age, is that we'll soon become a tapeless society, too. The humble compact cassette, still with us after over 30 years, is set to be replaced either by MiniDisc, or, more likely, rewritable CDs. As for VCRs, these can be had for under £50 as DVD recorders wait in the wings for their day to come. In under five years it will be almost impossible to buy video recorders and that the silver disc will reign supreme.

National Anthem

Many European radio stations - including our very own Radio 4 - broadcast a national anthem each day at sign on (or sign off) and this is a useful clue as to where an unidentified station may be based. Trouble is, most anthems are as bland as one another and not necessarily easy to distinguish.

thenationalanthems.net allows you to call up almost every national anthem on the planet by continent and country to compare with your mystery station. If you want stirring stuff, click on select the Russian anthem, pour yourself a vodka and enjoy.

Online Listening

The future of online listening looks a little more secure following a new European ruling on royalty fees for webcasters. At present, stations that also broadcast over the web have to pay a separate copyright fee, a cost that has forced a number of web broadcasts to cease.

Now, instead of merely licensing music for broadcast in their own country, music rights' societies will be able to licence for distribution across the EU at competitive rates. This will enable radio and TV broadcasters to shop around for the best rates in Europe. Good.

Elsewhere, there's a spat between the UK public broadcasters and Sky over the cost of carriage on the satellite. The BBC, ITV and Channel 4 are obliged to make themselves available on all platforms and want a cheaper, at-cost deal. Sky disagrees and will refuse to give them special treatment.

How times change. It was only a year ago that Sky was allegedly begging ITV to come on board as a 'clinger' to encourage wavering subscribers. ITV held out, as it's inclusion on Sky would sound the death knell for ITV digital. Yep! ITV finally agreed following poor viewing figures demonstrated that audiences were buying into Sky anyway.

The UK's new Communications Bill looks set to back Sky's case. The BBC's Greg Dyke has threatened to pull the channels off as the Corporation is concerned at the possibility of substantial price-hikes next year.



Happy Xmas

Talking of next year, you'll probably be reading this around Christmas time. Let me take this opportunity of wishing you a healthy, happy and peaceful year ahead.

MPL32 Log Periodic

★ Freq: 100-1300MHz Tx & Rx
★ Gain: 11-13dB
★ Length: 1.40mtr **£99.95**
★ Conn: N-type

MPL62 Log Periodic

★ Freq: 50-1300MHz Tx & Rx
★ Gain: 10-12dB
★ Length: 3.00mtr **£169.95**
★ Conn: N-type

The ultimate receiving antenna - a must for the dedicated listener

ROTATOR

Suitable for MLP Log Periodic or any UHF/VHF beams.

£49.95 + £6.00 P&P

BRACKETS

6" Stand off£6.00
9" Stand off£9.00
12" T&K (pair)£11.95
18" T&K (pair)£17.95
24" T&K (pair)19.95
36" T&K (pair)£29.95

MD37 SKY WIRE (LONG WIRE BALUN KIT)

25 METRES OF ENAMELLED WIRE
INCLUDES 10M PATCH LEAD & INSULATOR For use on with receiver 0-40MHz. All made no ATU required 2 "S" points greater signal than other baluns. Matches any long wire to 50Ω improved reception.



£39.95

MWA HF Wire Antenna Mk I

Freq 0.05MHz-40MHz Adjustable comes with 25 metres of H/Grade flexweave antenna wire, 10 metres of military spec RG58 coax cable feeder, insulated guy rope, dog bone & choke balun. All Mods No A.T.U. required. Super Duper Short Wave Antenna.



NEW LOW PRICE £49.95

SUPER SCAN STICK

Freq. Range 0-2000MHz
Length 1000mm.
It will receive all frequencies at all levels unlike a mono band antenna. It has 4 capacitor loaded coils inside the vertical element to give maximum sensitivity to even the weakest of signals. (Ideal for the New Beginner and the Experienced Listener alike).

£29.95

SUPER SCAN STICK II

Freq. Range: 0-2000 Mhz.
Length 1500mm.
This is designed for external use. It will receive all frequencies. at all levels unlike a mono band antenna. It has 8 capacitor loaded coils inside the vertical element to give maximum sensitivity to even the weakest of signals plus there is an extra 3db gain over the standard super scan stick. (For the expert who wants that extra sensitivity).

£39.95

5' SWAGED POLES

Heavy Duty All (1.2mm wall)
SINGLE 1 1/4"£7.00
SINGLE 1 1/2"£10.00
SET OF FOUR 1 1/4"£24.95
SET OF FOUR 1 1/2"£34.95
SINGLE 2"£15.00
SET OF FOUR 2"£49.95

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PL259/6£0.75 each
PL259/7 for mini 8£1.00 each
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BNC (Solder Type)£1.00 each
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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
RG58 6mm mil spec£0.60 per mtr
RF mini 8 7mm mil spec£0.85 per mtr
RG213 9mm mil spec£0.85 per mtr
RM200 9mm mil spec£1.10 per mtr
(Phone for 100 mtr discount price)

XI HF Vertical

★ Freq.: 1.0-50MHz
★ Type: Loaded
★ Height: 2.05mtrs
★ Conn: SO239



£49.95

UK SCANNING DIRECTORY

8th edition

£19.50

Wideband 25-1800MHz SuperGainer Rubber Duck Antennas

MRW-100 40cm long BNC£19.95
MRW-250 14-41cm long telescopic BNC£19.95
MRW-210 37cm long SMA£24.95 (ideal for Icom IC-R2)

Increase the performance of your hand-held, without an external antenna.

EXWM-1 Window clip mount

★ BNC socket ★ 2.5mtrs mini coax with BNC plug ★ Black finish Suitable for any BNC hand-held antennas! **£13.95**



(ADAPTERS FOR OTHER FITTINGS AVAILABLE)

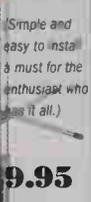
MRP-2000

(Preamplifier) Freq Range 25-2000 Mhz 9-15v input (Battery not included) 14 db Gain. Complete with lead and BNC connectors. **£49.95**



WEATHER SATELLITE ANTENNA

TURNSTILE 137 (Simple and easy to install a must for the enthusiast who does it all.)
Freq. 137.5 MHz
Length 1000mm
This Antenna is designed for external use to receive weather satellite signals. Complete with mounting hardware. **£39.95**



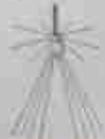
SUPER DISCONE

Freq. Range 25-2000MHz Length 1380mm
Internal or External use (A Tri-Plane Antenna). The angle of the ground planes are specially designed to give maximum receiving performance within the discone design. The Super Discone gives up to 3Db Gain over a standard conventional discone. Comes complete with mounting hardware and brackets. (Ideal for the Experienced Enthusiast). **£39.95**



HF DISCONE

Freq. Range 0.05-2000MHz Length 1840mm
Internal or External use (A Tri-Plane Antenna). Same as the Super Discone but with enhanced HF capabilities, comes complete with mounting hardware and brackets. (Ideal for the Short Wave HF Listener). **£49.95**



MTS42 MOBILE MICRO MAG

Freq. Range 25-2.1 GHz
Length 225 mm

£24.95



TRI SCAN III

Freq. Range 25-2000MHz Length 720mm
Desk Top Antenna for indoor use with triple vertical loaded coils. The tri-pod legs are helically wound so as to give it its own unique ground plane. Complete with 5mts of low loss coax and BNC plug. (Ideal for Desk Top Use). **£39.95**

£39.95

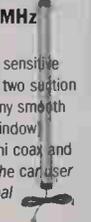
SWP 2000

Freq. 25-2000 MHz. Length 515mm. Multiband good sensitivity for its small size. Fitted with two suction cups for ease of fitting to any smooth surface (i.e. inside of car window) comes with 5 metres of mini coax and BNC connector. (Good for the car user who doesn't want an external antenna). **£29.95**



SWP HF30

Freq. Range 0.05-30MHz Length 770mm
Although small, surprisingly sensitive for the H.F. user. Fitted with two suction cups for ease of fitting to any smooth surface (i.e. inside of car window) comes with 5 metres of mini coax and BNC connector. (Good for the car user who doesn't want an external antenna). **£39.95**



ROYAL DISCONE 2000

(Stainless Steel) Freq. Range Receive 25-2000MHz Transmit 50-52MHz 144-146MHz 430-440MHz 900-986MHz 1240-1325MHz Length 1540mm Connector-N TYPE The Ultimate Discone Design. 4.5DB GAIN OVER STANDARD DISCONE! Highly sensitive, with an amazing range of transmitting frequencies, comes complete with mounting hardware & brackets (The Best There is). **£49.95**



G. SCAN II

Freq. Range 25-2000 MHz.Length 620 mm.
Magnetic mount Mobile Scanner Antenna. 2 vertical loaded coils for good sensitivity complete with magnetic mount and 4mts of coax, terminated with BNC plug. (Good for when you are driving about). **£24.95**



ADD £6 P&P PER ORDER



Roberts C9950

Kevin Nice has had the new multi-event dual speed cassette employed in his radio room since last month. Here is what he thinks.

What would we do without digital docks, mobile telephones, microwave ovens? What would we do without video recorders and what would we do without voice operated tape recorders with 6 event timers? This is the question you end up asking yourself once you've used the Roberts C9950 around the shack and it's similarity to a video recorder is uncanny.

"At last a cassette recorder with a VCR style timer - Just what we need for recording around the shack", says Kevin Nice.

The C9950 is a portable cassette recorder that is ideal as a recording workhorse around the shack. It's not as flexible, particularly when it comes to rapid access to recordings, as say using a sound card based solution using *Recall* or similar. Nor does it have a time/date stamp facility. Then again it's much more portable than the computer based system and it's unlikely to crash in the middle of a vital recording.

The C9950 isn't quite so portable or as small as say a MiniDisc recorder, nor is it as expensive. The media is cheaper too! I reckon it takes a lot to beat having a cassette recorder permanently wired in to the shack's audio.

Cassette Recorder

My Experience

I normally have a stereo cassette deck connected to the output of a cheap mixer which I picked up at a rally some years ago - it cost very little indeed. The mixer allows me to have several receivers connected to the tape recorder at once, it's possible the utilise left to right faders on the mixer to place mono output of different receivers on either of the stereo channels, therefore maximising the use of tape.

The C9950 simply plugged into my current arrangement and immediately offer the three additional benefits.

The most useful has to be the level activation system which has three levels of sensitivity. It can be tricky to set, though I found once I'd got the level correct, it was very responsive. This kind of operation is terrific, for monitoring channels such as civil air traffic control where there can be huge chunks of silence.

You can simply set the radio on frequency, press the record 'piano keys' on the C9950, select voice activation and the appropriate level and leave things running. With a C90 running the recorder at quarter speed, gives you three whole hours of recording time.

On a channel with little activity you can effectively leave it to get on auto monitoring while you do something more meaningful. I left the system running for several hours and upon my return was treated to a continuous stream of audio lasting a few minutes - just the job.

It is worth bearing in mind that the 'VOX' works best on strong a.m. and f.m. signals due

to the arrival of the unmodulated carrier prior any voice traffic activating the switching circuitry in the C9950. Weak signals don't work quite so well.

In these circumstance you have to rely on the long duration recording characteristics alone. Although, if you wish to monitor between certain times, then the C9950's exceptional timer capabilities come to the fore.

Lastly the C9950 can be powered by four C-cells, which provides a healthy away from base battery life. For use back in the shack there's a 6V p.s.u. that comes supplied with the recorder.

What Time?

Roberts have equipped the C9950 with a six event timer which has identical features to those of your average VCR. I'm amazed that no-one's done this before, but then perhaps it's a

little too specialised for the mainstream user. The requirements of we s.w.l.s are rather esoteric.

Once you've

let the C9950 know the time of day and the day of the week, you're ready to utilise its built-in six event timer. Gone are those long nights waiting for that elusive DX broadcast station, you can now 'time-shift' your listening and enjoy a good night's sleep! It is also possible to utilise the external activation 3.5mm jack to trigger the operation of the C9950 by an external device. There is a lead supplied with the C9950 for this very purpose, so are there for 'line in' and 'line out' signals.

Fine Solution

I would certainly give the C9950 shelf space in my shack, in fact I can foresee that it would spend



much of its time on the move too. With the C9950 you get the ideal combination for use in and around the shack. As I've already mentioned, there are other possible solution to the role fulfilled by the C9950. In my opinion though, none of them are as flexible and conveniently packaged as the Roberts recorder. For £80 it has to be worth it. It will certainly enhance your listening experience.

Many thanks to Roberts Radio, for the donation of the review C9950 at a prize for last month's SWM competition.

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The Future of Radio

From the makers of the multi-award-winning, groundbreaking digital hi-fi tuner of 2001 comes PURE EVOKE 1, an affordable portable digital radio that can be enjoyed by everyone. EVOKE 1 is a stylish new design, will read stereo and mono, listen, remember, and it has been the very latest in the generation of DAB digital radio technology, giving you the best of both worlds and a new DAB receiver in an affordable price.

EVOKE 1 features a digital display showing the scanning track, time, station, format and programme details, and is controlled by touch-sensitive keys. Being a DAB digital radio, it provides an explosion of choice, with a wide variety of stations to suit every time and mood.

The digital tuner power of EVOKE 1 is the perfect addition to any home or office, delivering amazing high fidelity digital audio, could without the hassles, break-up and loss of AM broadcasts.

Transform your radio listening with EVOKE 1.

Includes AC adapter.
Optional extension speaker (stereo) £29.99.

Technology

Using the latest computerised DSP technology, EVOKE 1 delivers outstanding digital sound quality with the latest DAB features and benefits at an affordable price.

Quality

Ensuring reliability is essential to design with its built-in automatic radio error using advanced memory and multi-spectrum scan techniques.

Performance

EVOKE 1 transforms your radio listening experience with three stations, stereo sound and more of the best digital and analogue signals.

NOW IN STOCK
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AR-8200 SERIES-3

Never before has one hand portable offered so much. ★ Covers 100kHz-3GHz (all mode) ★ Computer control capability ★ 8.33kHz steps for the new airband spacing ★ Reaction tune capability ★ Includes nicads charger antenna and car lead.

OUR PRICE **£385.00**

Optional case £19.99
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ALINCO X-2000

The intelligent scanner! 100kHz-2.15GHz. All mode incl's SSB, "Flash Tune" reads frequency of nearby signal & tunes the handle for you. Incl's battery, charger & loads more.

Includes 8.33kHz spacing **£449.95**

Optional case £15.00
Optional battery box £14.99
Cigar lead £19.99
PC interface £42.95



MVT-7100EU

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

OUR PRICE **£199.95**

Soft case for 7100EU 9000 - specify £19.99
MVT-9000 MkII Sale price £325.00
MVT-7300EU Sale price £219.00



ALINCO DJ-X10

Full-featured handy. 100kHz-2GHz all mode. Includes SSB/CW band scope, alphanumeric display plus loads more. (Includes battery drop-in charger).

OUR PRICE **£269.95**

Optional case £15.00
Optional battery box £14.99
Cigar lead £19.99
PC interface £42.95



NEW ICOM IC-R5

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

NOW IN STOCK **£159.00**
P&P £10.00

BATTERIES AND CHARGER INCLUDED



ALINCO DJ-X3

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Superb wideband receiver (all mode) with over 50,000 memories capable of holding text. 20kHz-1750MHz.

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NEW EUROPEAN VERSION

New comprehensive scanner (25-1300MHz) Alpha Tag, PC planning control. Smart scanner + trunk track facility. Includes PSU.

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The ideal holiday partner!
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A superb performance portable base synthesized world receiver with true SSB and 40Hz tuning for ultra clean reception. The same radio is sold under the

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Superb BNC in-line amplifier to boost signals! Fits on top of your scanner and away you go. (Powered by PP-3 battery - not supplied).

Freq: 24MHz-2.1GHz.
Gain: -10dB to +20dB.

SUPERB QUALITY

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A brilliant new compact indoor antenna that covers 0.1-3GHz and is just 24" when collapsed. Features "horizontal or vertical" adjustable elements. Ideal for table top mounting or by the window. Patch lead with BNC plug fitted. (frequency range: 0.1-3GHz).

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NEW 8th EDITION THE UK SCANNING DIRECTORY

Britain's best selling scanner book now larger than ever. Nearly 700 pages packed full of frequencies from 25MHz-1.8GHz.

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● Supplied with one remote (wireless) sensor ● Weather forecast ● Barometer ● 24 hr "radio" clock ● Thermometer

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"BNC" 21cm flexible whip that is ideal as replacement. (Rx:- 25MHz-2GHz) (Tx:- 2m 70cms).

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● 12 24hr alarm function
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£14.99 + £3.00 P&P.

Extra cells available @ 8 x AA pack £10.99 £1 P&P. 4 x AA pack £5.99 £1 P&P. 4 x AAA £6.25 £1 P&P. Rechargeable Alkaline. No memory effects. 1.5V cells. 3 x capacity of nicads.

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BNC-BNC (short patch lead)£6.99
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A fully adjustable desk top stand for use with all hand-helds. Fitted coaxial lead with BNC + SO239 connections.

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Two way combiner. one antenna feeds two scanners (without mismatch). 10-2500MHz. High isolation (BNC sockets).

Can be used in reverse **£59.95** P&P £3.50

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Very high quality combiner allows two short wave receivers to be connected to one antenna without interaction. 50kHz-30MHz (SO-239 fitting).

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Broadband amplifier for short wave, medium & long

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Q-TEK PL-25

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DPX-30 ANTENNA DUPLEXER/COMBINER

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Can be used in reverse

Ant A (0-30MHz) } To receiver low
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Deluxe SW ATU
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ONLY **£89.00**

(Probably the best ATU around) P&P £5
PATCH LEADS AVAILABLE IF REQUIRED.
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The MLB contains a special impedance matching transformer which converts any piece of wire between 6 and 20 metres long into a wide band receiving antenna. 100kHz-40MHz. Low noise - probably the best there is!

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A low cost, superb passive broadband (500kHz-30MHz) antenna useable down to 150kHz. Ideal for indoor or outdoor use and at only 4mtrs long you will certainly find the space! Using magnetic transfer technology, interference & noise is minimised. Ready assembled + PL-259 coas.

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(Airband base)

Prof quality base antenna for AIRBAND. (Civil & military). With SO-239 fitting (1.7m long). Gain 4.5 7dB.

PROFESSIONAL QUALITY **£79.95** P&P £10.00

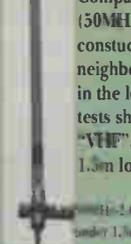
AIR-44N As above "N-type" fitting.....£84.95

AIR-25 (As above) 1m long. Gain 2.5dB.

£49.95 P&P £3.00

Q-TEK 55-2000

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Compact - indoor outdoor scanning antenna. (50MHz-2.6GHz). Superb glass fibre construction. Ideal in areas affected by "nosey neighbour syndrome". This antenna can be put in the loft or outside on the building. Initial tests show this to far outperform a disccone at "VHF". SO-239 socket (PL-259 plug needed) 1.3m long (mast clamps supplied).

£49.95 DEL £10.00

Q-TEK WIRE CYCLOPSE



A unique ready to go antenna system that works from 0.5-30MHz. The antenna is centre fed with coax (not supplied) and incorporates six tuned coils for optimum reception. The system also incorporates an anti-interference balun and comes ready assembled for immediate use. At only 15.5mtrs (51ft) long it will certainly fit most gardens. (Mounts horizontally down garden). Fitting PL-259 (not supplied).

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THE VERTICAL CYCLOPSE

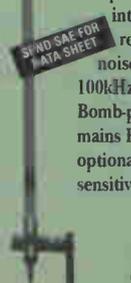


This new short wave listeners antenna was initially made specifically for one of our commercial customers but we felt the general public would find it of great interest. At only just over 7 feet high this vertical short wave receiving antenna will give amazing results from 0.2-30MHz and thanks to its commercial construction you simply erect it and away you go. Length 7'6". Fitting PL-259 (not supplied).

£79.95 P&P £10.00

DX-10 (R.F. SYSTEMS)

SEND SAE FOR DATA SHEET



A superb quality active antenna with a very high intercept point ideal for weak signal reception without increases in radiated noise. A truly amazing antenna! Freq: 100kHz-30MHz. Bomb-proof over loading figures, 90cm long, mains PSU + controller supplied (coax optional). Atmospheric-noise compensated sensitivity.

£169.95 DEL £10.00

DX-1 PRO (R.F. SYSTEMS)

SEND SAE FOR DATA SHEET



This is a professional wide band receiving antenna with a very high intercept point that ensures a low noise level allowing even the weakest signals to be heard. Constructed of high-impact plastic and aluminium alloy - the amplifier is protected inside a waterproof stainless steel vessel. The unit is supplied complete with mounting hardware and an indoor controller with PSU (coax not supplied). Freq. 20kHz-54MHz. Gain: +6dB (ref dipole). Intercept points: >+75dBm (2nd ord), >+50dBm (3rd ord). (Static protection included). For the true professional.

£329.95 DEL £15.00

Q-TEK D.C. 2000 DISCONE

SIMPLY THE BEST

0.2-2000MHZ

A high performance wideband disccone offering superb performance from 0.2-2000MHz. Transmitt range: 6m, 2m, 70cm, 32cm & 23cm (power handling 200W). Fitted with low loss 'N' type socket. Supplied with mounting brackets. (N-plug & coax not supplied).

OUR PRICE **£54.95**

P&P £10.00

Comments from John Griffiths
Putting the DC-2000 up gave me a tremendous boost to all signals with the ancient AR-2000 coming alive! Signals were well received and I found that I wandered out of airband.

ROYAL DISCONE

0.2-2000MHZ



(Stainless steel)
Frequency range: receives 0.2-2000MHz, transmit 6 2 70 23cm, connector N type. High sensitivity with an amazing range of transmitting frequencies. Comes complete with mounting hardware & brackets. (N-plug & coax not supplied).

OUR PRICE **£44.95**

P&P £10.00

NEW Q-TEK INTREPID 2000



An amazing vertical (glass fibre) colinear antenna. Quality construction with incredible performance. For the serious scanner enthusiast.
Freq range: 0.5-2GHz. PL-259 fitting (not supplied). Length 3m. Mast clamps supplied. (Gain up to 9dB is easily obtained). SO-239 fitting. Requires PL-259 plug (not supplied).

ONLY **£89.95** P&P £10.00

DXTV

and

FM

Special

Keith Hamer & Garry Smith welcome you to the fascinating world of long-distance TV & f.m. reception!

Ever since public broadcasting by wireless was inaugurated by the BBC some 80 years ago on November 14th 1922 from the 2LO Station, atmospheric conditions have played a key role in the behaviour and predictability of radio-wave reception. Over the years, propagation effects have had to be taken into account for broadcasters to be able to provide interference-free reception of domestic radio and TV stations.

For reception under normal conditions, engineers have gone to great lengths to ensure that transmitters sharing the same frequency are spaced geographically as far apart as possible in order to reduce the incidence of co-channel interference. When

atmospherics have the upper hand, reception can be degraded, causing annoyance to the viewer or listener. Even under 'quiet' conditions interference is inevitable, particularly if the receiving site is located beyond the fringes of both service areas.

Atmospheric anomalies are not always a disadvantage, and their effects are sometimes harnessed to enable communication to take place over vast distances. This is great news for the keen experimenter, or DXer, who has built up a fascinating hobby exploiting such anomalies and deriving pleasure from receiving signals which are not normally available.

It is well known that amateur radio enthusiasts revel in these anomalies, but perhaps not so well appreciated is that

TV signals are also influenced, unless of course you follow the monthly 'DX Television' column in *Short Wave Magazine*! So how do the signals arrive at distance locations and how can the enthusiast predict with some certainty when the conditions are right?

Tropospheric Enhancement

Weather conditions play an enormous part and it is commonly known that settled weather conditions (anti-cyclonic periods) associated with high-pressure tend to enhance semi-local stations and 'draw in' distant signals which are not usually present. This type of enhanced reception is called a 'tropospheric lift', or 'opening'. Its impact is more marked on the f.m. band, Band III (Hi-band

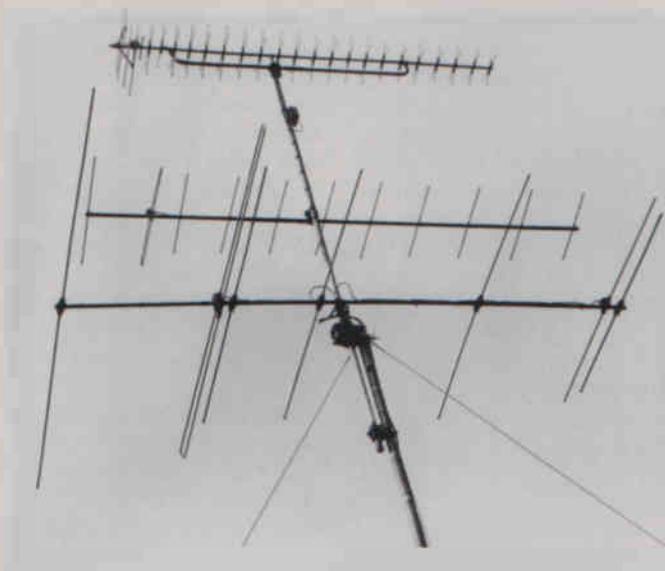


Fig. 1: High-gain rotatable antennas for Bands I, II, III and u.h.f.

mid-morning. Stations from semi-local to those located up to 800km are usually received.

When To Look And Listen

An opening is less obvious these days as the f.m. band is already overcrowded with even more local, RSL and community radio stations. Even the u.h.f. TV band in the UK is filled to capacity, particularly now that each main transmitter has gobbled up six additional channels thanks to the digital multiplexes.

Many years ago the advice would be to observe otherwise blank u.h.f. channels for signs of TV pictures emerging. These days a snowy channel might be occupied by a local digital multiplex, which looks invisible to the untrained eye. The digital signal, which resembles 'snow', blocks out analogue transmissions attempting to break through.

Nowadays it may be best to check semi-local analogue stations for signs of improving signal-strength. Digital transmissions can play havoc with analogue services sharing the same channel, resulting in a degraded and snowy picture not unlike a weak signal.

Enthusiasts living on the east and south coasts will probably have the most luck with this type of reception as antennas will usually be directed away from digital pollution. Enthusiasts living in the centre

of the UK will have less chance of receiving Continental TV these days as channels will be blocked by surrounding transmitters.

Don't think escaping to the hills will provide an ideal remedy and bring in lots of distant signals - the whole of the band is likely to be jammed by a variety of analogue and digital channels from local and semi-local sources!

RF Survival

So just how does the DXer survive these days? Well, there is one band that is of particular interest to the TV DXer and that is Band I (Lo-band v.h.f.), abandoned by BBC-1 405 lines on January 3rd, 1985. Different types of propagation affect this band which spans 40-70MHz and as a result BBC-1 was

and September. Layers some 75km above the surface of the Earth become highly energised and are able to reflect (or more correctly refract) signals back to Earth, which would normally continue into space. Reflection, or skip, distances are in the order of 1,100km, although reception can sometimes span almost double that distance.

The ionised layers are unstable in movement and in density, therefore making the path between the transmitter and receiving site volatile and unpredictable. Distant signals received by such propagation are random in duration, distance, direction, quality and intensity. Sporadic-E reception is the ideal recipe for keeping the DXer on their guard as the most unpredictable of events can occur with stations, previously thought impossible to receive,

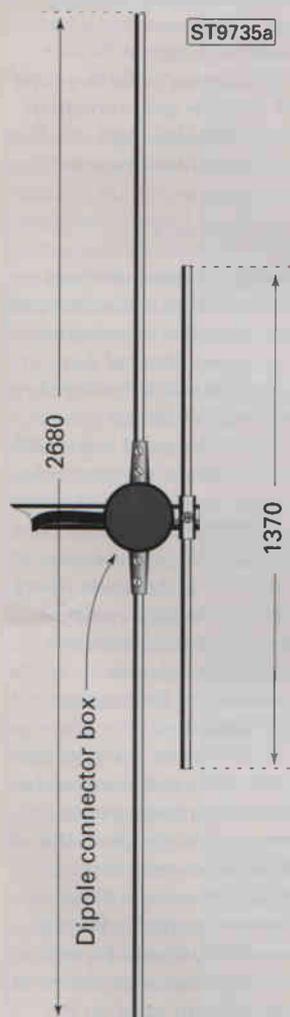


Fig. 2: A wideband dipole covering 48-110MHz, which is ideal for Band I and f.m. DXing. The dipole should be mounted horizontally as most transmitters use horizontal polarisation.

v.h.f.) and at u.h.f. (470-850MHz). Reception times tend to be early evening through to



Fig. 3: A chimney-mounted system featuring a wideband grid for u.h.f. DX-ing and an eight-element v.h.f. array for Bands I, II and III.

always plagued by 'Continental Interference' throughout the summer.

Band I is not particularly favoured by broadcasters because of the havoc atmospheric disturbances cause to transmissions. This is good news for the DXer, as long as other countries do not abandon it.

Sporadic-E

The summertime disruption referred to is caused by Sporadic-E activity, which presents itself between May

slowly emerging on the screen.

Sporadic-E often affects the f.m. band, occasionally venturing into the amateur 2m band at 144MHz and on rare occasions Band III. This form of propagation is highly recommended for beginners and it can be very addictive!!

F2-Layer

Another type of propagation that affects TV channels at the lower end of Band I (up to approximately 50MHz) is F2. Unlike Sporadic-E, which is an annual phenomenon, F2 occurs

roughly every 11 years in response to the Sun's solar cycle. Reception is at its best during the winter months between mid-October and mid-March. Reception distances are vast, usually spanning several thousand kilometres due to the higher altitudes of the ionised layers.

F2 reception between October 2001 and March 2002 was virtually a daily event with exceptionally strong signals from the Middle East and Far East and occasionally from Australasia. Severe multi-path distortion impedes traditional visual identification, but using a scanner to measure the exact vision carrier frequency is an ideal solution, once a reliable list of frequencies of identified stations has been obtained.

The highest solar ionisation density occurs around noon, so this is the time that the reflective layers need to be roughly between the transmitter and the receiving site. The best viewing times are mornings between 0800 and 1200 to receive stations from the east. Generally speaking, stations in the Far East tend to be received earlier than those transmitters located in the Middle East.

The 6m (50MHz) band is usually a good indicator as to where reception paths lie. African stations operating around 48.250MHz are few and far between, so while reception paths may

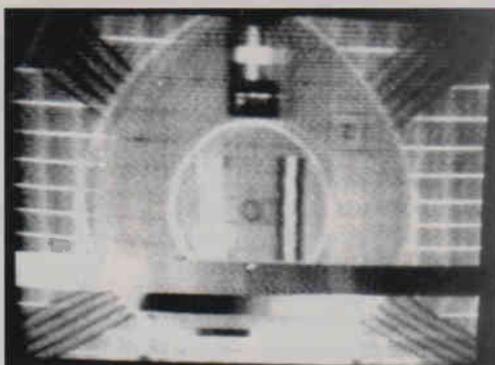


Fig. 4: The Swiss +PTT test card received in 1970, with a strip of colour bars superimposed when the colour service was introduced.



Fig. 5: The Finnish Test Card "G" received from YLE on an indoor dipole in 1971. The TV-2 Channel E2 is now defunct.

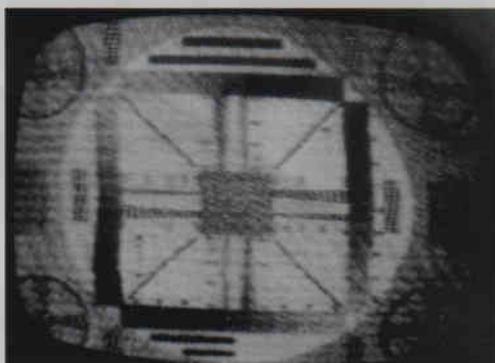


Fig. 6: In 1969, both Hungary and Poland used the RETMA 1956 Resolution Chart. Needless to say, identification was very difficult.



Fig. 7: The German studio caption from ARD photographed on June 12th 1970 during a tropospheric opening. The signal was received on an indoor dipole from the WDR Langenburg transmitter which operates on Channel E9.

frequently exist into Africa, it is often the case that TV signals are absent.

Transmissions from the west tend to be received in the afternoon. Unfortunately, TV stations in the USA and Canada are seldom received because the lowest TV vision carrier is 55.25MHz and often the m.u.f. (maximum useable frequency) only reaches around 50MHz.

TEP (Trans-Equatorial Propagation)

This generally occurs within 40° of the Equator and can affect all v.h.f. frequencies. Within the past couple of years, strong signals from Europe and the Middle East have ventured regularly into South Africa. TEP in Europe is rare, although in the Eighties, Zimbabwe was frequently received in the UK, assisted by Sporadic-E propagation.

Meteor-Shower

Ionised trails occur at various peak activity times throughout the year. Reception is brief (typically less than a few seconds) and so identification can be difficult. This type of reception is recommended more for the experienced DXer. Band I and the f.m. band are mainly affected, although Band III signals can be received during intense activity. Reflection distances are similar to Sporadic-E.

TV Transmission Systems

Nowadays there is less diversity between the TV systems employed in various countries. Less than two decades ago, 405, 525, 625 and 819-line systems operated within Europe. Nowadays only 525-line and 625-line systems exist throughout the world, the former adopted by countries such as the USA, Canada and Japan linked to public electricity supplies of 60Hz as opposed to 50Hz.

The budding DXer does

not have to be an expert in TV system differences to receive long-distance broadcasts. It is worth bearing in mind that three different sound spacings exist within Europe. In the UK and Éire it is 6.0MHz, in Russia and CIS countries it is generally 6.5MHz and in Western Europe, 5.5MHz spacing has been adopted. Some CIS countries are now adopting a 5.5MHz spacing with PAL colour, as opposed to SECAM.

France and Corsica operate a unique TV system in which the sound is a.m. (amplitude modulation) rather than intercarrier f.m. (frequency modulation) and with positive rather than negative-going vision. This means that when viewed on a normal TV, such pictures appear to be negative with unstable synchronisation. This is an ideal way of identifying these countries.

TV Channels

Different TV standards have varying channel allocations and channel numbering schemes. For example, Channel 2 in Western Europe is not the same frequency as Channel 2 in Russia, or Channel 2 in the USA. To differentiate, a letter prefix is usually assigned, for example 'E' for Western Europe, 'R' for Russia and CIS countries and 'A' for the USA and Canada. There are listings available on the Internet which can provide details of frequencies appropriate to the various channel numbers.

Our advice for the beginner is, trawl the band, discover the pictures then make a note of where signals appear on the dial for future reference. Western Europe has three channels allocated in Band I: Channels E2, E3 and E4, so if you receive the same picture at three different spots on the dial, then it narrows down the options of which likely country has been received.

Receivers For DXing

For f.m. DXing, a receiver with a frequency readout and RDS is a 'must'. Some receivers feature a narrow i.f. band option which improves selectivity thus making it easier to receive weak signals



Fig. 8: The French TF-1 test card received on a Bush dual-standard TV receiver modified to display the now defunct 819-line system.

adjacent to strong ones. It is possible to fit additional filtering, but unless you are fully conversant with r.f. circuitry techniques, the receiver innards are best left well alone. Many car radios feature RDS, thus making mobile DXing an attractive proposition.

Suitable DXTV receiving equipment is relatively easy to obtain and many receivers, particularly portables, will access Band I channels. Dial tuning is a 'must' for DXing as it enables you to see exactly where you are on the scale.

Receivers with automatic set-up, electronic search tuning and all the other bells and whistles are best avoided. Also avoid receivers with video mute (usually a blue screen) which comes into action when the signal weakens. Unless this can be disabled you are stuck with a TV which can only display strong signals. These remarks usually apply to the more upmarket products such as multi-standard TV's and video recorders.

Small Portables

Some of the best TV sets for DXing are the small portables priced around £30 or less and often found in novelty shops and High Street catalogue retail chains. They usually have a screen size of around 14cm (or smaller) and normally have a tuning scale marked not only with u.h.f. channels 21 to 68 but

other scales sometimes marked 2-4 (Band I) and 5-12 (Band III). For simplicity, they usually have a rotary knob for tuning.

Beware though - some versions may have been tailored specially for the UK (u.h.f.-only) market with only a u.h.f. tuner fitted. Look out for a slide switch sometimes marked 'Lo', 'Hi' and 'U' which indicates Lo band (Band I), Hi band (Band III) and u.h.f. At such a low price it may be worth taking a risk and buying one!



Fig. 10: A simple receiving system consisting of a D-100 converter feeding a monochrome TV for vision and an f.m. radio for sound.

Usually a telescopic antenna is provided, but take a look to see if an external antenna can be easily connected.

Video Recorders

Some video recorders have tuners which will access v.h.f. Bands I and III in addition to the usual u.h.f. channels. Use the recorder in its E-to-E mode to view the channels on the TV. As a bonus, the reception can be recorded directly off-air.

External Tuning Systems

For the more ambitious enthusiast, an external tuning system known as the 'D-100' is

are calibrated directly with DX channels.

Sound spacing is variable allowing the sound to be matched to the appropriate picture. The converter feeds an existing TV set on a spare u.h.f. channel. A traditional black-and-white portable with rotary tuning makes an ideal monitor and creates a powerful and effective receiving system.

Multi-Standard TV Sets

These will access virtually all the frequencies used for TV

broadcasting throughout the world, feature decoding for PAL, SECAM and the USA NTSC colour systems. Sound spacings of 6.0, 5.5, 6.5 and sometimes 4.5MHz (USA standard) are often catered for. Many receivers include the obscure French standard with

its positive-going video and a.m. sound.

Although the features may look impressive, many will be wasted for DX reception. For instance, the chances of picking up sound and colour from the USA in Europe are virtually zero. This type of receiver works fine with strong stable reception, but whether such a receiver would be suitable as the main DX monitor is doubtful.

Computer Cards

These are very popular and relatively cheap and effective for what they were originally designed for, i.e. domestic TV viewing. For DXing, the video mute is a hindrance and the computer itself generates in-band interference. These drawbacks are a pity really since, in theory, it would be an ideal way to receive, capture and store DX images.



Fig. 9: Good quality tropospheric reception from Belgium on Channel E10 captured using an indoor antenna at a location in Bristol.

tailor-made for the hobby. It features variable vision i.f. bandwidth reduction to help lift weak signals out of the

noise. As a bonus, selectivity is enhanced which helps reject interference from adjacent channels. Its rotary tuning dials

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VHF To UHF Up-Converters

These are best avoided at all costs because they generally give very disappointing results!

Scanners

These are ideal for measuring precise vision frequencies and they have the advantage that they will detect a vision carrier long before a TV receiver will display the beginnings of a picture. Some scanners have a video output but reports suggest that such an option is best suited for local-level reception.



Fig. 11: An ambitious receiving system featuring a bank of home-made signal processing units. A varicap tuner box with a meter display sits adjacent to the antenna rotator control unit.

Adjacent Channel Interference

Interference from close adjacent channels is one aspect of DX reception that is often overlooked. As signals from different TV standards can be present in Band I at the same time, their diverse channel allocations means that interference from adjacent channels can be a nightmare.

The problem lies with the fact that the internal TV tuning circuits 'see' a large chunk of r.f. spectrum and the receiver attempts to display it all. If it 'sees' two vision carriers, it will display them both, so you could end up seeing Russian pictures floating over Norwegian images, even though their channels are more than 1MHz apart!

Many experienced DXers use receivers with a narrowed vision bandwidth to help it 'see' less of the spectrum, thus helping to reject adjacent channels and display only the wanted signal. At a push, an adjustable notch filter could provide a remedy - simply set it to reject the unwanted signal.

Antennas

Sporadic-E signals in Band I often attain very high signal

levels so indoor antennas, or even a telescopic rod, can be used in some instances, but bear in mind there is a greater risk of interference from household products these days. Computers, central-heating switch-mode p.s.u.s, energy-saving lamps, even the dog's remote-controlled ball retriever no doubt, pose an annoying threat

to peace in Band I.

Where space permits, consider an outdoor multi-element array as it will provide superior gain when compared with a telescopic rod or dipole. However, if a long coaxial cable is used, the increased gain may be cancelled out by the cable loss.

Experimenting with different antenna systems is always good advice. If you are happy with the results of an indoor array then continue using it. Antenna height is not too important when encountering Sporadic-E or F2 reception as signals tend to arrive at a low angle. This is perhaps good news as it might be possible to hide the antenna from the neighbours by installing it at a lower height.

Having said that, a Band I array can look a monster at close range! Always try to position the antenna away from sources of interference.

For tropospheric reception in Band III or at u.h.f., high-gain arrays are essential and need to be mounted as high as is reasonably possible. The installation should be regarded as fringe-area, using good-quality antennas, double-

screened coaxial cable and low-noise mast-head amplifiers where appropriate. It goes without saying that multi-element arrays are directional and should therefore be rotatable.

Amplifiers

For Band I DXing (and probably f.m. DXing) it is best to avoid using amplifiers. Experience has shown that nearby local f.m.



Fig. 12: The impressive Swiss transmitter at Sankt Chrischona near Basel.

transmitters, CB installations and baby alarms can produce unexpected cross-modulation or overload problems.

Amplifiers can provide a significant improvement in Band III and at u.h.f., but avoid using them if you live very close to a high-power transmitter as cross-modulation can occur creating a mixture of local signal interference all over the

band. Choose one with a low-noise figure (1.8dB or lower) and gain figure of 13 to 25dB for optimum results.

Visual Record Of Reception

Keeping a visual record of reception has always been part and parcel of the hobby, whether it be film or video. Many enthusiasts possess photos of test cards and captions dating back several decades, so much so that archive TV has now become a hobby in its own right.

Nowadays, the PC and digital camera come into their own as shots can be instantly E-mailed to other DXers around the world.

It is worth keeping a logbook to record reception details, i.e. time, channel, length of reception, type of programme and where it came from, if identified.

Identifying Signals

Few services transmit a test card these days thanks to the intrusion of round-the-clock TV. Fortunately, most broadcasters feature an on-screen logo which can aid identification, although many first networks feature a '1' symbol which can be confusing if you haven't identified its style in the first place! In addition, logos can change and some broadcasters time-share transmitters, which sometimes leads to confusion.

Further Information

The Internet is a very useful tool for locating websites associated with the hobby. Use a comprehensive search-engine and simply enter either 'DX TV' or 'DX-TV'. A different selection of websites will appear if you include the hyphen!

Check out our website at: www.test-cards.fsnet.co.uk as this covers not only the DXTV hobby but also archive TV. An electronic catalogue featuring equipment and publications is available via the website. A hardcopy is also available for £1 from: **HS Publications, 7 Epping Close, Derby DE22 4HR, Tel: (01332) 381699.**

SWM

G1MFG.com *The best amateur television gear in the world...*



NEW microwave video receiver

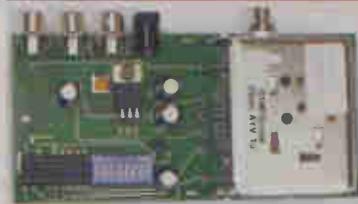
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Read the review in this issue!

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23cm Covers 1240-1367MHz in 500kHz steps, 50mW (nom) power output, sends video & audio, runs from 12V£42.50
13cm 2304-2559MHz in 1MHz steps, 20mW out£42.50



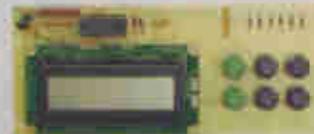
FM ATV receivers

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13cm like 23cm but 2304-2559MHz in 1MHz steps, no de-emphasis.£55.00



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TO ORDER: send a cheque or P.O. payable to **G READ** to G1MFG.com, L'Eglise, Durley Street, Durley, Southampton, SO32 2AA. Telephone 01489 860 318, email sales@G1MFG.com

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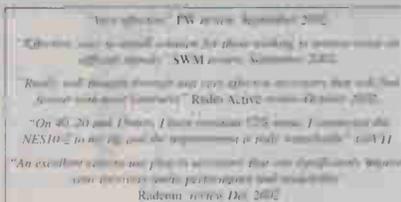
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Radio monitoring enthusiasts are always looking to further their reception horizons, so what better place to start than the exciting area of the 2.4GHz ISM Band? Delving into the microwave bands may seem a little daunting to some, but there are some cheaply available receivers and associated equipment to help you get started.

The 2.4GHz band is licence free for ISM purposes (Industrial, Scientific and Medical). This band was allocated by the International

small omni with a magnetic base is recommended. It's also helpful to have a low noise preamplifier to help 'pull in' the signals as they can be quite weak. A nice collinear antenna design can be found on-line at

www.geocities.com/radproject.geo/2.4colinear.jpg with another variation at www.frars.org.uk/cgi-bin/render.pl?pageid=1071

For fixed station use, as well as an omni-directional antenna, it's useful to have a more directional antenna on a rotator. Again, antennas from the wireless LAN world can be

the time to locate signals, and once found, the directional antenna can be used to peak the signal. This gets especially interesting when airborne video is detected, as real time tracking is required in order to keep the video signal locked. Directional antennas for this band take many forms, and a low profile design is the 'double quad'. A simple design can be seen in **Fig. 1**, this antenna is taken from the Radproject web site at

www.geocities.com/radproject.geo/2.4DQUAD.jpg and is very straightforward to build. There is a version with four phased elements which can be found at www.frars.org.uk/cgi-bin/render.pl?pageid=1162

Connectors & Feeder

Once a good antenna has been built or purchased, the next requirement is how to connect it to your receiver. I cannot stress enough that it is very important when dealing with microwaves to use good

Introducing 2.4 GHz Video Monitoring

Long term video and microwave enthusiast Alexander James combines both of these disciplines and introduces us to ISM band video. Read on and see just how easy it can be to extend your hobby to include microwave video monitoring.

Telecommunications Union (ITU) for low power 'short range' devices.

The band extends from 2.400 to 2.4835GHz, but it is very useful to have receive capabilities outside this range to cover the 13cm amateur television band for example. Generally, as with any microwave signal, line of site to the transmitter is usually required. For high bandwidth services such as television or wireless LAN this is important to consider but excellent results can be obtained without line of site.

Antennas

The type of antenna you'll most likely need will be an omni-directional one to start with. The advantage with this type of antenna is that no pointing is required, but it offers little in the way of gain. Because wireless LAN technology has exploded recently, you can find hundreds of articles on the Internet with design and construction information for 2.4GHz omni-directional antennas. For mobile use, a

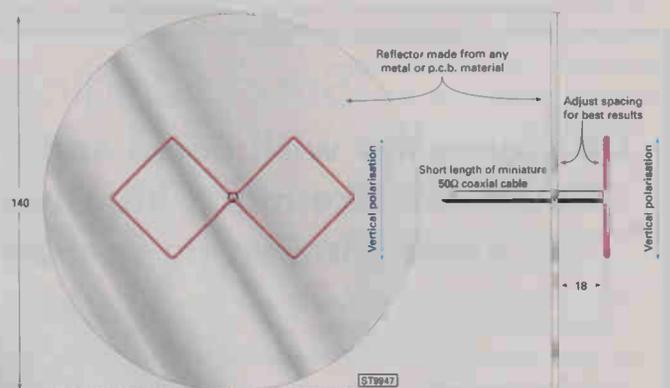
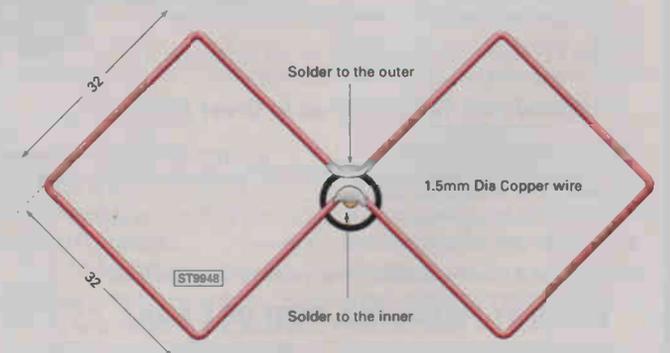


Fig. 1: A simple 2.4GHz antenna. Note the coaxial cable is not to scale but enlarged for clarity.



used, as they are cheap to buy or cheaper to build. Ideally, the omni will be used most of

quality connectors. You must ensure that you use good quality N-types, SMA, TNC and



Fig. 2: A 2.4GHz receiver card.

at a push BNC connectors. Try to limit the number of connectors in the system to the absolute minimum to keep signal losses low. For example, if the antenna has an N-type plug, then one end of your coax should have an N-type line socket, not an N-type plug and female back-to-back adapter. System losses soon build up at these frequencies.

The coaxial cable is important too. RG-213, RG-6 or 'satellite TV coax' should be avoided, as it has a very high loss at 2.4GHz. Instead, look out for the Times Microwave LMR series of coaxial cable. If the

cable run is short, say less than 3m such as in a vehicle, then LMR-100 coaxial cable can be used. If however the antenna is installed high up on a tower or house, then the coax run should use LMR-400.

The LMR-400 cable is very similar in dimensions to RG-213 so the N-type connectors can be made to fit, although a little initiative is required! If however, money is no object, then Andrew LDF-xxx series of heliax can be used, as this is extremely low loss. LDF-450 has around a 4.1dB loss per 30m at 2.5GHz where LMR-400 has around 7dB loss for the same length - at microwave frequencies it is the usual case of getting what you pay for.



Fig. 3: Airborne video captured.



Fig. 4: More airborne video captured.

Receivers

When looking at receivers for 2.4GHz there are several options, all of which should be explored. If you own a communications receiver that covers the 2.4GHz band, such as the AOR AR5000, then it's possible to build a simple f.m. video demodulator that can be fed with the 10.7MHz i.f. output. The problem with this solution is that the i.f. output only has a 10MHz bandwidth, so isn't really too good for a lot of the signals you will find, but it does work very well for 13cm amateur TV. Using a good quality communications receiver will of course allow the tuning to be performed very accurately which does

have its own advantages.

S-Band down-converters from the old *Arabsat* satellite days can be used also. These are identical in operation to the normal satellite TV - Ku-band - LNBS, although they work on vastly different frequencies (2.5GHz vs. 11GHz). Typically, they have

an r.f. input range of 2.5 to 2.7GHz but will allow tuning outside this range with little or no loss in sensitivity. Mostly, these down-converters output an i.f. of 950 to 1150MHz and so can be attached to a normal analogue satellite television receiver in order to demodulate the video. The majority of this type of down converters use 'high side' mixing with their local oscillator set at 3.65GHz - this means that the recovered video is inverted, so it's important to use a satellite receiver with selectable video polarity.

One such source of S-band down converters in the UK is Astrotel at www.astrotel.com There are limitations with using a satellite TV receiver, mainly the very wide i.f. bandwidth. This makes the selectivity very

poor and consequentially tuning of closely spaced signals is difficult. It is possible to replace the i.f. filters in satellite receivers, however, this is not a simple task and requires a good understanding of r.f. and electronics if it is to be successful.

The other common hardware for 2.4GHz reception is to obtain a 'Comtech 2.4GHz demo board' from the likes of www.g1mfg.com or www.13cm.co.uk

These boards are receivers that will tune from 2.2 to 2.7GHz in either 1 or 2MHz steps. Simple modifications can be performed to allow feeding power up the coaxial feeder for a preamplifier, and video polarity switching is simple. A big advantage of these receivers is the fact they can be powered from 13.8V, making mobile operation a very easy option. One of these receiver boards coupled with a small l.c.d. television makes a nice mobile S-band reception system that will fit into a briefcase. A typical Comtech wide coverage receiver board can be seen in **Fig. 2**.

These receiver boards are tuned with d.i.p. switches allowing any frequency within range to be set, although toggling up through the band does get a little tiring after a while. Better tuning methods are available in the form of 'l.c.d. controllers' - both being available from the above suppliers. The l.c.d. controller from www.g1mfg.com is the more advanced version, having variable speed tuning and several v.f.o.s, whilst the

Uses of the 2.4GHz ISM Band

Typically, you'll find the band is shared between the following technologies or uses:

- Wireless LAN equipment (802.11b, Bluetooth, Home r.f. and other CSMA/CD wireless networking technology).
- Short-range video sender devices - two and four channel giga-video types.
- Spread spectrum cordless telephones (mostly in the USA)
- Personal Role Radio (spread spectrum).
- Wireless surveillance cameras.
- Microwave Ovens.
- Outside broadcast links.
- Military.
- Airborne video downlinks.

controller from www.13cm.co.uk is more basic allowing push button tuning only.

A UK company www.videoscanner.co.uk offers an all in one solution for 2.4GHz video monitoring with a portable monitor with built in 2.3 to 2.5GHz receiver. This monitor will scan the band and stop on a video signal. The monitor does have a patch antenna attached that would be useful close to a transmitter, but ideally, an external antenna and preamplifier should be used. The Videoscanner is also powered by a nominal 12V making it too a candidate for mobile use.

Lastly, the IC-R3 scanner from Icom, which features TV reception from 902-2450.095MHz has to be discounted as its receive sensitivity is sadly not really up to the job - a pity as it would be a handy package for this aspect of monitoring. Perhaps the next revision of the set will make the grade.

Automatic Reception

The very nature of the 2.4GHz video transmissions means that they are usually not present 24 hours-a-day, which can make long periods of monitoring seem a little boring! Especially as you have to watch the screen to catch short duration transmissions. The answer in this case is to build some additional circuitry to allow the receiver to scan up and down the band looking for video signals. Once a signal is detected, the scanning can stop and a VCR can be activated to record the video. Home-brew electronics are required for this, unfortunately I'm not aware of any kits or built products to perform this function. The video detector looks for the 15.625KHz line synchronisation signal present in PAL video - detecting the 50Hz frame sync. would result in lots of microwave ovens being detected, and they don't transmit anything interesting!

The Radproject video scanner adapter at www.g1mfg.com/website/Datastuff/borrowed/MFGSCAN2.gif is worth a look. This

design will scan the 2.4GHz band looking for a video signal. Once a signal is found, then a VCR can be started to record the video for a few minutes, before the scanning is resumed. Very handy indeed.

What Can Be Received?

Domestic video senders usually operate on one of four spot frequencies in this band:

Channel	GHz
1	2.415
2	2.435
3	2.455
4	2.475

Here you will see the normal run of the mill broadcast television being relayed around the house. With a reasonable antenna, you'll receive normal domestic video senders over half a kilometre away. Since the band is also shared with wireless LAN devices, horizontal noise bars may be present indicating spread spectrum or frequency hopping network activity. After a while monitoring these bands, it's easy to pick out different types of wireless LAN traffic simply by looking at the patterns of interference on the screen.

Video from airborne sources can be received over distances of greater than 50km, providing the receive antenna is fairly high up and there are no local obstructions. Emergency services and news helicopters are probably the most frequent users of this band, but on occasion it is possible to see video from civil and military aircraft during flight tests. **Fig. 3** and **Fig. 4** show some examples of airborne video down links.

Security and CCTV cameras that operate in the 2.4GHz band usually have a good coverage area due to being mounted at a high vantage point, and as such that r.f. coverage will also be very good. Typically you can expect a coverage radius from around 250m to a 3-4km, mostly dependant on the type of antenna and the mounting position of the camera/transmitter



Fig. 5: Image from a ground surveillance CCTV camera.



Fig. 6: Image from a ground surveillance CCTV camera.



Fig. 7: Image from a ground surveillance CCTV camera.

combination. The output from a set of typical wireless CCTV cameras can be seen in **Fig. 5**, **Fig. 6** and **Fig. 7**. Interestingly, the cameras producing these pictures also

have what looks like u.h.f. control for pan, tilt and zoom.

That's it for this time, I'll be back soon with some more.

SWM

Kevin Nice looks at a convenient solution to the choice of 2.4GHz receiver. The new boxed scanning receiver from G1MFG is aimed at those shy of home construction.

G1MFG

microwave receiver

If you read this month's introduction to microwave video monitoring on page 30, then you'll quickly realise that this emerging facet of our hobby is a little devoid of ready to go receivers. Until very recently, there were only p.c.b. based receivers which required the use of on-board, fiddly, dual in-line switches to set-up the module's receive frequency.

The introduction of the brand new G1MFG Microwave receiver has just changed this. Unlike the only other competitor, the Videoscanner, the G1MFG Microwave receiver has no built-in screen. This is either good or bad depending on your perspective and your intended use. If like me you fancy some roaming monitoring, then a small l.c.d. panel for view is preferable, though I've been using both a 14in colour portable and a 3in mono TV in conjunction with video recorder during my period of testing. I've used the video recorder mainly because neither TV has direct video input which is a requirement as the G1MFG Microwave receiver outputs 1V p-p composite video. This signal I've been feeding into one of the VCR's SCART inputs and then by utilising the recorder's internal modulator on to the TV via r.f. A tortuous path with some degradation, but it works and the kids wouldn't let me 'borrow' their set with video in,

apparently it was busy with their X-Box - whatever that is? The added benefit of the video recorder approach is the ability to record any captured signals in an instant.

Two Versions

There are two versions of the receiver, based around the 13cm and 23cm amateur bands, but covering widely extended



frequency ranges. The 13cm version reviewed here covers 2.2-2.7GHz (2200-2700MHz) and offers 10 memories, scanning functions, and superb frequency control. The 23cm version, which covers 800-1800MHz, offers similar facilities. I've only used the 13cm version so all my comments relate to that version.

Both receivers are housed in identical custom-made aluminium cases measuring some 130 x 70 x 100mm, with a high quality painted finish and white screen printing on the front panel which identifies the button functions.

The front panel contains a pleasantly green back-lit two line liquid crystal display and six push buttons. The display shows the receive frequency, to the nearest 5kHz, and other operating information such as the current memory or scanning mode. The push buttons offer control of frequency (in 125kHz steps),

band searching between two arbitrary frequencies, memory scanning, plus storing and retrieving the memory frequencies. As you can tell, it's not quite what we're used to with scanning receivers, but the receiver is simple to drive and effect in use.

Connections

The rear panel contains the socket to allow interconnection to the other system items. These are; an SMA socket for the r.f. input, power (a 2.1mm coaxial type), and three phono sockets for video, 6 and 6.5MHz offset audio signals. Most 'videosender' transmitters and all amateur TV activity uses one or both of these frequencies. All you need to get the receiver running is a regulated 12V power supply, an antenna, and phono leads to connect to the AV inputs on a TV set.

Performance

The receiver sensitivity is - quite simply - stunning. If you've ever used an lcom R3 and decided that there are no signals out there, think again. The G1MFG receiver is estimated to be around -90dB, which is around 1000 times 20-30dB (100-1000 times) more sensitive! Even with a simple antenna, and I only used a patch antenna 'borrowed' from my home video sender unit, the G1MFG receiver can pick up wireless cameras at several hundred metres, whereas the R3 struggles to achieve a fraction of this due to its -60dBm sensitivity as measured by Alan Gardener in *SWM* October 2001. Picture quality is excellent, although the brightness can vary between different sources.

Overall

These new G1MFG receivers offer a whole new easy-to-use way of getting into microwave scanning. It isn't exactly a crowded market - apart from the p.c.b.-level products by G1MFG, the Videoscanner integrated receiver/monitor and of course the IC-R3, very few off-the-shelf products offer anything like this level of sophistication at an affordable price. That price by the way is £125. Giles at G1MFG tells me by the time you read this the receiver will be in full production. My experiences here relate to the preproduction model, though it's only the case that that's preproduction, the electronics remain identical.

Thanks for the loan to www.G1MFG.com who are the UK's leading supplier of microwave video transmitting equipment for amateur television enthusiasts. In the last five years, they have helped get many hundreds of people interested in, and active on, amateur television (ATV). A lesser-known part of the business is that it sponsors a number of ATV repeaters, with a mixture of equipment and/or financial donations. Giles Read, the man behind the business, is well-known in ATV circles. He is an active and enthusiastic ATVer of around 20 years' standing, and frequently takes part in amateur television contests. He can also be seen at many of the amateur rallies around the country, and is always available for technical support by 'phone: (01489) 860318 or E-mail: sales@g1mfg.com

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See review in October 2001 *Short Wave Magazine*



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13cm Package, Wide coverage Receiver and 13 cm Transmitter £65.00.

23cm Package, Transmitter and Receiver £65.00.

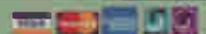


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Win a 2.3-2.5GHz Videoscanner microwave video receiver

Worth over £200!

The Videoscanner is a simple no-frills receiver capable of tuning over the 2.3-2.6GHz band. The receiver is sensitive (-90dBm) and capable of providing good reception providing you are within range of the transmitting source, especially in large urban areas where there is likely to be a high degree of usage. The Videoscanner provides a quick means of receiving signals without the hassle and unpredictability of connecting together lots of individual bits of equipment and obtaining a suitable antenna. The Videoscanner could well herald the beginning of a new dimension to the hobby of monitoring radio transmissions.

The Videoscanner is basically a small black and white video monitor measuring approximately 130 x 170 x 200mm with a built in 2.3-2.6GHz receiver and directional antenna. The monitor was originally designed to be part of domestic wireless CCTV system, but it has been carefully modified to provide extra functions including an on-screen frequency display. The unit only has a few controls, but they provide all that is required for the basic reception of video signals. The front of the unit is dominated by the 125mm monochrome c.r.t. display.

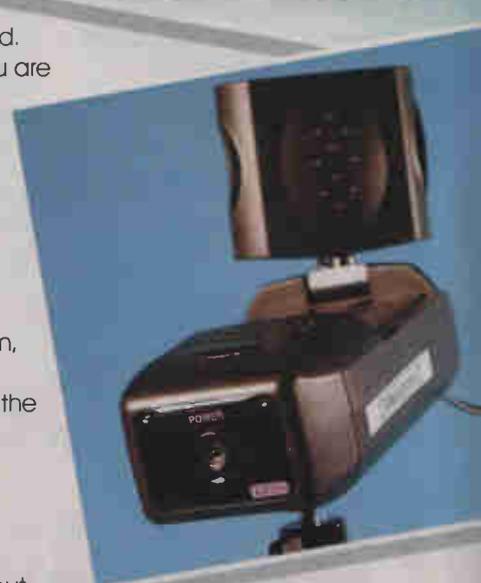
Videoscanner have very kindly donated one of their deluxe packages comprising of a Videoscanner receiver, camera and power supplies. Full details can be found at www.videoscanner.co.uk or Videoscanner, PO Box 12, Hedge End, Hants SO32 2EG.

The Videoscanner cost around £159.99 and includes a mains adapter and video output leads for connecting to a VCR or colour screen.

Also available for use with the Videoscanner is a companion video camera complete with p.s.u. and brackets which costs £49.99.

This excellent system which could provide you with simple entry into the world of video monitoring could be yours. Just enter our competition to the Videoscanner prize draw, simply complete the entry form below answering the three questions and post your entry now.

Good luck!



Entry Form

To enter this prize draw, please fill in your details on the entry form, (photocopies can be accepted with the original corner flash attached), answer the three questions and post your entry to: **SWM Videoscanner Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.**

Name

Address

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Do you receive SWM every month?.....Where do you buy SWM?:.....

Q1: What frequency range is covered by the Videoscanner?
.....

Q2: What size is the Videoscanner screen?
.....

Q3: How is the frequency displayed by the Videoscanner?
.....

The closing date for this competition is 23 January 2003, the winner will be drawn on 4 February 2003 - the first correct answer drawn will win. The winner will be announced in the March 2003 SWM. The Editor's decision is final.

If you wish not to be contacted by PW Publishing Ltd. or associated companies please tick here.



Videoscanner Comp
SWM Jan 03

Like many of us, Dave Roberts has lots of portable kit that relies on batteries. These days, there are many choices of potential power packs. Dave looks at what is currently available.

A few months ago I received a letter from a *Short Wave Magazine* reader commenting that although so many scanning receivers and scanner/transceivers required battery power there was precious little information available regarding the batteries that drive the radios. Like most of us, he found the plethora of batteries available rather confusing. He wondered what power would be suitable for his hand-held scanner, which would give him reliable service coupled with longevity. He also was keen to know the best way to charge

From the pocket torch to the pocket tape recorder, batteries form the 'life blood' of the system.

Non-Rechargeable Types

For most of us, the first batteries with which we had any contact was the good old zinc-carbon battery. These were the energy store that you would find powering a pocket torch and maybe in the guise of a small cuboid 6-cell battery called a PP3, they would have driven your first transistor radio.

One electrode is made of zinc and the other carbon. They are separated by an acidic paste which acts as the electrolyte. As soon as the battery is manufactured the acidic electrolyte starts to eat away at the zinc electrode. There is no effect on the carbon electrode

applications these battery types will have an advantage over zinc carbon types. This is entirely due to the type of use that radio users will subject their equipment. We tend to use our radios on a continuous discharge basis, i.e. the radio is on for an extended period of time. If you transmit on the set then a percentage of use will be at a higher current load. Basically, the alkaline-manganese battery has almost twice the energy content of a same sized zinc-carbon battery. This is still the case at higher loads.

Lower Power

For really low power applications or discontinuous discharge equipment, such as the ubiquitous pocket torch, the zinc-carbon battery can provide an inexpensive alternative to the

practical and furthermore is not usually possessed by most hobbyists. A specialist charger/regenerator must be used. A 'charge' strategy of 12/1 is required, i.e. 12 hours charge for 1 hour use. In any case, even under the most stringent conditions of use and regeneration Alkaline-manganese batteries have an absolute maximum number of regenerations, this is accepted to be 20 cycles. Having said that, a friend of mine has been using this system with two sets of three AA size cells for two years. He is very careful not to discharge the cells over 30%, only runs them at low current and swears by this method. Most pundits, however, believe this regeneration method to be impractical in respect of charge time and cost.

There is, though, a new alkaline battery available.

Batteries - A Difficult Choice

his batteries in order to get the best out of them.

I replied directly to him thanking him for his excellent suggestion and then I began to scratch my head and gather information. It took a while and I found out that there are more battery types than I ever imagined.

What's Included

I am not including details of any lead acid technology batteries here as they are not generally fitted in scanners or hand-held transceivers. I am also going to skip 'button' cells as likewise, they are not fitted in radio equipment other than covert equipment.

Most of us have at least one hand-held radio. I for one, have more hand-held sets than hands. They are all battery powered. Without the convenience of such available power, portable radio equipment could not operate. The same goes for portable telephones and a host of other handy gadgets that we all use on a daily basis and take for granted.

but when you connect a wire between the two, then electrons flow through it and combine with hydrogen on the carbon rod. A voltage can be measured across the electrodes and current can be produced. Typically these cells produce 0.76V and will be placed in series to produce a battery that supplies a nominal 1.5V when first manufactured and used. The zinc rod will eventually dissolve completely due to the action of the acid or the hydrogen ions in the acid are exhausted and the battery is then exhausted or 'flat'.

The same basic reaction forms the basis of all batteries. The difference being that different metals and electrolytes will produce different potentials (voltages). As you probably realise some of the chemical reactions are reversible, which results in the cell being rechargeable.

The most popular non-rechargeable cell/batteries in use at the moment are alkaline-manganese. In these units the electrodes are zinc and manganese-oxide, with an alkaline electrolyte. In most radio

alkaline-manganese type. It is important to stress that both these battery types are non-rechargeable and both start to lose capacity as soon as they are manufactured thus giving them a finite shelf life. Alkaline-manganese units will self discharge at a rate of around 2% per year and zinc-carbon batteries at a maximum of 4% per year. When an alkaline-manganese battery is fresh (recently manufactured) it will provide a terminal voltage of 1.5V. Just prior to final discharge that voltage will have dropped to 0.9V.

Alkaline-manganese batteries can, however, be regenerated. To achieve this, certain conditions have to be met with regard to the use of the battery. The battery must not have been used at a high discharge rate with the terminal voltage not dropping below 0.8V. No more than 30% of the capacity should have been used otherwise an irreversible process will occur that will prevent regeneration. The above figures are critical and should be monitored constantly with equipment that is not 'field'

Marketed as a rechargeable alkaline cell under the name *Pure Energy* the manufacturers claim that the cells will retain its charge for five years. More of this product later...

Therefore, for non-rechargeable battery use, the clear choice for powering radio equipment is the alkaline-manganese type. It has a good shelf life and is able to provide higher current for longer periods than the zinc-carbon. Remember too, that the storage life of batteries is dependent on the conditions of storage. Generally the higher the storage temperature, the less a battery retains its capacity due to the increased reaction rate of the interval chemistry. The ideal storage location would be a refrigerator set at between 0° and 10°C. Batteries should be kept tightly wrapped in vapour proof packaging such as plastic laminated aluminium foil to prevent them drying out. They should be left at room temperature for an hour or two prior to use.

Most of us will never go to this trouble.

Rechargeable Types

Batteries of this type are manufactured in the usual AA, AAA, C and D cell sizes and in addition they are also made in equipment specific packs. Most radio amateurs, scannists and laptop computer users are familiar with batteries that are put together specifically for a particular make of radio, computer or other appliance.

Firstly, the Nickel Cadmium cell (NiCad) The electrodes in this case are nickel-hydroxide and cadmium with potassium hydroxide as the electrolyte. Most hobbyists and radio amateurs will be familiar with this type. Typically these cells will, when charged, give 1.2V per cell as opposed to 1.5V for Zinc Carbon and alkaline-manganese types. Unlike alkaline-manganese they discharge at an almost constant 1.2V. This level is roughly equivalent to the average discharge voltage of the alkaline-manganese battery. Therefore, exchanging battery types in equipment is not a problem as long as they are not mixed in use, i.e. don't use different cell types in an appliance's battery tray.

NiCad batteries have long been the most popular rechargeable power plant for scanner users and amateurs using hand-held radios. Supplied in a discharged state these items should be fully charged before use. The type of charger supplied or sold for charging NiCad batteries is the type that will recharge a flat battery in between fourteen and sixteen hours. Manufacturers make these chargers to operate at a rate of 0.1C. This is where C is the hour capacity of the battery. A typical NiCad battery has 600mAh capacity and therefore has a C rate of 600mA. The 0.1C rate is therefore 60mA. A 0.1C charge rate is, therefore, the cheap option for manufacturers of the charging units. If the charger operated at a higher rate then a circuit would have to be built to detect when the battery was fully charged and then shut off to avoid damage to the battery. The charger would cost more.

The 0.1C rate is the best option for keeping the charger cheap and cheerful but still charging the battery within reasonable time. A battery charging at 0.1C will be fully charged at between fourteen

and sixteen hours. You may wonder why it takes that much more time to charge the battery than the formula would indicate. A 0.1C charge should, after all, charge the battery in ten hours. The fact is that actual battery capacity is usually greater than it's rating and the efficiency of charge is **always** less than 100%. This means that the fourteen to sixteen hour period is necessary for a full charge. Charging over this period of time only heats up the cell and builds up internal pressure. At the 0.1C rate, this does not cause damage but accelerates deterioration of the cell and so reliability suffers.

In practical terms, charging should be carried out in accordance with the manufacturers instructions. Normally a fifteen hour charge is recommended to charge a fully discharged battery. If you are a meticulous sort of person you may work out just how discharged the unit is and you can adjust the charge time accordingly. If the battery has a third of the capacity used then it will be fully recharged in five hours. This, however, can cause a problem. If the battery is repeatedly only partially discharged before being recharged then the battery will form a so called memory of the discharge level and forget that it can be further discharged. This memory effect is caused by a chemical reaction to repeated partial charge and manifests itself in the user realising that the cell does not provide current for as long as it did previously. The best thing to do with NiCad and Ni-Mh batteries is to regularly discharge them before charging.

Nickel Metal Hydride

Nickel Metal Hydride (Ni-Mh) cells provide the same voltage as NiCads but will give around 30% more output in terms of use. They also cost more. Again a charger specified by the manufacturer should always be used. Unlike the NiCad battery Ni-Mh can withstand random charging but a good tip is to treat it pretty much like a NiCad and discharge it fully before giving it a fifteen hour charge in a charger meant for Ni-Mh batteries. Ni-Mh batteries initially were not thought to suffer the memory effect but it seems that they do, as the nickel plate common in both NiCad and Ni-Mh units contributes to

crystalline formation that causes the effect. Memory effect is not so noticeable in Ni-Mh batteries because they have a shorter life cycle.

Both types of cell have a pretty high 'self discharge' rate of around 1% per day at room temperature. Also NiCad and

In laboratory tests a properly maintained NiCad was cycled for 1100 times before any deterioration in performance took place at all. The battery remained fully useable for another three hundred cycles and then the main difficulty noticed was that the self-

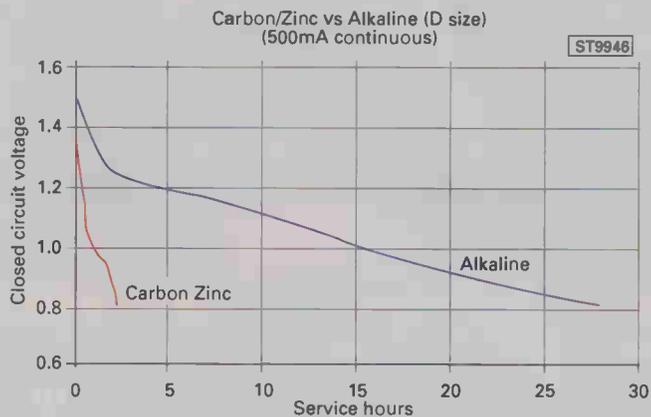


Fig. 1: Service life comparison for Zinc-Carbon and Alkaline D-cell - 500mA.

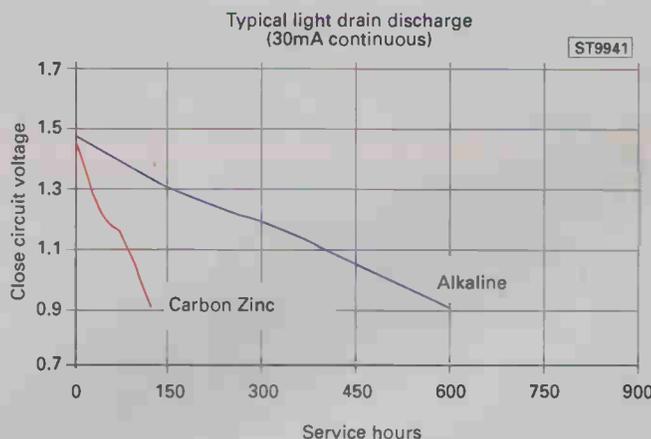


Fig. 2: Service life comparison for Zinc-Carbon and Alkaline D-cell - 30mA.

Ni-Mh batteries may not reach their full efficiency with regard to charge retention until after they have been fully discharged and recharged about five times from new.

To keep NiCad and Ni-Mh batteries fully charged when not in use you can either allow them to 'trickle charge' at a **very** low rate using a purpose-built charger for the battery type or, using their normal chargers and a cheap timer unit, simply give them a thirty minute charge every 24 hours. This works for me.

If properly cared for, regularly discharged and fully charged (whether they are actually used in an appliance or not), a NiCad battery is the clear winner. It will maintain constant, almost perfect performance over many hundred charge/discharge cycles.

discharge rate increased. Testing ultra high capacity NiCad batteries that contain around 60% higher energy density revealed less spectacular results with capacity dropping off quite noticeably after four hundred charges and the battery being useless after around a maximum of around eight hundred cycles. Note that these were laboratory tests conducted under ideal conditions and don't reflect normal use where the battery would be subject to stress of differing temperatures and current flow.

Nickel Metal Hydride battery life is definitely not as long as NiCad types. Tests have shown that after around three hundred discharge/charge cycles the thing is pretty much useless. Significantly less than the life of a well looked after NiCad!

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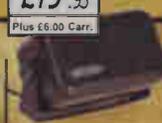
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Lithium-Ion

Lithium-Ion (Li-ion) batteries are a recent addition to the power armoury of the portable radio user.

They are around 30% lighter and have at least 30% more capacity than NiCad or Ni-Mh equivalents. They require a very special charger to charge at

by this time. These batteries seem just the job for mobile phone use where the phone is often replaced after a year or so. Time will tell how they shape up in the hobby radio market. In any case if you buy a Li-ion battery you may be purchasing a unit that was made months ago and may be well past its prime. The makers of these units code

hundred times the service life of a zinc-carbon battery. Apparently RAM cells should be recharged before going flat in order to optimise longevity. There are few statistics available indicating just how many discharge/charge cycles the battery can deal with before deterioration but such test results that are in the public domain indicate that around sixty cycles are possible before the cell exhibits any degradation. The makers claim that the cells may be cycled over two hundred and fifty times which does not compare favourably with NiCad units.

RAM cells cost around twice as much as nickel-cadmium but are around the same price as NiMh. A special charger type is

available to hobbyists at the present and at reasonable cost it seems to me that for non-rechargeable batteries the manganese alkaline type is the clear winner.

Nickel-cadmium and nickel-metal hydride rechargeable cells are high maintenance batteries in that they require regular discharge/charging cycles to ensure long life. Lithium-ion batteries seem destined to fail after around two years and RAM batteries have yet to be proven in the long term.

It seems to me, therefore, that the NiCad battery, if well looked after, is the clear winner in terms of service life and cost.

If you run a hand-held radio there are many power options

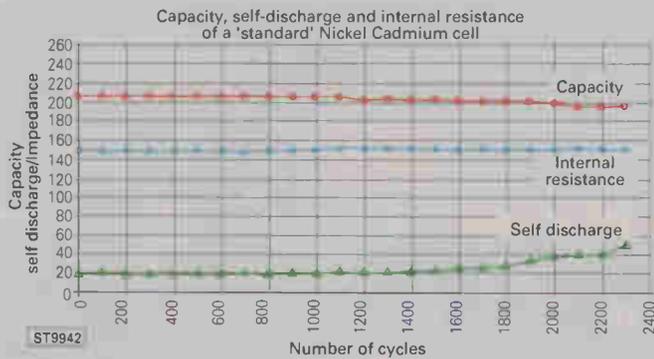


Fig. 3: NiCad cell characteristics - standard.

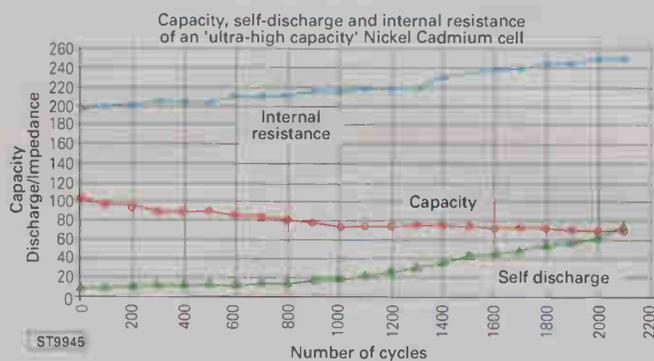


Fig. 4: NiCad cell characteristics - ultra high capacity.

constant current (0.2C to 0.7C depending on the manufacturer) until the battery reaches 4.2Volts per cell. Then the voltage is held at that figure until the current has dropped to 10% of the initial charge rate. The charger should detect this drop and cease charging. In effect this means that equipment manufacturers build the chargers and we stick with them.

Overcharging Li-ion cells is downright dangerous and they can catch fire. Lab tests on Li-ion batteries show capacity remaining constant over a thousand cycles with very good performance. There is no memory effect with Li-ion cells but and this is a big but, the makers of these batteries never mention that these batteries seem to age rapidly whether the battery is stored or in regular use. If your Li-ion battery is over two years old and is still in fine fettle then give it a party because many of them are dead

the date of manufacture and mere users like us are not able to establish this vital statistic. You have been warned.

RAM

A newcomer to the market place is the RAM (Reusable Alkaline-Manganese, trademark of Battery Technologies Inc.) battery. Currently manufactured in AA, AAA, C and D cell sizes they are delivered fully charged and are claimed not to suffer self-discharge to the extent of NiCad and Ni-MH types. Nor do they contain nearly the same amount of heavy metals of the other types thus reducing pollution on disposal. They are rated at 1.5V and exhibit no 'memory effect'. The chargers for these cells are less expensive and the makers claim that one RAM cell can deliver up to twenty five times the service hours of a single use alkaline-manganese battery and up to a

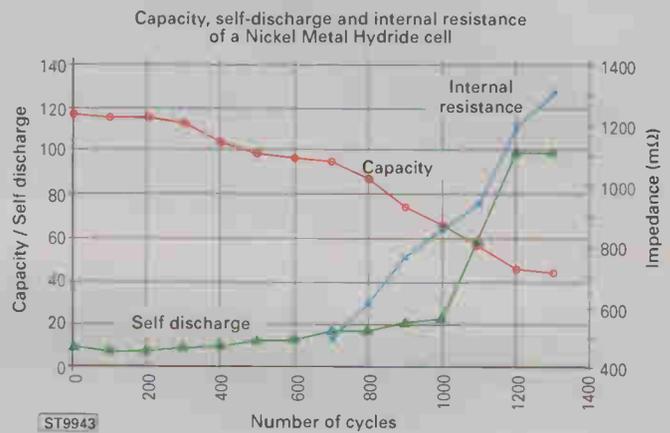


Fig. 5: Nickel Metal Hydride cell characteristics.

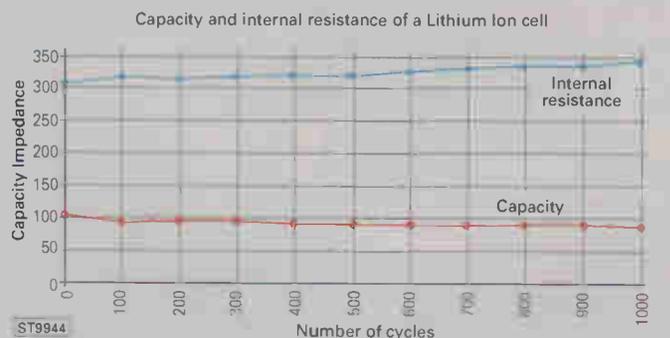


Fig. 6: Lithium ion cell characteristics.

required but an advantage is that the charger is inexpensive and the makers claim that the cells can be left in the charger for weeks with no ill effects.

I'm sure that further information will become available if and when these cells enjoy more widespread use.

You Choose

Battery technology is continually moving forward but having looked at all the options

available. Some users will prefer the convenience and power of single use alkaline-manganese batteries. Others will require a rechargeable solution, perhaps built into a radio specific cell case.

It is definitely the case that good battery maintenance will enhance battery life and serviceability and in the long run help us poor hobbyists save our cash, and that can't be a bad thing - can it?

SWM

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Worth over £120!

Get started scanning with the help of SWM and RuSK.

Reviewed in SWM last month, the PRO-82 scanner is a chunky beast presenting a comforting handful and measuring around 150 by 65 x 40mm. It covers 29 to 465.6375MHz with gaps. A belt clip is supplied as is a 150mm helical rubber antenna that locates on the left hand of the top panel via a BNC connector. This easily allows an external or replacement antenna to be hooked up. There are two battery trays supplied in the box. One tray is for 1.5V AA size cells and the other, a yellow tray, takes rechargeable cells. Optional adapters can be purchased to charge the batteries in the set or to power the unit from a mains supply.

There are two controls on the top panel. One is for on/off/volume and the other handles the squelch threshold. A headphone socket completes the line up on the roof of the radio.

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RuSK can be contacted at 29 The Hollies Industrial Estate, Cannock, Staffordshire WS1 1DB. Tel: (01543) 468855.

Entry Form

To enter this prize draw, please fill in your details on the entry form. (photocopies can be accepted with the original corner flash attached); answer the three questions and post your entry to: SWM PRO-82 Competition, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

Name

Address

Tel:

E-mail:

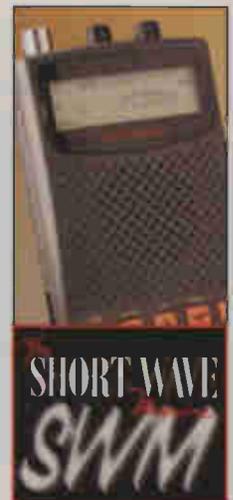
Do you receive SWM every month? .. Where do you buy SWM?

Q1: What is the lowest frequency that is covered by the PRO-82?
.....

Q2: Where are RuSK based?
.....

Q2: What colour is the tray for rechargeable cells?
.....

The closing date for this competition is 23 January 2003, the winner will be drawn on 4 February 2003 - the first correct answer drawn will win. The winner will be announced in the March 2003 SWM. The Editor's decision is final. If you wish not to be contacted by PW Publishing Ltd. or associated companies please tick here.



PRO-82 Comp
SWM Jan '03



.....A SWEEP-UP for 2002

A reflective article from John Wilson this month as he looks back at a busy 2002 and ties up a few loose ends.

Towards the end of each year of writing for the magazine, I try to clear up some of the unfinished topics which may have arisen from my articles and reviews, and although I am writing this at the end of September, I know that you may be reading

performance transceiver being presented in the current issues of *Radio Communication*, the RSGB's journal, in which he says:

"...in normal usage, an amateur is unlikely to require a receiver with a spurious free dynamic range (SFDR) exceeding 95dB...In this regard, local oscillator noise leading to reciprocal mixing is more troublesome than pure IMD performance..."

Wise words from a very knowledgeable expert, reinforced by an article in the July/August 2002 issue of *QEX*

He found that quite often, phase noise causes reciprocal mixing that masks the IMD performance of receivers".

For those of you who are now nodding heads and thinking "Yes, well, I know all this, why is he repeating it again" I must apologise, but a magazine writer should never forget that there are always newcomers to the hobby who might welcome an insight into what makes a good or bad receiver, and an introduction to the more esoteric language which the experienced among you find so familiar. So what, in simple terms, is reciprocal mixing? The

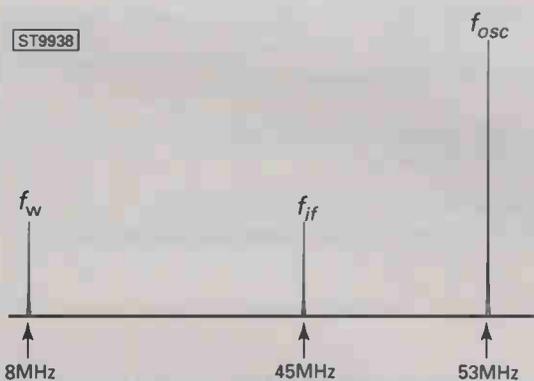


Fig. 1: The mixing process in a superhet receiver.

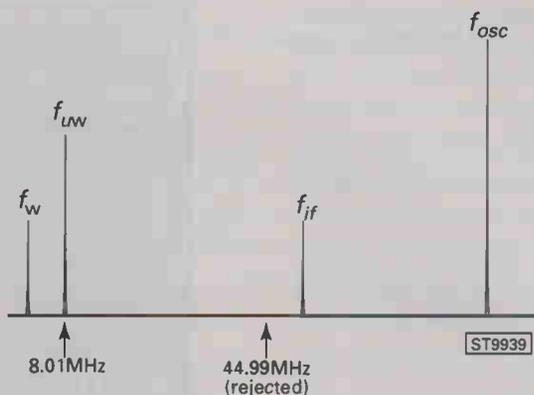


Fig. 2: The conversion of a 8.01MHz signal.

it in December, so Happy Christmas. I mentioned at the end of my review of the AOR LA-350 loop antenna that I had been talking to Colin Horrabin about a design for a high

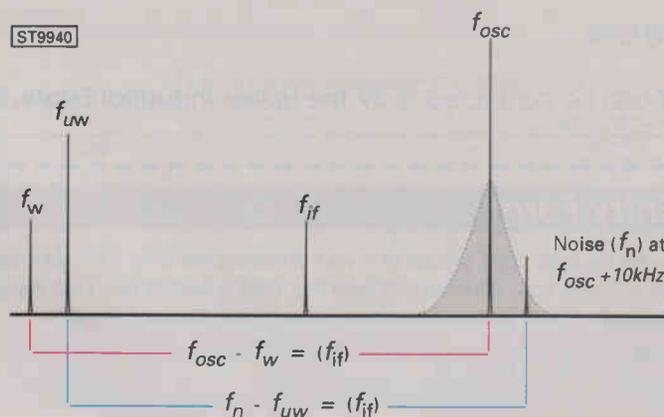


Fig. 3: Here, due to oscillator noise, the unwanted signal makes it through the conversion process.

entitled 'Improved Dynamic Range Testing' which said:

"Peter Chadwick, G3RZP, took on the task of deciding how much dynamic range HF receivers need. He made some measurements of actual received signal strengths and based his conclusions on those.

definition given in ITU Recommendation F.612 says:

"Reciprocal mixing in a receiver occurs when, during the reception of a wanted signal, a strong out-of-band interfering signal mixes with out-of-band skirt noise from the synthesiser, producing mixing products which

fall into the receiver IF band, causing the receiver output signal to noise ratio to be degraded".

What does that mean? The normally encountered explanation of the mixing process in a superhet receiver uses a diagram similar to that of Fig. 1, where the wanted signal f_w is mixed with a local oscillator f_{osc} to produce an i.f. shown as f_{if} . I have shown typical frequencies for today's receivers, where it is customary to convert to a high i.f., often 45MHz, in the first mixer stage.

So far, so good, but these neat diagrams represent theoretically perfect signals with no sidebands and a single wanted incoming signal. Life isn't like that, so what if there are several signals around our 8MHz wanted one, and what if the unwanted signals are higher in amplitude? No problem, according to Fig. 2, for if there was a strong unwanted signal f_{uw} some 10kHz higher than f_w , say at 8.010MHz, then this would be converted by our theoretically perfect local oscillator to an i.f. at 44.990MHz which does not correspond to our theoretically perfect 45MHz i.f. and would seem to be rejected.

Is there such a thing as a local oscillator which behaves in such a perfect fashion - of course not, and every oscillator generates sidebands of noise on each side of its wanted frequency. If we add some noise sidebands to our local oscillator, what happens?

Getting more complicated, Fig. 3 shows that the original situation still applies, with our wanted signal f_w mixing with f_{osc} to produce f_{if} . However, now we have the strong unwanted signal f_{uw} mixing with the noise sidebands of f_{osc} which also produces f_{if} , so in addition to our wanted signal being put into the i.f. stages of the receiver, we also have an i.f. full of unwanted noise from the unwanted signal.

Expand the situation further and imagine a wanted signal surrounded by many unwanted signals, each of which can mix the local oscillator noise sidebands into

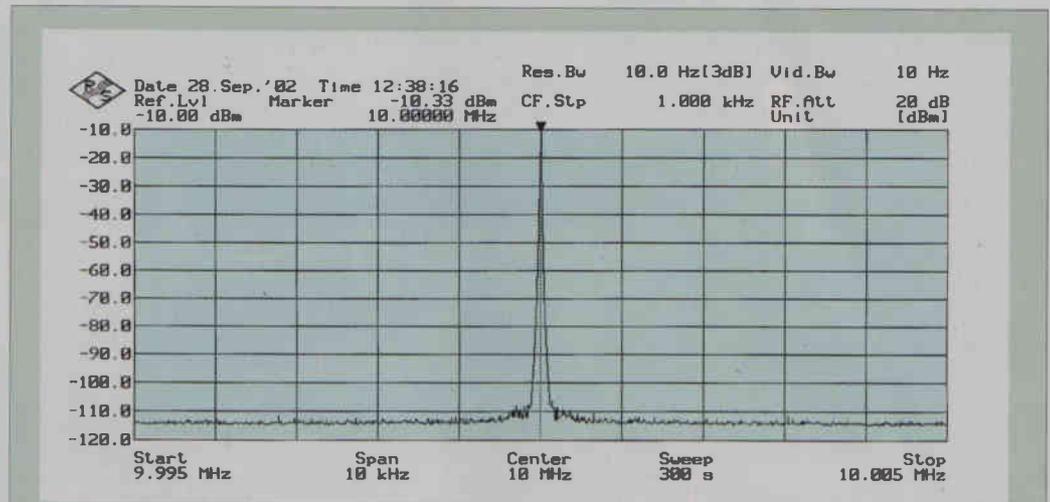


Fig. 4: The ultra clean spectrum of JW's Rocal Rubidium frequency standard.

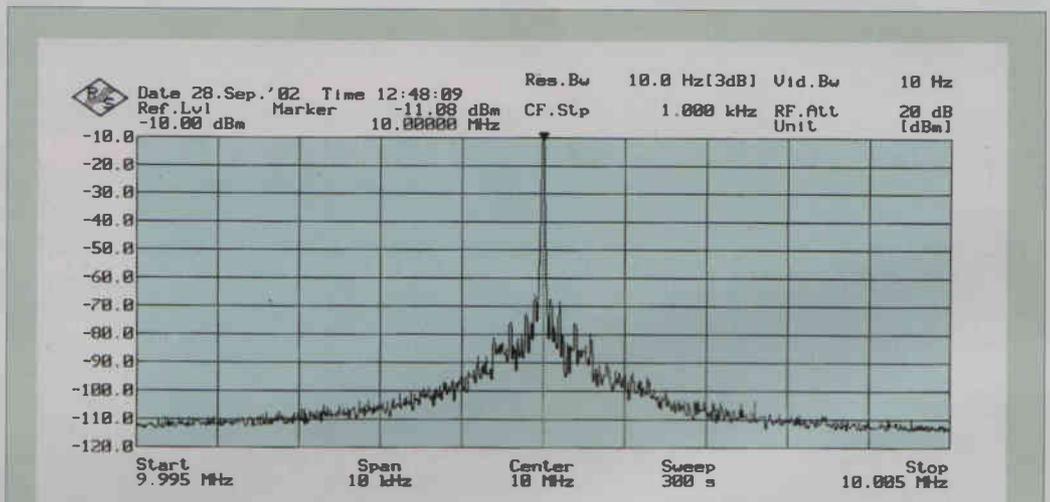


Fig. 5: The H-P 8657A synthesised generator is not so clean.

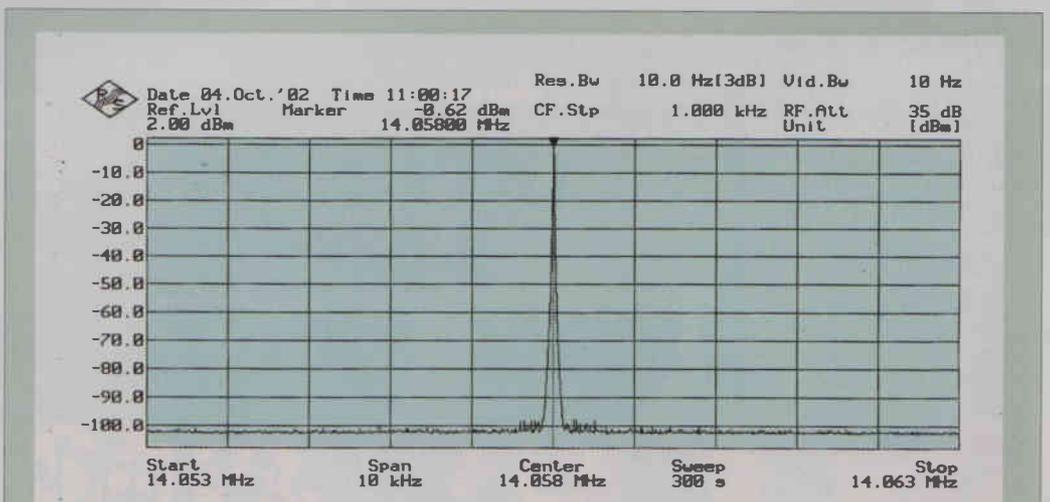


Fig. 6: John's 'standard' crystal test oscillator spectrum.

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.....A SWEEP-UP for 2002

the receiver i.f. chain, and you begin to approach real life. Inverting the process, it's no more complicated to understand than having a very noisy wanted signal mixing with a totally clean local oscillator which obviously gives a noisy signal into the i.f. It's this inversion which leads to the term 'reciprocal mixing' used to describe the effect.

When a receiver suffers badly from having a noisy local oscillator, you can get some strange effects. Going back to **Fig. 3**, what happens if the unwanted signal is keyed, such as a transmission using Morse code? In such a case, the reciprocal mixing products would also be keyed, giving the listener the impression that there is a strange Morse code keyed noise on top of the wanted signal.

It's no good switching in a noise limiter, or tuning around to find the source of the keyed noise because it's coming from the noise sidebands of the local oscillator - and this does happen, even in the best receivers if the unwanted signals are of sufficient amplitude. Perhaps it is now clear why, in my reviews, I always try to measure the reciprocal mixing performance of receivers, and why I go on at length about the inherent low noise granted by the use of crystal controlled local oscillators, particularly in the designs of Art Collins who introduced the 'Collins' conversion configuration - clever engineer.

To hammer home the point yet again, let me show you **Fig. 4** which is the close-in spectrum of a good crystal oscillator (actually the 10MHz monitor output of my Racal 9475 Rubidium frequency standard), and compare it with **Fig. 5** which is the same plot of the output from a decent synthesised signal generator (H-P 8657A). The superiority of the crystal

oscillator is plain to see, and highlights one aspect of trying to make reciprocal mixing measurements on a real receiver, for in order to carry out such tests it is essential that any signal sources used should have sideband noise lower than that of the oscillator(s) in the receiver being measured.

In other words, I couldn't use the H-P 8657A to make measurements on any reasonably good receiver. In serious measurements, one technique used has been to use a crystal oscillator followed by a very narrow crystal filter to further reduce the close-in sideband noise. However, for the record I also include (**Fig. 6**) a plot of one of my standard crystal oscillator sources at 14.058MHz which I use in my regular receiver review measurements.

A simple test of a receiver's reciprocal mixing performance is to tune very slowly through a clean signal - such as a crystal oscillator. In the olden days, when most receivers has a crystal calibrator built-in, this was an easy thing to do.

Nowadays the crystal calibrator is no longer found, but plenty of simple designs abound for crystal oscillators, typically using a single f.e.t. and providing more than enough signal to do this check. The mark of a clean receiver oscillator is that as you tune towards the crystal oscillator frequency you will hear a gradually increasing hiss, then the signal should 'plop' into the i.f. passband and

'plop' out again as you continue tuning into the hiss on the other side of the signal.

If the hissing starts a long way from the crystal frequency you can be fairly certain that the noise is being generated by your receiver's local oscillator (synthesiser). To some extent, the results are affected by the shape of the i.f. passband in the receiver, but you will soon get to know what a good or bad receiver sounds like.

My outstanding memory of good performance was, oddly enough, the performance of the KW2000 transceiver which utilised a Kokusai mechanical filter in the i.f., and slavishly copied the classic Collins frequency conversion system. In those transceivers the signals did indeed 'plop' in and out of the i.f., and that was a tribute to the use of crystal controlled first conversion and a low noise v.f.o. in the tunable i.f. - but you don't want to hear all that again, because I've said it all so many times before.

My Comparisons

Another subject which has raised some correspondence from readers relates to my comparisons between active whip antennas and active

loops, and there are still some unconvinced souls out there who think that I am 'fiddling' the figures. Having an afternoon spare recently, I did some further plots in the EMC Centre using my regular Rohde & Schwarz active rod antenna and the measuring loop which Wellbrook made for me to enable measurements of radiated emissions at low frequencies as demanded by the IEC 60945 Marine equipment test standard.

To make it simple but realistic, I set up both antennas on 1.5m high tripods in the centre of the building, which has fluorescent lighting and an administration computer running on a desk about five metres from the antennas. Using a Rohde & Schwarz measuring receiver, I plotted the output from each antenna, without using any correction factors in the test software. What you see therefore is the raw performance of two very good examples of their type of antenna under real conditions.

Take a look at **Fig. 7** - this shows the signal output from the active rod antenna from 10kHz to 2MHz, which starts at over 60dB microvolts (1mV) at 10kHz dropping to a noise floor of about 2µV just above 1MHz. Notice the prominent

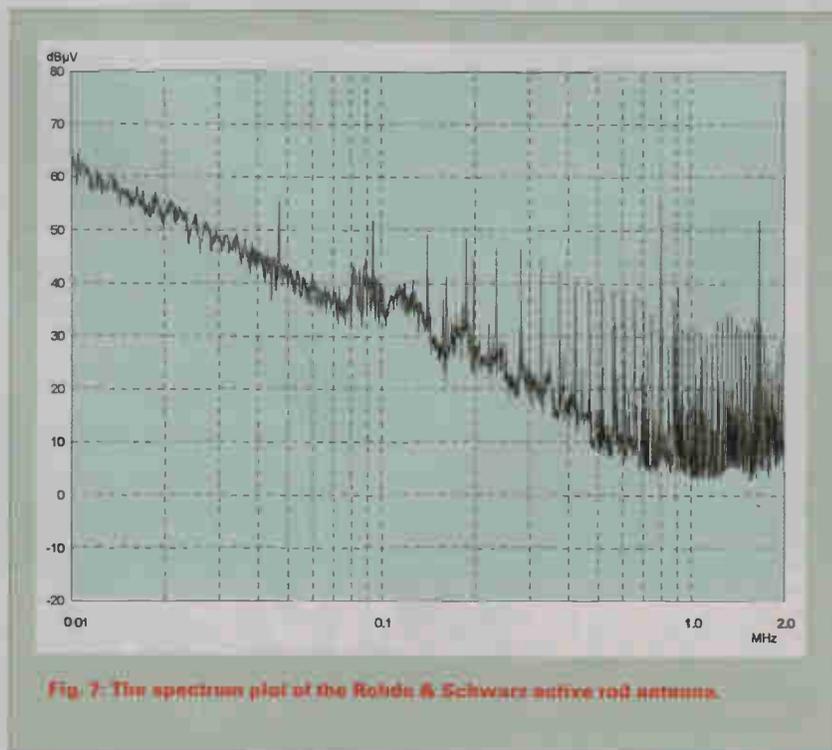


Fig. 7: The spectrum plot of the Rohde & Schwarz active rod antenna.

'comb' of signals in a regular pattern sticking out above the noise and starting at about 47kHz. Those, dear friends are the harmonics of the line scan drive in the computer monitor, and it is clear that they extend up to (and beyond) 2MHz.

Where is Rugby on 60kHz? Where indeed is any signal except for 198kHz Radio 4, barely visible at a level of about 45dB microvolts? Now take a peek at **Fig. 8**, which is the output spectrum from the Wellbrook loop. (Incidentally, this loop is only 600mm in diameter compared to the normal Wellbrook ALA1530). Not only can you see signals, even GBR is clearly visible at 16kHz, MSF on 60kHz is there at +38dB microvolts, 198kHz is at nearly +60dB microvolts, LORAN centred on 100kHz and loads of other signals all clearly visible (and audible) across the entire spectrum plot.

What is missing? Why, the computer monitor signals which were the only signals heard above the noise from the active rod antenna. Does anyone need more convincing?

More Questions

My old acquaintance Tricky Dickie has his hand up at the back of the class again, and

asks "If the active rod (or whip) is so useless at receiving signals, how can it possibly be used for EMC measurements?". As so often in the past, little Dickie hasn't thought it through, and has forgotten that the active rod antenna is normally used inside a fully screened room which has no external signals present due to the screening.

Under these conditions, the active rod has a low noise floor and can be used to make accurate measurements, as a glance at my results for front panel radiation from the Watkins-Johnson HF-1000 will show (June 2001 *SWM*, page 33). In a screened room the active rod (or whip) is great; outside in the real world, and certainly in near-field conditions, a decent loop antenna will always be better for lower frequency listening.

Memory Lane

Looking back over the year I have certainly had a varied time having reviewed the Racal RA1772 and RA1795, a classic of all time, the Collins R-390a, two of the latest offerings from a re-vitalised Ten Tec company in their RX-320 and RX-350, two trips down memory lane with reminiscences of the Marconi Company in Nigeria and a look

at classica domestica in the Zenith Transoceanic saga, lately another Racal, the RA3791 and a couple of loop antennas.

Quite a mixture, and a real opportunity to compare the classics with more modern receivers, so to answer the inevitable question of "which one did I like best?". You may be surprised to find that it was the Ten Tec RX-320 which gave me the most enjoyment overall, combining as it did a modest price tag with really good r.f. performance, a d.s.p. back-end which worked without producing 'monkey chatter', but most of all the fact that it was being supported not only by Ten Tec, but by lots of enthusiasts who were writing innovative control software and handing it out as shareware via the Internet.

I'm seriously contemplating locating the RX-320 some 30m from my desk and using it as an instant access receiver which I can call up using the RS-232 line from my PC whenever I need to listen to the h.f. bands. Needless to say, the RX-320 will also be connected to a Wellbrook loop!

My Collection

My modest collection which started with a Zenith Transoceanic G500 from the early 1950s has gradually grown to include the next model along, the H500, a 'Royal 1000', a 'Royal 3000' and a 'Royal 7000', these last three being the solid state Transoceanics and the Royal 7000 being the last of the line before Zenith ceased production under the onslaught of firms like Sony.

I mentioned my Sony CRF-5100 which was,

to my eyes, the direct competition for the Royal 7000, and thanks to a reader of *Short Wave Magazine* I also have a CRF-5090 which was the nine band version of the CRF-5100. The '5090 is a non-working specimen, but if time allows, I will attempt to get it back into good order and tell you about it.

Last on the list of portable 'serious' short wave receivers is a Nordmende 'Globetrotter' which I found in a scrap bin minus its knobs (the owner of the bin had removed them so I was able to get them back), and which is a masterpiece of complex dial stringing - I know, I had to work out where the missing cord had been and then work minor miracles in getting a new cord back in place. Many swear words were used, in addition to dial cord.

I have to mention that of all these portables, the nicest audio without any doubt at all comes from the two 'tube' Zeniths. The combination of a Class A output stage coupled to a decent size speaker in a substantial wooden cabinet is just unbeatable.

Amazing Feedback

My thanks to all of you who have written to say that you enjoy my observations on this and that, and also to those who found fault. It's only by listening to all the comments that I can judge future articles, and the feedback constantly amazes me with the amount of knowledge which is held by short wave enthusiasts and about which I know relatively little.

Top of the knowledge list must come Michael O'Beirne who regularly surprises me by commenting on obscure topics of equipment design and history, and who must have a memory like a rat trap to remember it all. His latest surprise for me was to tell me how the fine frequency adjustment on the Racal 9475 Rubidium standard actually worked, but we'll tell that story another time.

I hope that the world becomes a more peaceful place for us all, and wish you all: Happy listening in 2003.

SWM

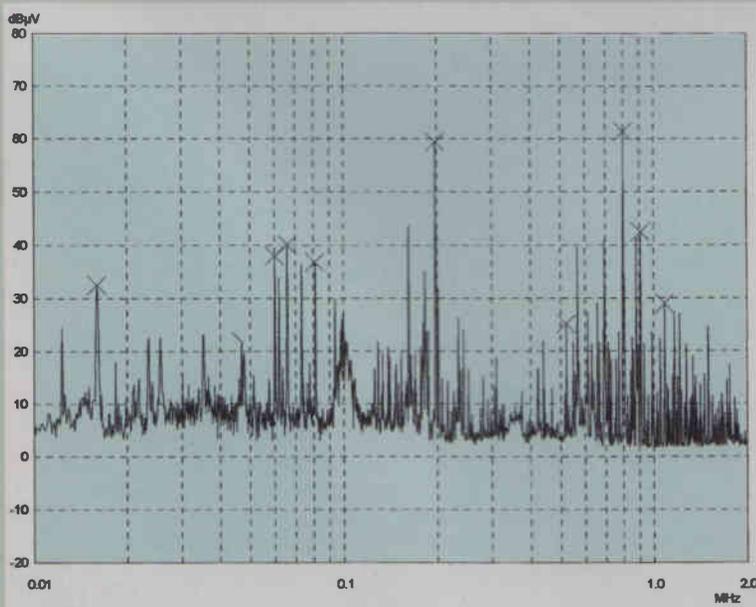


Fig. 8: The same slice of spectrum received via the calibrated 600mm Wellbrook loop.

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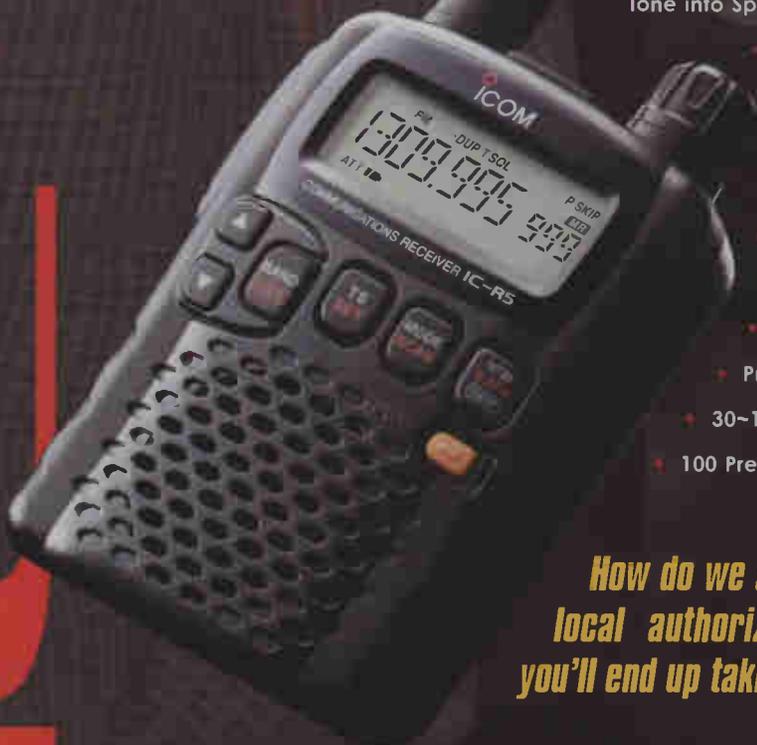
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Amateur Bands

Where am I? Not such an easy question for a radio amateur to answer. Most people can indicate where they are by giving some component of their postal address. But for the amateur, there are several different systems for indicating location. The one to use is often determined by the requirements of an award, or the rules of a contest. Some do require part of the postal address, most need one or other indicator of location based on the systems outlined below.

ITU

The most official system is that of the International Telecommunications Union (ITU), the pan world UN organisation overarching the telecommunications administrations of member countries. The ITU has divided the world into three geographical regions and sub-divided those regions into zones based on geographical and political boundaries. These zones, 90 in all, are identified by number.

For example, the British Isles together with France, Andorra, Luxembourg, Belgium and The Netherlands are in zone 27. The ITU is also responsible for allocating callsign prefixes to each country, and each country makes allocations to the amateur radio service within their ITU allocation.

Great Britain has been issued the prefixes G, M and 2, with amateurs having calls consisting of the prefix followed by an alpha numeric series which denotes the location and class of licence. Aircraft watchers will be aware that UK flying machines are allocated calls with the prefix G followed by four letters.

CQ

Just like the ITU, the American *CQ* magazine has also divided the globe into zones, but their zone boundaries are different from those of the ITU zones. For example, CQ zone 14 includes those countries which are in ITU zone 27, plus Norway, Sweden, Denmark, Switzerland, Spain, Portugal and Gibraltar. There are 40 CQ zones which means the average area covered by a CQ zone is somewhat greater than that of the average ITU zone.

Both systems are used in various contests and for awards. There are awards for working a number of zones. For some contests the scoring involves multiplying the number of stations or countries worked by the number of zones. For example, working one country would score 1 - one country times one zone. A second country worked in the same zone would

increase the score to 2 - two countries times one zone. A third country in a different zone raises the score to 6 - three countries times two zones.

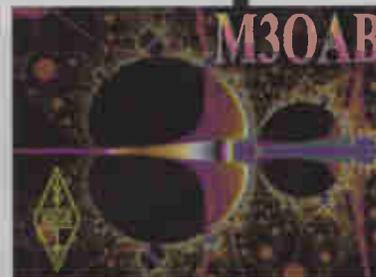
The site that provided the maps for this page and has a lot of good information is <http://www4.plala.or.jp/nomrax/webatlas.htm> which is run by Takumi Namura JF9EXF.

For greater accuracy of indicating a station's position, other locator systems are used, and I'll look at those next month. Before leaving the subject of locators for this month, I'll mention one other system, whilst not amateur radio related, that might be of interest. Citizens' Band (CB) has a locator system all its own. Ad hoc, and probably born out of the need for operators in some countries to be evasive about their location, it gives most countries, and a few areas within countries, a number. For some reason countries are called 'divisions' and England is number 26. A clue to its origins? Italy is 'Division One'!



M3 Time Again!

Congratulations are in order for a couple of contributors to the page. **Ted Stanmore** is now **MW3EBS** and **Alan Barker** has the



Alan Barker's impressive QSL card.

call **M3OAB**. Although Ted's licence is new, his Morse skills go back to his days in the RAF. The list of countries he's notched up with 10W from his TS-930S and a half size G5RV antenna using both c.w. and s.s.b. is impressive. Most of Europe is in his list, as well as Bombay, Brazil, the US and Jordan. Alan hasn't had his call for so long as Ted, but I'm pleased to say I was one of the first contacts in his log on 7MHz. We were both squirting 10W into the feeder, which was more than enough for a good contact. Alan's QSL card is also rather smart!

Military Manoeuvres

Philip Davies has been busy listening as usual. His interesting letter had some rather nice little snippets worth passing on. Probably one of the first occasions when a military station, this one using the call MRE52, joined in with an amateur QSO on 5MHz. (One wonders if, technically, only amateurs authorised to use 5MHz are permitted to listen to the military side of such QSOs?).

A special event station W2WTC (World Trade Centre) to remember the events of 11th September 2001, which it is believed took the lives of several licenced amateurs. So many special prefixes in use for the Scandinavian Contest that Philip logged over 40 different ones from that area during the 24 hours of its activity.

Next month - IARU, WAB and IOTA locator systems.

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DX Television

October saw the return of F2 reception but, compared with last year, the openings made less of an impact. Auroral activity occurred on the 1st with distorted pictures from Scandinavia. Meanwhile, the Spanish Band I transmitters continue to be on-air.

F2 Reception Reports

Weak Iranian signals on E2 were encountered at scanner-level around 0800 on October 6th. Two days later, there was a report of strong pictures from Dubai (EDTV) sporting logos in the top and lower-right of the screen. On the 9th, 6m (50MHz) activity from Kazakhstan and pictures from Chinese TV penetrated Western Australia.

Simon Hockenull (Bristol) regularly monitors 34-35MHz for prevailing F2 conditions. The 19th was particularly rewarding with Arabic p.m.r. and the USA Fire Service heard between 1300 and 1530.

On the 20th, **Paul Farley** (Newhaven) noticed line syncs on E2, but the signal was insufficient to produce locked images. Using a scanner the signal was identified as Iran with later reception from Dubai. Several Norwegian E2 stations were identified in South Africa on the 21st.

By 0915 on the 22nd, **Peter Barber** (Coventry) discovered scenes of rivers, hills and trees on E2. Pictures were strong, but exhibited the typical characteristic smearing and multiple images associated with F2 reception. By 1050, **Stephen Michie** (Bristol) identified the Iranian 1st network (IRIB-1) by its diamond logo in the top-left of the screen. An IRIB-2 announcer was also visible with its broken diamond logo in the top-right of the picture. A news and parliamentary programme followed at 1105.

On the 24th at 0851, **John Faulkner** (Sutton-in-Ashfield) detected scanner-level signals from Australian commercial station TVQ-0, based in Queensland. The station was simultaneously received in Japan. On the 26th, Moscow R1 was identified in Western Australia.

Equatorial Guinea

On several days, weak E2 carriers were present from the south, hovering just above noise-level. Equatorial Guinea (TVGE) is the likely contender as transmissions on this channel ceased in Ghana many years ago.

On the 27th in the Netherlands, a type of colour-bar test pattern was just visible at around 1430 from the TVGE 1kW outlet at Malibo. The TVGE logo is now positioned on a dark rectangle in the lower left of the picture. It will be interesting to discover whether the Spanish GTE electronic test card is still in use, but with TVGE identification.

Tropospheric Reception

Peter Barber was successfully rewarded with Luxembourg (RTL Plus) E7 in the German language on the 11th. Belgium (RTBF-1 E8 and VRT TV1 E10) and the Netherlands (NED-1 E4) were also logged. On the 4th, 5th, 15th and 19th, Stephen Michie heard various UK f.m. broadcasts originating from Croydon, Mendlesham and Chillerton Down. An opening on the 28th also brought in a few f.m. stations.

BBC Colour-Bar Riddle Solved

Jon Kempster (BBC, London) and **Andy Middleton** have solved the mystery surrounding the colour-bar identification caption (*SWM* November 2002, **Fig. 3**) seen by Stephen Michie. 'N6' is TV Studio N6 (the main studio for News Summaries and Bulletins at the BBC Television Centre in London). Obviously the BBC-2 Presentation suite had N6 faded up ready for a transmission, but accidentally broadcast the colour-bar pattern.

Freeview Launched

'Freeview', the new 'no-subscription' digital terrestrial service, commenced on October 30th with the promise of 30 channels. Unfortunately, the whole event was somewhat of a damp squib with an unceremonious switch-on at 0600. It was not surprising really as the only 'new' TV channels to appear on that day were Sky News, Sky Sports News, Sky Travel and UK History.

Prior to this, these channels were showing trailers from mid-October. Sky News, with their warped sense of respect and bad-taste, showed endless repeats of 'news breaking' items including upsetting reminders of recent rail disasters and the tragic events from September 2001 in America.

Two pop video channels ('The Hits' and 'TMF') were also available, but these have been up-and-running since early October anyway. Quite a few more channels are to enter service, according to the channel 'banners', but apart from FTN, which opens on 15th January 2003, no other channel seems to want the viewing public to know when to expect their fantastic offerings!

Some technical changes were necessary which meant digital receivers throughout the country required retuning. This was to accommodate the reshuffling of digital channels and changes in modulation from 64 to 16 QAM.

Although the reduction means less channels per multiplex, the digital signal is now more robust and reception should be more reliable with less incidence of picture break-up. This will effectively extend the present service area and create the same effect of imposing a 3dB e.r.p. increase at the transmitter. Since July, many of the UK's main digital transmitters have increased their power by 3dB.

Freeview could have been launched on November 2nd to mark the anniversary of the World's first TV Service which opened in 1936 from the BBC Studios at Alexandra Palace, but the powers-that-be seemed oblivious to this fact. Incidentally, Channel Four has been serving up, in our opinion, rubbish now for twenty years; it began on November 2nd, 1982.



Fig. 1: The Spanish GTE test card, which may still be used by TVGE in Equatorial Guinea, but bearing the appropriate identification.

Fig. 2: The new bland and boring logo from Channel Five which neatly sums up their programmes.

Fig. 3: The UK TV Channel caption.

Fig. 4: The FTN logo advertising their new digital service.

Service Information

United Kingdom: The trademark Channel Five colour-bar effect captions have now disappeared. Since October, the cheap-and-cheerful channel has used 'five' as their identification. They have also abandoned their translucent on-screen '5' logo.

From November, ITV have dropped their regional logos in favour of a single 'ITV-1' logo.

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

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Satellite TV News

The past 12 months has seen terrorism making the big news and unfortunately mid October 2002 continued the trend. Bali, noted for peaceful surroundings, the blue sea, skies, palms and white sand beaches in an instant became a burning, bloodied nightmare with 200 locals and holidaymakers incinerated after a massive terrorist bomb exploded.

Within hours the media arrived and live pictures from Bali were uplinking to the world's TV networks from October 14th. Use of *Europe*Star-1* @ 45°E ensured that a single Ku-band hop could provide excellent quality pictures into London/Western Europe out of Bali and the 'NON CAT THAILAND' uplink unit was soon on-site running at 12.644GHz-Vertical, SR 6116-FEC 3/4 carrying many live 1 and 2 way TV reports into the European networks.

Picture content varied to the extreme. The reporter standing against a beautiful scene of blue seas and skies, beaches with the palms moving in the breeze to the soldiers shovelling ice around piles of bodybags. Such are the faces of terrorism 2002.

Another side of terrorism was witnessed some two weeks later when Chechin terrorists seized a theatre in Moscow city centre and held the audience hostage. Not surprisingly, their demands were ignored and following the shooting of a hostage, the 'elite force' went in and in the resulting firefight all the Chechins and over 100 hostages were killed either by gun or gas. Once more *Europe*Star-1* played media host to this latest terrorism outrage, feeding back pictures and live reports into the BBC and others via a new uplinker 'VISCOM' using 11.627GHz-V (5632+3/4).

Iraq and Saddam with his government are far from happy over the UN demands for weapon inspections. Saddam however looked much happier on October 15th when he swept to an election victory taking over 99% of the vote. Baghdad coverage of the election was carried live on 'APTNBAGHDADPATH1', 12.677GHz-V (5632+3/4) *Europe*Star-1* @ 45°E. The locals seen in APTN's footage looked happy and excited on election night.

The Iraqi satellite TV 'Space Channel' showed the election victory speech with Saddam on a podium thanking all for their support and congratulating them on their voting decisions - his speech was translated into English and mixed with the original Arabic sound track. Less expected was the audience member that stood up, shook his fists and remonstrated loudly whilst Saddam stood impassively during this democratic outburst. It's difficult to edit out such problems on a live broadcast and his comments were not translated into English!

With the sabre sharpening in the Middle East, the 'Fox News' feed out of Jerusalem is worth monitoring - the signal is present on a 24 hour basis over Eutelsat's SESAT bird @ 36°E, it's strong on a 1.2m dish at 10.960GHz-V SR3250+3/4.

Alan Richards (near Nottingham) first alerted me to the South African 'Tellytrack RSA' horse racing programming that runs during the afternoons and later into the evenings plays out a recorded 'video loop' of that day's racing highlights complete with the racing odds, etc. Only South African courses are included at this time. The *Europe*Star* signal feed is strong and appears at 11.495GHz-V (SR3254 + FEC 7/8).

Alan E-mailed 'Tellytrack' and received an enthusiastic reply from Dieter Wohlberg, their executive producer, commenting how delighted they were down there knowing that he was enjoying their productions up here.

A note from Edmund Spicer who comments 'nag racing channel 'E-Quinielia' has started FTA with excellent pix on 11.731GHz-H (SR28126 + FEC 7/8) over on *Hispasat*, 30°W (FTA = free to air). Spanish exiles might note that 'AXN Portugal' has moved to 12.591GHz-V freeing up the 11.615GHz-V slot for the Madrid 'Canal 35' on test early November (both using SR27500+3/4 on *Hispasat*).

For German speaking weather anoraks there's a dedicated weather forecast that pops up evenings on *Intelst 801*, intended for regional TV services in Germany. 'WETTERSTUDIO GAIS' uses 10.988GHz-V (5632+3/4) with a service id 'SUE-GAI 001' suggesting a Swiss origination, check

from about 1800.

Atlantic Bird-1 @ 12.5°W has now 'run in' and happily carries the Globecast bouquet - 11.014GHz-H (SR20145 + 3/4) - now carrying sporting events on many evenings - in the clear. November 1st and Globecast Ch.2 featured high class ice skating championships in the '2002 Mastercard Skate Canada International' from Quebec, really compulsive viewing. Meanwhile Globecast Ch.3 carried American PGA Golf.

The Globecast bouquet also carries a further three channels that will not lock on certain receivers, for example my RSDs will not lock the additional chs. 4-6 whereas the Manhattan does. November 11th featured the American 'NESN' ice hockey which locked up on Globecast Ch. 1 and Chs. 4-6.

Digital satellite receivers are temperamental things, not unlike a 2-stroke motor bike engine - each has its own personality! So I'm scanning over *SESAT* @ 36°E and hit signals at 11.149GHz-V which eventually establish as SR6667 + FEC 7/8 - but it's encrypted. Now all digital transmissions normally carry a service ident, the RSD tells me an interesting 'MTI-EBU-LBR', but the Manhattan DigiPlaza receiver differs, telling me 'TES D16'!

In this temperamental theme I have been testing a NewWave 9000 satellite receiver, brilliant operational and very quick, running fine until one day I check out the Kabul Fox News feeder on 45°E which of course used 525-lines NTSC. Receiver crashes, self reboots and crashes again, on each crash the nearby (digital) receivers also crash in sympathy. Manufacturer suggests it's the firmware that operates the software gone down and a reprogram is advised. Never had these problems with valves!

NASA-TV provided excellent picture coverage evening November 9th of the *International Space Station (ISS)* with the departure of an earlier *Soyuz 5* craft from *ISS*, the crew having flown up more recently in a later model *Soyuz 5* craft which had docked and transferred supplies and other material into *ISS*. The return flight down to the Russian Steppes takes about two hours and an external *ISS* camera provided a poignant view as the *Soyuz* slowly pulled away growing smaller in the vastness of space. NASA provided pictures of both the Johnson USA and Moscow control centers in the NASA-TV feed. Globecast obliged with these dramatic pictures on their Ch.2 slot via *Atlantic Bird-1*.

There's not much to be seen on *NSS-703* @ 57°E, but at the end of October I'm scanting the output and apart from the Star package, I find activity at 11.436GHz-V running an odd SR1488 + FEC 3/4. The service id 'P11098 V 01' looks promising, but a total refusal to reveal a picture. I've had no success in the Eutelsat 48°E slot where their 2F1 bird has been in hibernation, late October and *Eutelsat 2F2* has taken over from 2F1 so perhaps 'things' will live up?

But good news from Edmund Spicer (Littlehampton) who reports that RUV Iceland has appeared on satellite - the spot to check is *Astra 2D*, 28.2°E - 10.818GHz-V (SR22000+5/6) where late October into November 'NLC' promotional pix, patriotic music and aerial Icelandic shots have been carried on two video streams. 'NLC' = 'Northern Lights Communications' and the service idents ringing up are 'RUV TESTS 1 (and 2)' - signal levels are 95% on Edmund's 450mm dish.

Meanwhile over on *Thor-2* @ 0.8°W the 'Telenor Info Channel' is also carrying the same promotional video offerings - and within the same transponder is carried the Icelandic religious channel 'Gospel Channel Europe'. These two channels on Thor are on 11.247GHz-V (24500+7/8) - excellent detective work from Edmund.

A final note from Roy Carman (Dorking) who comments on the eruption of Mount Etna, carried live on *Eutelsat W2*, 16°E October 28th showing red hot lava flows ('HOL 091' 12.517GHz-G 5632+3/4). Next day the recently slotted *Russian Express 3A*, 40°E gave more live lava flows, roads blocked and forests destroyed (11.662GHz-V 6400+3/4). This period of Earth's instability led to the collapse of an Italian school with many kiddies and their teachers lost, a tragic happening recalling for many the Aberfan disaster of the 1950s.



Police Chief of one of the primary County updates the press on the sniper shootings (NSS-7).

REUTERS WILL WILL REFEED BIBI AND THE REST OF THE CUT AT 20:00

Take 2. VTR re-roll!



First asylum seeker is rescued from the Florida visitors (NSS-7).



Sky Home news package - Bali bomb - transmitted over Europe (Star-1)



Australian reporter prepares a news report - Bali bombing - a beautiful inland marred for years with the terrorist outrage.



Sky Sports VTR clock in widescreen (Intelst 801).



Italian, with his screaming 28th direction win, makes his victory speech live on 'Italy Sports Channel'.

■ PETER BOND, c/o EDITORIAL OFFICES, BROADSTONE

■ E-MAIL: skyhigh@pwpublishing.ltd.uk

Sky High

9-11 The Recovery

Some excellent news was announced in mid November when the airline passenger figures for October 2002 were made public. At our busiest seven airports, 11.4 million passengers travelled in October, these figures are up 16.2% compared with October 2001, (for obvious reasons). There was also an increase of 2.3% compared with October 2000, which means that we are now back on a par with pre September 11th passenger numbers. Perhaps not surprisingly, the Trans-Atlantic figures showed the biggest increase with a 25.8% rise between October 2001 and 2002. All in all it's great news for the civil airband listener.

Another piece of interesting news was the announcement that to hopefully curtail any further expansion of Heathrow and Stansted, it is possible that they will consider building a new four runway London Airport on the Thames estuary at Cliffe in North Kent. From an Air Traffic point of view, another major airport launching aircraft into the busy skies above south east England may not be such a good idea, but I suppose expansion will have to take place in one form or another.

It's funny how these projects go around in circles. If I remember correctly in 1971 the plan was to build the new third London Airport at Maplin Sands on edge of the Thames estuary, the only difference was that it was on the northern Essex side! Interestingly, the plan to build at Maplin was apparently not finally scrapped by the government until 1984.

5 Squadron - Coningsby

Some news from **Dave L** and **Mick** who recently visited RAF Coningsby, they report that sadly another RAF Squadron disbanded on the 27th September. 5 Squadron performed a farewell six ship flypast on the 26th, (callsigns Scorpion 1 to 6), to mark the stand-down of one of the resident Tornado F.3 squadrons, thus leaving just 56 (R) Squadron and the Tornado F.3 OEU. I was under the impression that 5 Squadron were due to reform at Coningsby in mid 2004, equipped with the new Eurofighter/Typhoon, but recent reports indicate that they may now reform at Waddington in 2005?

Some of the 5 Squadron callsigns noted in use by SWM readers between 2000 and 2002 were: CARBON, SATURN, SCARLET, SCORPION, TITAN, TYPHOON and WARLOCK. (It should be noted that some of the Coningsby callsigns have been reported in use by our readers by both 5 and 56 Squadrons). It would be interesting to see any reports of callsigns still in use with 56 Squadron - also, can anyone confirm if the 5 Squadron frequencies, (243.325 Air/Air) and (254.675 Maple Ops) are still in use?

Thanks to **Graham** another brief piece of news regarding Coningsby based aircraft, the Battle of Britain flypast over London on the 15th September, was executed by four aircraft from 56 (R) Squadron using the callsigns SATURN 1-4.

Lakenheath

Two SWM readers who wish to remain anonymous have sent me a listing of the main radio studs for the 48 TFW F-15s at RAF Lakenheath. The information was apparently copied from a photograph of the stud list which was located on the dash, inside an F-15 cockpit! This photo was taken during a private visit to the base in September. As you can see the operations frequency on Stud 01 varies for each of the three based squadrons.

Studs 17 to 20 are individually programmed with specific pre-set frequencies before each operational mission. According to my records there appears to have been a few changes in the past year, so it is worth including the complete listing. ICF = Initial Contact Frequency, SOF = Supervisor Of Flying. It was also noted during the visit that the Air to Air frequency 343.675 appears to be used by visiting TDY aircraft rather than based aircraft.

Stud 01	300.075	Bolar Ops/492 FS
Stud 01	343.475	Panther Ops/494 FS
Stud 01	316.7	Reaper Ops/493 FS
Stud 02	397.975	Ground
Stud 03	358.675	Tower
Stud 04	242.075	Departures
Stud 05	300.8	UK Low Level Ops
Stud 06	299.975	London Mil East ICF
Stud 07	275.475	London Mil West ICF
Stud 08	249.475	Scottish Mil ICF
Stud 09	362.125	SOF/Ramrod
Stud 10	337.6	Approach/Rapcon
Stud 11	309.075	Radar/PAR
Stud 12	259.05	Radar/PAR
Stud 13	290.825	Radar/PAR
Stud 14	367.325	Radar/PAR
Stud 15	369.075	Radar/PAR
Stud 16	338.025	Have Quick Timing
Stud 17-20	as above	

Leuchars Bob

Thanks to **Dave** and **Jimmy** for their E-mail in which they include a short list of some of the more notable callsigns used by aircraft arriving at the Leuchars Battle of Britain show on the 12/13th September.

BARON	GAF/JG-71	F-4F
BISON	USAF/914 AW	C-130H
FREEBIRD	UK/CIVIL	STRIKEMASTER
KEMBLEJET	UK/DELTA JETS	HUNTER T.7A
PACK	US ANG/157	ARWKC-135R
SCALP	USAF/917 Wing	B-52H
SCARAB	RAF/14 SQN	Tornado GR.4
TRON	USAF/52 FW	F-16C

Also noted during late September by Dave and Jimmy were 3 Squadron Harriers using the apparently new callsigns HATCHET and BLOWLAMP. These were exercise callsigns rather than actual 3 Squadron callsigns and were used by aircraft

deployed to St. Mawgan for the National Collective Training Exercise, (see next).

Collective Training

During the period of the 17th to the 25th September a National Collective Training Exercise was held at RAF St. Mawgan. Unfortunately, due to other commitments I only managed to turn the radio on a couple of times during the exercise and they were both relatively quiet periods. I am therefore grateful to **Rich**, **Steve P.** and **Brian** whose information I have collated into the following report.

The exercise involved eight 3 Squadron Harrier GR.7s and eight 54 Squadron Jaguar GR.3As, one of the Harriers was damaged during the exercise and was taken by road to St. Athan for repair, a replacement was flown in from Cottesmore. The reports did get a bit confusing as it seems that some of the callsigns used during the exercise were used by both squadrons at differing times. Hopefully, I have sorted this out and the callsigns that were reported are as follows, (it seems likely that some of the callsigns such as POISON and CHAOS were used for positioning as well as actually during the exercise).

- 3 Sqn/Harrier GR.7 BLOWLAMP 1-2, HATCHET 1-4, POISON 1-3, RAMPAGE 1-4
- 54 Sqn/Jaguar GR.3A ACID 1-4, BLACKCAT 1-8 (arrival callsigns), CHAOS 1-2 (or 4?), HATCHET 1-4, HAVOC 1-4, NEWCON 1-2, PASHER 1-2, UKON 1-2, (possibly YUKON?).

It appears that switching callsigns for different elements of a mission also took place so this caused more confusion between the reporters. For example it appears that aircraft were heard switching to/from HATCHET to callsigns such as JOYFUL and DIVINE, (type uncertain). LION 1 and NESTEGG 1-3 were also heard providing refuelling for the exercise aircraft and these are presumably Brize Norton VC-10s.

On the 21st RAMPAGE 1-4 and 5-7 plus HAVOC 1-4 and 5-7 took off for Yeovilton where they performed a simulated attack on the airfield as part

of the air show flying display. They then proceeded to carry on with their mission in the area of the Bristol Channel and interestingly were heard to use some D - School frequencies after leaving Yeovilton - 249.725, 259.8 and 276.25 were all noted in use.

Apart from standard ATC frequencies, very few other frequencies were noted by my correspondents, the following were the exceptions: 255.85 which is the 4 Squadron Harrier, Skeleton Ops. 275.475 which is UK Low level channel 3, (TAD 043) was used by HACHET 1-4. If you can add to or amend this report please let me know.

Lastly, a new Coltishall Wing callsign has appeared in the past couple of months and that is SHOCKER which seems to be used mainly by 16 (R) Squadron.

Tk8500 - Update

Following up my report on the *Tk8500* software for the Icom IC-R8500 and other radios in the November *SWM*, some further information has now been passed onto me. When I evaluated it originally, it was version 0.6 of the software. This has now progressed to version 0.8 Beta, unfortunately any changes or updates to the software are not identified in a text file. From a personal point of view, I didn't notice any obvious changes to the software with the new version, but readers may wish to make the upgrade.

I did however find one small glitch. The IC-R8500 allows you to cut and paste memories between banks up to a maximum of 99, consequently I had two of my banks set to 75 and 82 memories respectively. When I downloaded the memories from my R8500 with the software, it would only recognise banks of up to 67 memories. After an E-mail to Bob in the USA, I found out that the tk8500.ini file has a line which reads HighestChannel=67, (67 is the maximum number of memories Bob had in a bank in his R8500). If you change the tk8500.ini line to read HighestChannel=99, the full range of memories will be enabled. Bob warns however, **do not use a number above 99!**

After two months I continue to use the software on an almost daily basis and I still continue to be impressed, (especially as it's free). The problem with the scan delay is annoying, but if you have the log function running you don't miss anything. For information and downloads of the software see www.parnass.org



For this month's photo, I thought we would have something exotic from the archives. Seen on the ramp at Jacksonville in 1966 is this very smart Florida Air National Guard F-106A.

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Decode

The hot news this month is the release of version *Skysweeper* version 2.10. Regular readers will know that this program has been gradually evolving over recent years and is becoming an ever more competent decoding system. The latest release marks a

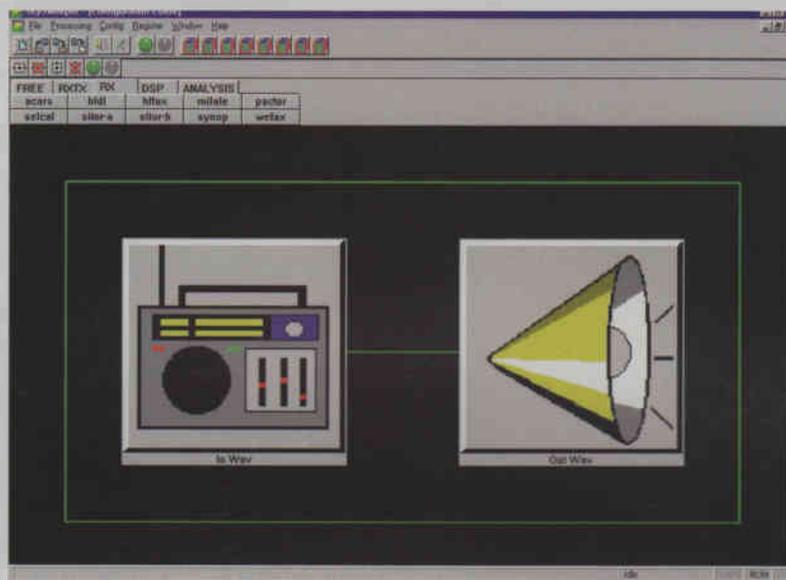


Fig. 1 - Basic *Skysweeper* v2.10 screen.

significant step forward, so justifies a bit more space. Although 2.10 represents a major improvement over earlier versions, current owners will be delighted to hear that 2.10 is a free upgrade - this is excellent news and shows the developers commitment to continuous development.

Major Revision

If you've not come across *Skysweeper* before, there are a few unique characteristics that are worth noting. The most notable is the facility to put together a customised decoding system using the software modules built into *Skysweeper*. This modular approach provides enormous flexibility and allows you to use *Skysweeper* for much more than just simply decoding signals. The range of modules built into the latest release is amazing with fifteen decoders, eight transmitters, eight filters, five visualisation tools, four applications and eight analysers! These are not just fixed

modules with a simple set-up, all are fully configurable.

With such a huge range of options, the program needs a well thought through interface to make the features manageable. This is achieved through the neat graphic interface that shows the *Skysweeper* components in block diagram form thus making the set-up very obvious. Adding or subtracting modules is done using a very simple menu system. Probably the best way to show this is to take you through an example.

Let's try making a simple RTTY decoder with a built-in tuning display. To do this start the program and you will be presented with the basic interface as shown in **Fig. 1**. This just shows a picture of a receiver connected directly to a speaker. Making this into a RTTY decoder just requires one extra module - a RTTY receiver.

To add a module you use the '+' icons on the toolbar, see **Fig. 2**. These icons are used to either connect modules in series with the signal path or to connect visualisation (display) modules across the signal path. If you start by clicking the '+ Add Block' icon, you will be presented with a comprehensive list of module categories, these will include: Decoders, Transmitters, Filters, Visualisers and Applications.

Select decoders and you get a choice of 15 decoder types - choose RTTY and press OK. You don't have to worry about the position selector, there's only one place it can go at this stage. When you hit OK you will find the RTTY decoder module inserted between the receiver and the speaker. You should also find the main RTTY decoder screen will be on show.

Whilst the actions so far will give you a basic RTTY system, there are a number of other items that can be added to make the system more interesting. One of the first choices may be to add a spectrogram display. This is easy, just choose the parallel + (Insert Analyser) and choose Spectro. In this case you have a choice of two positions for the monitor, either before or after the RTTY decoder, select position one.

If you've completed this correctly, you should find your screen looks something like **Fig. 3**. Before we move-on, lets take a look at how the spectrogram and RTTY decoder can be configured. That's not to say you have to configure them as the default settings are generally very well chosen.

Getting Configured

You will note that on the both the RTTY decoder and the spectrogram there's a CONFIG menu item in the top left of the display. This is where you can customise the modules to do exactly what you want. Start with the RTTY decoder. When you click the Config button you get a grey box with a number of user adjustable options. In the left of the box you will see the tone scan ranges. This controls the range of frequencies that the decoder will monitor whilst it tries to find a usable RTTY signal.

If you want to save a bit of processing power, you could adjust this to be closer to the range we would normally use for RTTY, i.e. 1 to 2KHz. You need to do this for both the mark and space scan frequencies. Providing you tune your signal to this frequency range, this should speed-up the automatic baud speed recognition process. There are a few other parameters you can play with in the RTTY module.

Perhaps the most interesting is the SYNOP/SHIP tick-box a tick here starts the SYNOP/SHIP translator that takes five digit coded weather messages and produces a detailed message readout. This is really great fun and very informative too. If you want to save all the decoded output, just hit the Save button

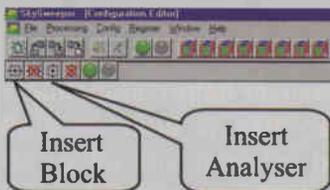


Fig. 2 - Block and analyser selection.

in the RTTY receiver and you can send everything you receive to a log file.

If you know the parameters (speed, shift, etc.) of the signal you want to receive you can preset these, which will speed the time from tuning into the signal to decoded text being displayed. If you're monitoring the coded weather stations then set the speed to 50, shift to 450 and tick the SYNOP/SHIP box. On my system (450MHz Pentium3) this reduced the time taken from tuning the signal to receiving text from fourteen seconds to four seconds.

Another module you may want to seriously consider is a band pass filter to help cut out some of the unwanted noises and make your signal easier to decode. Again this is really easy to do. Go to the '+ Insert Block' icon, choose filters then select FIR. This is a Finite Impulse Response filter and is one of the most powerful d.s.p. building blocks. Insert this block in position 1 and you will be presented with what might appear an overpowering array of options. Don't panic. This filter is really quite easy to use.

The first thing to decide is the type of filter you want, for this example we want to pass a band of frequencies so choose band pass. Next job is to set the upper and lower limit of the range of frequencies we want to pass. Well set that to just slightly wider than the scan range we used for our RTTY decoder, i.e. 800Hz and 2.1kHz. To do this set FP to 800 and FS to 2100Hz.

Next adjustment is the filter length - the longer the length the more processing power is required and the sharper the cut-off. To help you optimise this setting, the two graphs on the right show the filter bandwidth and its impulse response. The only other setting is the window type and you can choose this by experimentation using the graphs as your guide. The filter parameters can also be adjusted whilst you are decoding. Just open the window, make the changes you want and hit the 'Apply' button to implement the change.

Powerful Filtering

This is a really powerful way to apply filtering to your signal as the range of adjustments are huge. Once you've designed the filter you want you can save it for future use by right clicking on the adjustment screen and selecting 'Save to File'. This will save all your setting in a *.tap file for use again whenever you like. Don't forget to press the green button to start the d.s.p. running!

One of the other great features of *Skysweeper* is the facility to reuse many of the modules. A good example of this is the way in which you can use the same analyser tool in different parts of your decoding system. Going back to our RTTY decoder with FIR filter, it would be really useful if we could monitor the signal immediately before and after the filter so we can see the effect for ourselves. With *Skysweeper* this is simple use the '+ Add Analyser' icon to add a spectrogram or

FFT power spectrum display at position one and another at position two. You now have a very clear view of how the filter is improving the signal.

At this point you may be struggling with a rather messy screen layout, don't worry, there's a simple solution. Go to the Window menu and choose Tile, the open windows will be magically rearranged to fit within the main *Skysweeper* window. Its also worth maximising the *Skysweeper* window so that you have lots of space to work within.

When you've managed to put together a customised decoder, you can save the entire configuration via the save icon on the main menu. Conversely you can also load one of the many pre-assembled configurations.

You may have twigged by now that, although *Skysweeper* is mainly viewed as a decoding tool, it also doubles as a very effective audio d.s.p. unit and can be used to tidy-up all manner of signals using comprehensive range of d.s.p. filter systems. In addition to the expected band pass related filters, there is an excellent noise reduction systems for white noise and an amazing notch filter that can take out up to eight separate whistles. Don't be tempted to use this anywhere a utility signal, it will take it out completely. Even Morse code is quickly eliminated. I don't mean reduced either, they are rendered totally inaudible!

Although this has taken the entire column for this month, I've only really scratched the surface of what the program can do. As if that wasn't enough, the team at *Skysweeper* are currently working on a professional version of the program that will include a host of sophisticated analysis tools. If you would like to try a copy just go to the UK agents (Pervisell) web site and download a trial demo or buy the full version at £59.99. The address is www.pervisell.com

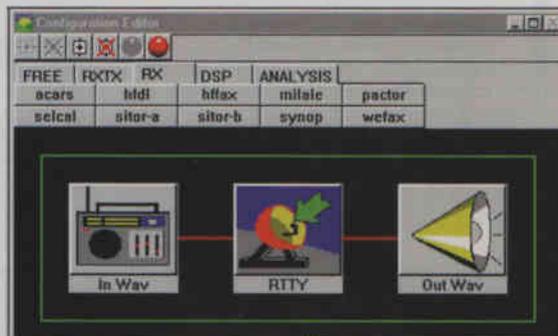


Fig. 3 - Basic RTTY decoder.

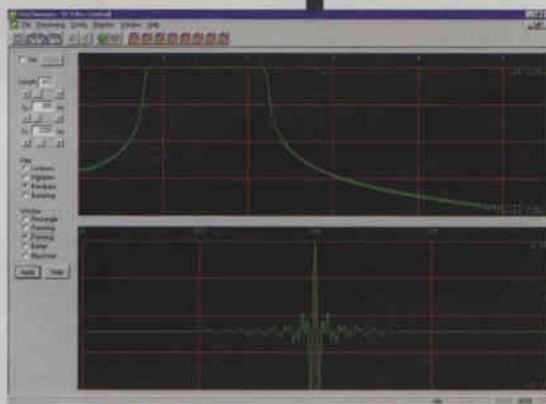


Fig. 4 - Skysweeper FIR parameter screen.

```

SYNOPSIS MESSAGE
WMO identification number: 71912 CANADA GILLAM, MAN 56 21N 94 42W
Precipitation indicator : Precipitation reported in group 1 only
Station type           : manned station -- weather group included
Cloud base             : above 2500 m
Visibility              : 24 km
Total cloud cover      : 0 eighths (clear)
Wind direction         : 330 Deg
Wind speed             : 12
Temperature            : -15.3 C
Dewpoint temperature  : -17.7 C
Station pressure       : 1009.2 hPa
Sea level pressure     : 1028.3 hPa
Pressure tendency     : Increasing, then steady -- resultant pressure higher
3 hour pressure change : 02.5 hPa
Liquid precipitation   : 0.0 mm
Precipitation meas time : 6 hours
Present weather        : clouds dissolving
Past weather (type 1)  : snow or mixed rain and snow
Past weather (type 2)  : snow or mixed rain and snow
Time of observation    : 09h 23min
Data for National use  : 10082
Data for National use  : 20082
Data for National use  : 30229
Data for National use  : 40161
  
```

Fig. 5 - Skysweeper SYNOP output.

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■ E-MAIL: ssb.utils@pwpublishing.ltd.uk

SSB Utilities

This month's column is entirely devoted to the recent changes to the global h.f. system used and operated by the US forces world-wide. Last month I mentioned that some subtle changes had been noticed since the 1st October, and the publication of the latest US DoD *Flight Information Handbook (FIH)* at the end of October has revealed the extent of the changes. Some of the changes are immediate and have already been noticed by listeners, and some will take place over the next few months.

GHFS Is Dead, Long Live The HF-GCS

The most significant change is that the h.f. network has changed its name. It is no longer called the GHFS (Global HF System). It is now the USAF High Frequency Global Communications System or HF-GCS. The *FIH* says that there are 15 stations in the network, but it only lists 14 of them.

The station at Thule on the west coast of Greenland will be closing down in January 2003 and will be replaced by a new station operated from NAS Keflavik in Iceland. Keflavik has already been heard making test transmissions on 11.175MHz during the day in early November, in preparation for its official start in the new year.

I know that the *FIH* is publicly available from the NOAA in the USA, but many people seem to want to avoid contacting them, maybe think that they would not sell individual copies. Well, they are quite happy to sell to individuals, so long as you have a credit-card. However, for those who are unable to get hold of the latest *FIH*, here are the details from the HF-GCS section of the new *FIH* that was released on 31st October 2002.

USAF High Frequency Global Communications System (HF-GCS)

The HF-GCS System is a world-wide network of 15 high-power h.f. stations providing air/ground h.f. command and control radio communications between ground agencies and US military aircraft and vessels. Allied military and other aircraft are also provided support in accordance with agreements and international protocols as appropriate. The HF-GCS is not dedicated to any service or command, but supports all DoD authorised users on a traffic precedence/priority basis. General services provided by the HF-GCS are:

General 'Phone Patch and Message Relay Services
Automatic Link Establishment (ALE)
HF Data Support
Command and Control Mission Following
Emergency Assistance
Broadcasts
HF Direction Finding Assistance
ATC Support

SCOPE Command replaces older high power Global h.f. equipment. SCOPE Command incorporates Automatic Link Establishment (ALE) to automate and enhance h.f. communications. By January 2003, all HF-GCS station transmit and receive equipment will be remotely controlled from the Centralised Net Control Station (CNCS) at Andrews AFB in the USA.

HF-GCS Procedures:

General Calling. Aircrews use a preliminary call as outlined in *ACP-121 (US) Supplement 2* using

the collective callsign "MAINSAIL" or the HF-GCS station callsign (example: Sigonella Global this is Dark 86 on 11175, Over). HF-GCS operators require approximately 10 seconds (for automated equipment configuration) to respond to calls for service. The HF-GCS operator may request the aircraft change to a discrete frequency for improved and/or extended service.

PUBLISHED FREQUENCY LISTING - all the HF-GCS stations operate on "core" frequencies to provide increased "Global" coverage. The published frequency listing does not reflect complete system frequency authorisations. These published frequencies will be used for initial contact, EAM broadcasts, and short term C2 'phone patch and message delivery. Other extended or special services will be moved to each station's available "discrete" frequencies.

FREQUENCY GUIDE - The frequency guide is designed to optimise air/ground communications.

Primary HF-GCS Frequencies - 24 hours - 8.992, 11.175
Back up HF-GCS Frequencies - DAY - 13.200, 15.016
Back up HF-GCS Frequencies - NIGHT - 4.724, 6.739

Unclassified 'Phone Patch and Message Relay Services.

'Phone Patch Service. 'Phone patching allows direct voice communications between ground agencies and aircraft by electronically connecting telephone circuits to radio transmitters and receivers. 'Phone patch service is reserved for official unclassified business only and should not exceed five minutes. Patches of more than five minutes, or of a sensitive nature, should be run on a discrete frequency. Aircrews requesting a 'phone patch must include all information necessary for HF-GCS operators to complete the call, such as the identity or location of the called parties and telephone number if known. 'Phone patches are monitored by HF-GCS operators and if radio reception is not of sufficient quality to complete the patch, they will attempt to copy the traffic and relay it to addressees.

Message Relay Service. HF-GCS operators transcribe encoded or plain-text messages for aircraft or ground stations and forward them to the addressees by radio or landline. The text of the messages can be in the form of alphanumerics, code words, plain text, acronyms, and/or numerical sequences. Aircrews may use "READ BACK" procedures when the message data is critical, or when an incomplete transmission is suspected due to poor radio reception. All messages received by Global stations will be accepted and delivered by the fastest means available according to precedence and priority.

ALE - ALE allows automated ground agency contact by selecting the best station and best frequency without operator interaction. ALE radios make this possible by using a datafill that contains frequency, station and other pertinent information. For ALE radios to operate properly, the radio must have a loaded datafill, be turned on in the "automatic" mode and remain there the duration of the flight. If the radio is removed from the ALE mode, history tables will require time to rebuild and initial communications may be slightly degraded.

HF Data Service. All HF-GCS stations have h.f. data access to AUTODIN and SACCs. HF Radio Teletype requirement has been removed by Joint Staff J6.

Command and Control Mission Following. C2 agencies can use the HF-GCS for mission tracking/control of their aircraft. Aircraft responsible to a C2 agency for mission tracking/control should transmit an initial contact/departure report to a Global HF System station after takeoff. The following information should be included:

Aircraft Callsign
Departure point and time
Destination point and ETA
Relay Instructions for C2 Agencies
Remarks: DV codes, special instructions, etc.

EMERGENCY ACTION MESSAGE (EAM) BROADCASTS - Most HF-GCS stations transmit high priority EAMs on published frequencies during specific broadcast periods. During EAM broadcast periods, aircraft may only transmit In-Flight Emergency traffic.

EMERGENCY ASSISTANCE - Distress and urgency situations should be clearly identified by the words "MAYDAY" or "PAN" as appropriate (refer *ACP 121 (US) Supplement 2*, chapter 8 for definitive usage). Aircrews should transmit present position and heading when encountering grave or serious emergency situations.

HF DIRECTION FINDING (D/F) ASSISTANCE - HF-GCS stations are capable of coordinating D/F efforts between aircraft and direction finding facilities for both emergency situations and suspected spectrum interference location efforts.

Emergency D/F Requests. Aircraft requiring D/F support should advise the HF-GCS station of the nature of the emergency, a bearing (steer) or a position (fix). The HF-GCS operator will arrange the support and ask the aircraft to transmit a slow count from 1 to 10 and back, followed by the aircraft callsign. The aircraft should then standby for further instructions and/or results of the service. D/F facility response time will vary, depending on operating conditions, location of the aircraft, nature of request, prevailing d.f. facility operating commitments, type of D/F facility providing the service and coordination of all concerned. The average response time is estimated at four minutes for bearings and ten minutes for positions after the slow count.

D/F support for suspected spectrum interference. Aircraft experiencing spectrum interference may obtain D/F fix information on source of interference by calling the nearest HF-GCS station and requesting Spectrum Interference D/F support. The aircraft will advise the Global stations of the frequency affected, type of interference (Voice, Morse Code, Printer, Noise, etc.) and request a read-back of the information passed. A report will be filed in accordance with *AFI 10-707* by the aircrew upon landing. The Andrews CNCS will report Spectrum Interference D/F results via message to the AF Frequency Management Agency and the aircraft unit command post.

ATC SUPPORT - HF-GCS is not configured to meet ATC communications routing requirements and cannot provide ATC flight following service. This service can be obtained through the

appropriate Civil/ICAO ATC communications agency such as the AREA CONTROL CENTER, SECTOR RADIO, or FLIGHT INFORMATION CENTER (see section B, ICAO HF Aeronautical Station List). Global h.f. stations will accept emergency ATC traffic and provide 'phone patch or message relay support as required.

Although the ALE details are not strictly covered by this column, I have mentioned them here as they are part of the HF-GCS system. Over the next few weeks and months I will be able to spend some time analysing these changes and next month I hope to provide some comments.

HF-GCS Network Frequencies

Winter (Oct-Mar), Summer (Apr-Sep), times UTC.

MHz (u.s.b.)	4.724	6.712	6.739	8.992	11.175	13.200	15.016
Andrews	0200-1230 0430-0930	2400-1230 0230-0930	-	24 hrs	24 hrs	1230-0200	1230-2400
Ascension	2400-0700 2400-0700	-	1900-2400 1900-2400	24hrs	24hrs	-	0700-1900 0700-1900
Croughton	1800-0800 2230-0400	1800-0800 2230-0400	-	24hrs	24hrs	0800-1800	0800-1800
Diego Garcia	-	-	-	24hrs	24hrs	-	-
Elmendorf	0230-1900 1000-1300	-	0030-2130 0800-1400	24hrs	24hrs	1900-0230	2130-0030 1400-0800
Guam	1200-2030 1300-2030	-	1000-2030 1100-2000	24hrs	24hrs	2030-1200	2030-1000 2000-1100
Hawaii	0800-1700 1000-1600	-	0400-0800 0500-1000	24hrs	24hrs	-	1700-0400 2000-1300 2000-1100
Keflavik	Station will be operational in January 2003						
Lajes	1800-0800 2230-0400	-	-	24hrs	24hrs	24hrs	0800-1800 0400-2230
McClellan	0500-1530 0730-1300	-	0300-1530 0530-1300	24hrs	24hrs	1530-0500	1530-0300 1300-0530
Offutt	0300-1400 0600-1100	-	0100-1400 0400-1100	24hrs	24hrs	1400-0300	1400-0100 1100-0400
Puerto Rico	0200-1100 0300-1000	-	2400-1100 0100-1000	24hrs	24hrs	1100-0200	1100-2400 1000-0300 1000-0100
Sigonella	1800-0800 2230-0400	-	24hrs 24hrs	24hrs	24hrs	24hrs	0800-1800 0400-2230
Thule*	-	-	-	24hrs	24hrs	24hrs	24hrs
Yokota	0930-2200 1200-1930	-	0730-2400 1000-2130	24hrs	24hrs	2200-0930	2400-0730 2130-1000

*Station will deactivate in January 2003.

HF-GCS ALE Address and Frequency Chart.

Station	Call	MHz									
		3.137	4.721	5.708	6.721	9.025	11.226	13.215	15.043	18.003	23.337
Andrews	ADW	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ascension	HAW	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Croughton	CRO	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Diego Garcia	JDG	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Elmendorf	AED	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Guam	GUA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hawaii	HIK	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓
Keflavik	IKF	Operational early 2003									
Lajes	PLA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
McClellan	MCC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Offutt	OFF	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Salinas	JNR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sigonella	ICZ	Operational early 2003									
South Atlantic	MPA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thule		No capability									
Yokota	JTY	✓	✓	✗	✓	✓	✓	✓	✓	✓	✗

Scanning Scene

You know how it is. You can't sleep and you eventually wind up surfing the Internet. About

eight months ago I was mooching around at about three in the morning and decided to run a search for audio inversion decoders.

The more I venture into the 'net the more convinced I am that all of the world's weirdest people have websites so that they can let the entire planet know just how strange they really are. Anyhow, after a while I managed to find some audio inversion decoding programs. As I located them I would download the files and have 'em ready to run on the computer in case I came across any inverted signals.

I found one such program hidden in the depths of an American university ftp site (I can't remember which one) and like the others I left it handy for use should I encounter any coded audio transmissions. One by one I deleted the other programs as I found that they were as useful as a spittoon in the ocean. Eventually I was left with the single file freeware program called *Speech Inverter*.

Several weeks ago I was just running the scanner around some frequencies and came across some audio that was clearly encoded using some sort of audio inversion. It sounded similar to MASC encryption in that there were data bursts at the start and end of transmissions. My set up here is such that I can plug the computer soundcard into any of the receivers in a trice.

Within a second I had connected the Bearcat receiver to the computer and was running the *Speech Inverter* program. It worked, just like that! It actually worked! After so many failures I couldn't believe it.

The program runs under *Windows* and my mate Iain (who knows about this stuff) reckons that it doesn't need too much processor power to operate. I am using it on a PC with a 233MHz AMD processor and 132MB of RAM, running *Windows 98*. You will need a lead to connect the soundcard's line input socket to the audio out socket on your receiver. Then all you need to do is to tune the radio to the inverted audio signal and launch the program.

There are four controls on the screen. START, STOP, EXIT and Inversion Point Control. Hit 'START', you'll then hear audio coming from the computer speakers. It's pretty unlikely that you will hear decipherable audio at this stage. The thing to do now is to tune the Inversion Point Control slider gently until the audio starts to make sense. It is very similar to tuning a lower sideband

signal. After all this trouble, the signal that I decoded on 169MHz sounded like fishermen from Northern Ireland discussing their catch (or rather lack of it). I found that I was able to decode their audio with the Inversion Point set at around 1500Hz.

The kind of encryption that they were using required me to continually adjust the Inversion Point Control to keep decoding the transmissions. After a few minutes this becomes almost second nature. This program is certainly worth a try if you are hearing encrypted audio on the scanner. It's so simple and it really works.

By this time Kevin will have

sobered up from the *SWM* office party and the *Speech Inverter* program should be languishing in the files section of the *SWM* Readers group site just ready to be downloaded and pitted against your local audio inversion users!

Listening In

I'm sure that it's not terribly lawful to decode inverted audio you know. Even less so was the chap from north east Scotland who was recently fined four hundred quid for listening to his neighbour's cordless telephone conversations on a radio scanner. The matter came to light when he told another acquaintance about what he had heard and then the word

brought down trees and power lines. Some consumers were left without power for a whole week. Often the factors that contribute to power outages make radio monitoring more interesting. Just when you need the scanner...no electricity.

Have you considered an alternate power source? I don't mean an expensive generator although a 'genny' is a handy item. No I mean a straightforward battery. I recently bought an 85AH 12V Leisure (Deep Cycle) Battery for £35. Guaranteed for a year it represents a pretty good deal. When charged it will run a radio scanner for ages and can also supply power to any 12V device. Using a suitable inverter will create a.c. mains.

The amount that the

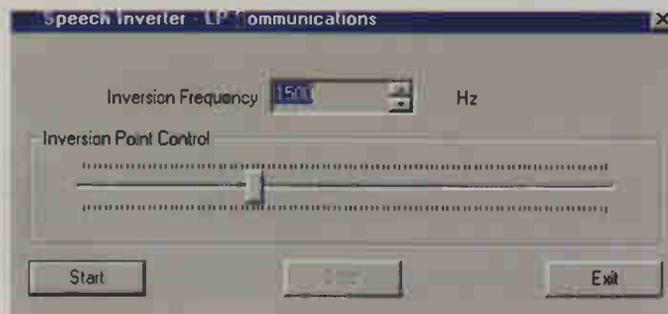
inverter costs will determine how much current it will supply. I have a 125W inverter that will happily run the TV in the house and a computer (not at the same time). In the past I have used this

inverter to power a laptop in my car. It certainly has been useful here in the wilds.

New Lease Of Life

As I write this, the firefighters are in the middle of their first forty eight hour strike period. It may well be that the dispute will be concluded by the time that we go to print, but it appears that military MOULD frequencies in the London area are being utilised by military units providing fire cover, giving that system a new lease of life.

The MOULD repeaters are characterised by a few seconds of blank carrier followed by a short data burst



got around. A complaint was made to the authorities who searched his gaff and located the offending radio receiver and found it to be well laden with frequencies.

The court heard that he had a previous conviction for placing a listening device in a room. The 'beak' threatened him with a period of incarceration in the slammer should he offend again. Be Warned Folks!

Power Cuts

A few weeks ago the TV and radio news was full of stories of lengthy power cuts inflicted on people in England due to some windy weather that

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Merry Christmas!

The Publishers and Staff of *Short Wave Magazine* would like to wish all our Readers, Advertisers and Authors a very Merry Christmas and a Prosperous New Year!

Please note that the *SWM* Offices will be closed from 24 December until 2 January 2003.



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Info in Orbit

I had hoped to publish the first image from *MSG-1* in this month's column - but...see later. A closer look at *METEOSAT*'s normally encrypted Primary Data stream was unexpectedly offered during October when, for reasons that are not clear (!), encryption was turned off on two occasions. As well as having a look at the transmissions still available, I include a summary of the information recently released by the World Meteorological Organisation, following a recent meeting about weather satellites (*WXSATs*). The storms of October and Mt. *Etna* erupting are also featured this month.

MSG-1 On 'Hold'

The first hold-up in the otherwise smooth commissioning timetable to bring *METEOSAT-7*'s replacement *MSG-1* online later this year, happened in the early hours of Thursday 17 October when a solid state power amplifier (SSPA) on the satellite switched off unexpectedly. At that time, operational conditions of the satellite were nominal. Following this anomaly, staff have not managed to switch the SSPA back on.

There are four such units on board - one providing redundancy. Before reconfiguring the Mission Communications Payload and continuing with other commissioning activities, further investigations into this switch-off are being performed with ESA (European Space Agency) and industry. This allows for the re-start of commissioning activities in the safest possible mode. Consequently, commissioning was still on-hold during late October and up to press-time in mid-November. When re-started, the next steps of commissioning will include activation of the *SEVIRI* radiometer, leading to the first images.

The timetable is as follows:

25 September 2002 - official handover from ESOC to EUMETSAT (completed).

25 September 2002 - start of commissioning phase A (Geostationary Earth Radiation Budget (GERB), IQGSE Imaging and Image, Calibration and Product Dry-runs), (started/then suspended).

TBD (to be determined) - first image taking.

Early 2003 (TBC - to be confirmed) - dissemination of level 1.5 images based on IQGSE (rectified images).

End May 2003 - end of commissioning phase A.

End May 2003 - start of commissioning phase B (Core Imaging Tests and Image, Calibration & Product Validation Tests).

End 2003 - end of commissioning phase B, start of routine operations.

METEOSAT-7 Primary Data

Because of the time I have spent getting my telescope set up on a permanent mount in the garden, my 1.8m *METEOSAT* dish has remained upside down in a corner, awaiting 'the day'! As I write, I have some days off this week and EUMETSAT has advised that - for the second time in a few days - there will be no encryption of Primary

Data for several hours. This was too good an opportunity to miss, but re-assembling my own receiving system was not possible within the time-scale, so I contacted Dr Götz Romahn of Germany and he very kindly sent me a set of images. These form a complete set of *METEOSAT* PDUS (Primary Data User Station) images from the non-encrypted visible formats. These particular images are on the regular *METEOSAT* schedule - in effect we have a complete tour around the world in 24 hours.

Figure 1 originates from the American *GOES-E* *WXSAT*, currently *GOES-8*, positioned above the east coast. This high resolution image reveals excellent detail across the entire hemisphere. Severe weather conditions across the tropical regions can be seen when they occur, from the eastern Pacific ocean, through the Gulf of Mexico and on to the Atlantic. Next in chronological sequence, **Fig. 2** shows the world as seen by the Japanese *GMS* *WXSAT*. The whole of Australia, and a large part of the Pacific ocean, together with mainland China are shown several times each day. **Figure 3** is the *GOES-W* visible-light image from 2130 and is one of my favourites, showing the eastern Pacific ocean and the west coast. **Figure 4** originates from *METEOSAT-5*, positioned at 63°E (over the Indian ocean), showing the view to the east of the main *METEOSAT-7* full-disc, visible-light image of **Fig. 5**. This, together with its companion **Fig. 6**, form one of the unencrypted transmissions made during a synoptic hour (1200).

All of these images are from the Primary Data *METEOSAT-7* channel A2 data stream transmitted on 1691.0MHz. For those unfamiliar with *METEOSAT*, some background notes may be of interest. *METEOSAT-7* is a geostationary *WXSAT* that is part of the global world watch network in which several such *WXSATs* are positioned around the world over their respective countries or continents. Each is marginally different, reflecting the requirements of the funding countries, but most have kept to the original principle that



Fig. 1:
GOES-E (east)
25 August 1800 relay
from *METEOSAT-7*.

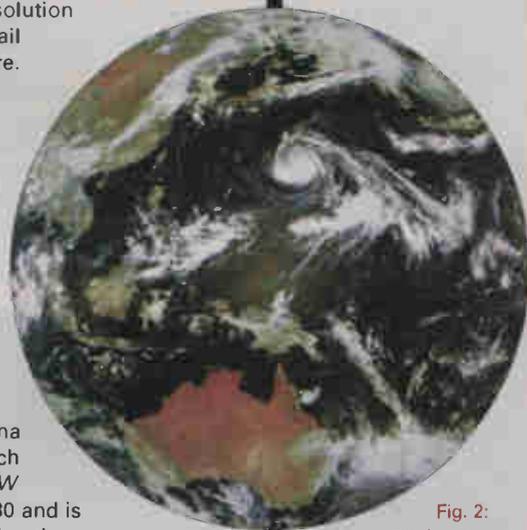


Fig. 2:
GMS visible-light
26 August 0300 relay
from *METEOSAT-7*.



Fig. 3: *GOES-W*
(west) 26 August
relay 2130.

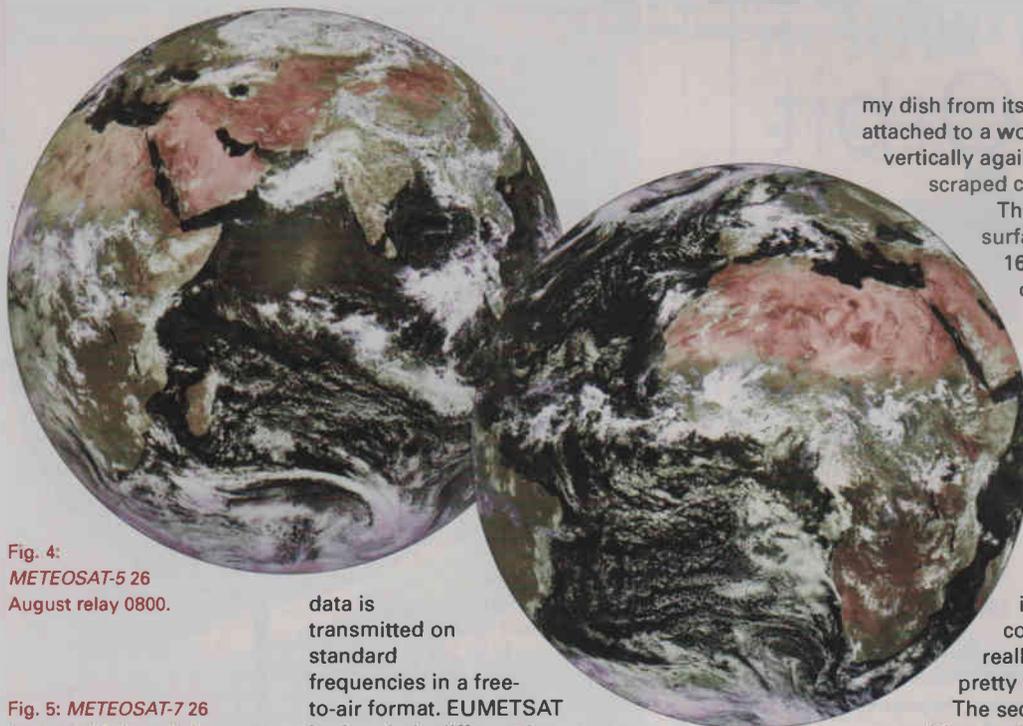


Fig. 4:
METEOSAT-5 26
August relay 0800.

Fig. 5: METEOSAT-7 26
August mid-day whole-disc image 1200.

data is transmitted on standard frequencies in a free-to-air format. EUMETSAT is singularly different in having established encryption in order to prevent 'home-produced' imagery being routinely seen by 'unregistered' Europeans. To view this data, the potential user has to formally register with EUMETSAT, usually via the local meteorological office, and then pay 700Euros for a decryption unit and a key interface for their own receiving station. Fortunately for amateurs, two sets of images - those produced during synoptic hours (0600, etc.) and those from other satellites - are not encrypted.

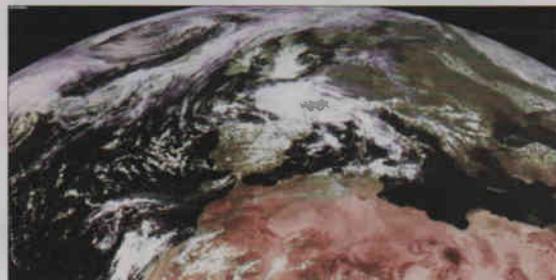


Fig. 6: METEOSAT-7 26
August European sector image 1200.

The availability of these images to those with a PDUS receiver does allow amateurs to receive an excellent series of 'prime' images, and once sampled, you can become 'addicted'! WEFAX images originate from Primary

Data, but of course are of considerably lower resolution and much cheaper to receive. As with WEFAX, original PD images are transmitted in black-and-white. Although Primary Data systems are now of somewhat academic interest due to the near-future introduction of *MSG-1* all-digital telemetry, and the consequent phasing out of *METEOSAT-7* transmissions, parts of the basic receiving system are not too dissimilar to the requirements for *MSG-1* reception.

A Typical PDUS Set-Up

The physically largest component of the system is the dish - and for consistent image reception quality - many official organisations employ four-metre jobs, or even larger. My own is about 1.8m and has proved adequate under most circumstances.

If - as I did until last year - you live in an exposed situation, such a dish needs to be either fixed firmly to the ground, or able to be dismantled and stowed away when storms are forecast. On one occasion several years ago, I returned home one evening to find that the wind had transferred

my dish from its normal sedentary position attached to a wooden framework, and had stood it vertically against a garden wall, leaving a trail of scraped concrete behind!

The other aspect of a PDUS dish is its surface quality. We are monitoring the 1690MHz transmission, and this does offer considerable latitude in dish construction. My PDUS dish was originally used (abroad) for 4GHz television transmissions, so its surface accuracy was much greater than that required for *METEOSAT* data on 1.7GHz. Götz tells me that his dish antenna for *METEOSAT* (HRI) image reception is a 1.35m prime focus dish with a coffee can feed - see Fig. 7. His antenna is buried among large trees, so he comments that his HRI signals are really marginal. Figures 1 to 6 seem pretty good to me!

The second component is a low-noise amplifier, and this is mounted at the dish end of the feed. It may incorporate a down-converter to convert the received carrier to 70 or 140MHz for transport to the receiver - rather than experiencing increased attenuation losses at 1700MHz. The receiver is designed to allow switching between both *METEOSAT* dissemination channels (A1 and A2) because high resolution data can be relayed on either channel. The recommended bandwidth of the receiver is 1MHz, and the demodulator output will be a Pulse Code Modulation (PCM) signal with a bit rate of 166.66Kb/s.

A PDUS system comes with software to condition and process the data stream from the receiver. With adequate signal strength, perfect images can be received, and - as illustrated in Götz's images - artificial colour can be added to great effect. My thanks to Götz for these images. Visit <http://goetz-romahn.bei.t-online.de/>

Storms Hit Britain

Ever since my first large dish showed its vulnerability to strong winds, I have remained 'concerned' whenever forecasters start quoting figures in excess of 56kph for average wind speeds. Chimneys start whistling when gusts get strong, so Marion and I usually remove the steerable h.r.p.t. dish to prevent it rocking on its bearings. When I returned from work one Friday evening in late October, only to hear winds being forecast to reach in excess of 128kph I almost needed sedation!

Figures 8 to 10 show comparable portions of the D2 format transmitted at 0300, 0600 and 1200 on 27 October, and reveal the speed of movement of the intense depression that brought havoc across Britain that Sunday. By way of preparation for the storm, I fitted a rope across the dome of my observatory and anchored it to the ground using hefty paving stones that I bought a year ago to lay last Easter.

Kevin Hughes of Tamworth returned home after the storm to find his QFH's support mast bent at 45°, his 2m/70cm colinear antenna barely clinging to the mast, and the top section of his 8m high h.f. transmitting vertical antenna had disappeared altogether. This was eventually found



Fig. 7: Dr Götz
Romahn's METEOSAT
dish.

in a tree at the other side of the garden. Most of the following afternoon was spent up a ladder! Kevin sent me **Fig. 11** - a NOAA-17 image the day after.

Figure 12 and Fig. 13 show differing views of the eruption of Sicily's Mount Etna.

WMO - CGMS Meeting

From weather prediction to air pollution research, and from climate change related activities to the study of ozone layer depletion, the World Meteorological Organization (WMO) is there. The WMO coordinates global scientific activity to enable increasingly prompt and accurate weather information and other services for public, private and commercial use, including international airline and shipping industries.

The WMO's activities contribute to the safety of life and property, the development of nations, and the protection of the environment. Within the United Nations, the Geneva-based 185-Member Organization provides the authoritative scientific voice on the state and behaviour of the Earth's atmosphere and climate.

The recent Co-ordination Group for Meteorological Satellites (CGMS) meeting enabled satellite operators from Europe, India, Japan, America, Russia and China to present updates on the state of their WXSATs. A summary of two of these updates is included here.

Peoples Republic Of China:

FENGYUN-1C is a 3-axis stabilised polar WXSAT that was launched on 10 May 1999 with a two-year-design lifetime, but continues to provide real-time telemetry in CHRPT format. It is in a sun-synchronous orbit having a descending node at 0716 (passes over Britain at approximately 0716 each day).

Instrumentation includes a 10-channel radiometer with ocean colour sensors. Like the American NOAA WXSATs, *FY-1C* records a certain amount of high resolution data during its orbit, and this is 'dumped' over the ground station. During 2002, problems hit *FY-1C* on 7 February and 17 October, but neither problem was critical.

The polar orbiting meteorological satellite *FY-1D* was launched on 15 May, 2002 from Taiyuan Satellite Launch Center, and the Urumuqi Meteorological Satellite Ground Station received the first image. The satellite is similar to *FY-1C*, but has a descending node passage at 0845 (local time). The Multi-channel Visible and IR Scan Radiometer (MVISR) is the primary sensor of *FY-1D*, providing 10-channels of spectral data.

The *FY-3* series will be the second generation of Chinese polar orbiting meteorological

satellites. It will include seven satellites to be operated from 2005-2020. The first two satellites *FY-3A* and *FY-3B* and the on-board instruments, are being designed and manufactured. Updates on China's other meteorological satellites will be included in future columns.

Russia's Polar Orbiters

Transmissions from *METEOR 3-5* resumed as expected in mid-November. This polar satellite is operating well beyond its lifetime. Currently transmissions on 137.30MHz are from the MR-900 imager (resolution 2km, swath width 2600km) in the spectral band 0.5-0.7µm. The latest satellite, *METEOR 3M-N1* was launched on 10 December 2001, but does not carry an a.p.t. transmitter.

The Russians announced a "serious revision" to the plans for future *METEOR 3M* series WXSATs. Instead of using a new "'lightweight' platform as originally announced, "It is now planned to develop and launch in 2005 and 2007 two satellites on the base of 'Resurs' type (of) unified heavy platform". "The Meteor -3M spacecrafts will be launched on sun-synchronized orbit. The orbital parameters are clarified and will be coordinated with CGMS later".

Seasonal Thoughts

This publication reaches the stands just before Christmas, so may I offer a timely seasonal greetings and wishes for a Happy New Year to all readers, and a special thanks to the many who have contributed to this column during the past year. I look forward to hearing from many of you again in the coming year.



Fig. 12: METEOSAT-7 28 October 1800 showing Mount Etna erupting.



Fig. 13: NOAA-16 28 October 1317 Sicily's Mt. Etna erupting.

Frequencies

a.p.t.

- NOAA-12 (off during v.h.f. clashes) and NOAA-15 transmit a.p.t. on 137.50MHz.
- NOAA-17 transmits a.p.t. on 137.62MHz.
- METEOR 3-5 usually transmits on 137.30MHz when in sunlight.

h.r.p.t.

- NOAA-12 and NOAA-16 transmit h.r.p.t. on 1698.0MHz.
- NOAA-14 transmits on 1707MHz.
- NOAA-15 transmits on 1702.5MHz.
- NOAA-17 transmits on 1707MHz.
- FENGYUN-1C and -1D transmit on 1700.5MHz.



Fig. 8, Fig. 9 and Fig. 10: Section of METEOSAT-7 infra-red D2 formats on 27 October 2002.



Fig. 11: NOAA-17 1117 28 October from Kevin Hughes.

STOP PRESS

Fig. 14: The imager on MSG-1 was finally switched on for the first time and the first image was taken at 1215 on 28 November. Because of the special circumstances (unresolved problems with an amplifier), the image is raw unrectified with only preliminary settings. Further images are expected after more tests. More news next month.

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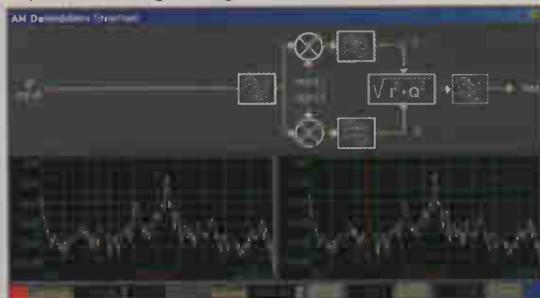


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- *Sound Blaster 16 (or compatible sound card)
- *Windows 98/ME/NT/2000/XP

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The advantages of this receiver are too numerous to list in this limited space: In addition to the flexible and friendly user interface of a PC-based receiver, with its numerous functions and facilities not normally available on any conventional receiver, the WINRADIO G303i Software-Defined Receiver excels particularly by the ability of its demodulators: While the Standard Demodulator provides the performance of a highly respectable shortwave receiver including synchronous AM demodulation and a real-time spectrum scope, the optional Professional Demodulator offers even more: continuous IF bandwidth adjustment (in 1Hz increments), interactive block diagrams with two additional audio spectrum scopes, and even built-in THD and SINAD measurement facilities. Additional demodulators are planned as further options, including a DRM (digital radio) demodulator.

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ShackWare

A very merry Christmas and a happy new year to all *SWM* readers and especially to those of you who have followed my 'ShackWare' column over the years and written with your queries, tips and offers of help for fellow readers. I write this in late November so there's no telling what Angela will tuck under the Christmas tree for me this year (though I have one or two ideas for the shack as you might imagine!), but I hope the season brings all that you want this year. Now festive greetings are out of the way, let's press onto your letters without further ado...

Mailbag

There's one question which I've had many times now and which I've been saving for a kind of 'special', a one-off 'ShackWare' devoted entirely to a single topic. However, the increasing spread of broadband telephone services and the widespread use of the web nowadays means that I can't really put it off any longer. So for regular correspondents and novice 'ShackWare' readers alike, **Ernie Johnson, Anthony Bartlett, Steven Hunter, Keith Morris** and others whose names have slipped my memory, here's the answer to your home networking questions.

Each asked whether it was possible to link two or more computers to share a single Internet connection and move data around between a computer in the shack and the family machine under the stairs.

The simple answer is of course yes, it's entirely possible to network home computers and share a single Internet link as though each machine had an individual connection. There will be overheads depending upon how many machines are connected, but if you have a reasonably speedy modem (or better yet Home Highway ISDN or one of the new broadband services), your surfing will not suffer too much. What's more, with a network, you can swap data between computers as easily as moving it from one folder to another - even across machines of different types such as PCs and Macs.

There are many possibilities for establishing links including Apple's excellent proprietary radio networking standard 'AirPort', but the easiest, cheapest and fastest solution is Ethernet. Using simple pairs of wires and a protocol invented by Bob Metcalf in the early 1970s, Ethernet is the solution bar none for local-area networks (LANs). To use it, each machine will need an Ethernet port (later Macs have them as standard, PCs can be upgraded with a simple and inexpensive card), a hub (or 'switch' though nowadays the names are interchangeable) if you're networking more than two machines, and a few 'RG45 cables'. Essentially you plug the cables from the computer ports into the hub, fire up suitable software (it's shipped with the cards for PCs and built into Macs) and networking...well, just happens. Of

course to do anything useful you'll need to acquire and run applications packages rather than simply the networking software itself, but this is widely available as free and shareware downloads from the web.

Returning to the original question then, and assuming you have a network up and running, you dial into your ISP (Internet) account via one machine with the modem and share that connection with other machines via your Ethernet LAN. Every computer attached to the Internet has a unique number (IP address) which, for a home user, is assigned when the connection is established. It looks something like this: 234.38.175.11. Each of the machines on your network must also have a unique number and these are created, assigned and managed by a router, either a hardware device (expensive) or a piece of software (cheap or free). *Windows 98* (second edition), *ME* and later *Windows* versions and *Mac OS X* all have routing built in. The *Windows* machines offer Internet Connection Sharing (ICS).

From the *Windows* control panel, select Add/Remove Programs and click on Internet Tools from the dialog which appears, then click on Internet Connection Sharing. An ICS 'wizard' will run and prompt you through the set-up process - its very easy. The wizard will create a client configuration floppy which you use to set-up the client PC(s). If you're using Macs with *OS X*, download a copy of *IPNetShareX* from www.tucows.com which provides an easy-to-use graphical interface to the *X*'s own routing software.

Those with machines still running *Windows 95* must acquire a copy of an add-on software router such as *WinRouteLite* (www.tucows.com). Versions of the *Mac OS* earlier than *X* (7.1 to 9.x) can use Internet Gateway (tucows again) for the same purpose. Simply install and follow the on-screen instructions.

So that's it! One or more client computers tapping into and sharing a single Internet connection across an Ethernet LAN. Cost? Well a five-port hub can be had for less than £30 - PC World has one for £29.99 and an Ethernet card for PCs is about a tenner (though PC World offers a pack of five cards for £24.99-ish). If you're connecting two machines, there's no need for a hub. You can buy or make an Ethernet 'crossover' cable (like a null modem cable) which essentially has the 'send' and 'receive' connections crossed over (Mac iBooks can use a standard Ethernet cable and make the cross-connection themselves!). If you'd like to make a cable see www.makeitsimple.com/how-to/dyi_crossover.htm for details of making your own.

One small point: don't leave large coils of Ethernet cable between nodes on the network otherwise you can induce what's known as 'ringing' - essentially, echoes of the original signal which can disrupt communications. Try to use cable which is more or less the exact length.

An Apple A Day

Though many claim the title of 'the micro that started it all' and certainly one or two came before it, the Apple, a 6502 micro devised by Steve Wozniak and sold by Steve Jobs at the end of the 1970s, is probably the machine closest to the title. Wozniak was a hardware engineer for Data General who designed his own computer in his spare time. Friend Jobs was a barefoot hippy and college dropout with radical ideas about business, computing and life in general. The pair earned themselves extra dollars by building 'blue boxes' in their spare time - electronic gizmos which could be used to whistle the necessary operating frequencies into AT&T's telephone lines in order to get free international calls and trunking via exotic exchanges.

'Woz' built his one-board, 6502-based prototype and Jobs drummed up enough venture capital to launch it and the new company Apple Computer. Within a year they were impossibly rich and wielding immense power in the computer industry. Typical of American machines at the time, the Apple (followed quickly by the Apple II) were 'systems': they sported add-on floppy and graphics boards, real monitors and keyboards and all the extras that we take for granted nowadays, but which here in the UK were rare indeed then (compare with the Sinclair ZX81 for example!).

Like its corporate rival the Atari 800 (essentially a 'copy' of the two Steves' machine), the Apple was hugely expensive in the UK, listing at more than £1200 in 1984 (five years after its launch). By comparison, the expensive Atari 800 with similar specs cost £399 - a third of the price. That sum bought you a 16K machine with mono monitor, 280x192 graphics resolution, parallel and serial interfaces and eight internal expansion slots. From its beginning, Apple's computer was designed to be expanded, unlike offerings from rival companies where you only had to think 'screwdriver' to invalidate the warranty! Install a drive card for example, and you could daisychain up to six floppy drives offering a breathtaking 140K each per disk at high-speed transfer rates.

It's price made the Apple exclusive here. You might spot one at a computer club meeting, but you were more likely to run your fingers over an Oric, a Jupiter Ace, a Spectrum or a Commodore 64. Colleges bought them by the dozen, networked them together and used them to teach Pascal to novice programmers eager for real computing experience.

The Apple was also the first machine to spawn clones - around a dozen lookalikes from other manufacturers. These met with only moderate success and there was even a Russian clone call the Agat. Built by Elorg, it featured a full-size keyboard with Cyrillic and English character sets, one disk drive and colour graphics. The Agat was actually the first Soviet microcomputer and it came to light around 1983 when a US eye surgeon and computer buff called Leo Bores came across one while travelling in the Soviet Union. He wrote about it in nothing less than scathing terms for *Byte* magazine when he returned home. *Byte* reported:

"Bores discovered that the Soviet machine performs some tasks 30 per cent slower than an Apple. The Soviets would not be able to export Agat to the West even if they gave it away. Stephen Bryen, a top Defence Department expert on technology trade, claims that the disk drive on the Agat often breaks down. The government has not allowed ordinary Soviet citizens to own personal computers. Even if the machines became available, few people could afford one. The Agat costs at least \$3,600, far more than the typical worker's annual salary of \$2,500" ...and so on in not exactly glowing terms!

There's still a huge fan base (largely on the web, see www.applefritter.com as a good starting point) and much software - including some radio-oriented gems. Interfacing an Apple to a terminal unit is easy and I suspect that even to this day, they'd still give good service in the shack. If you see one buy it. If you've got one and you don't want it, send it to me: I'll tell Angela it's a Christmas present!

That's it for this time. I hope to see more of your radio-oriented computer queries and tips in the new year. In the meantime, good listening!

Propagation Forecasts

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.

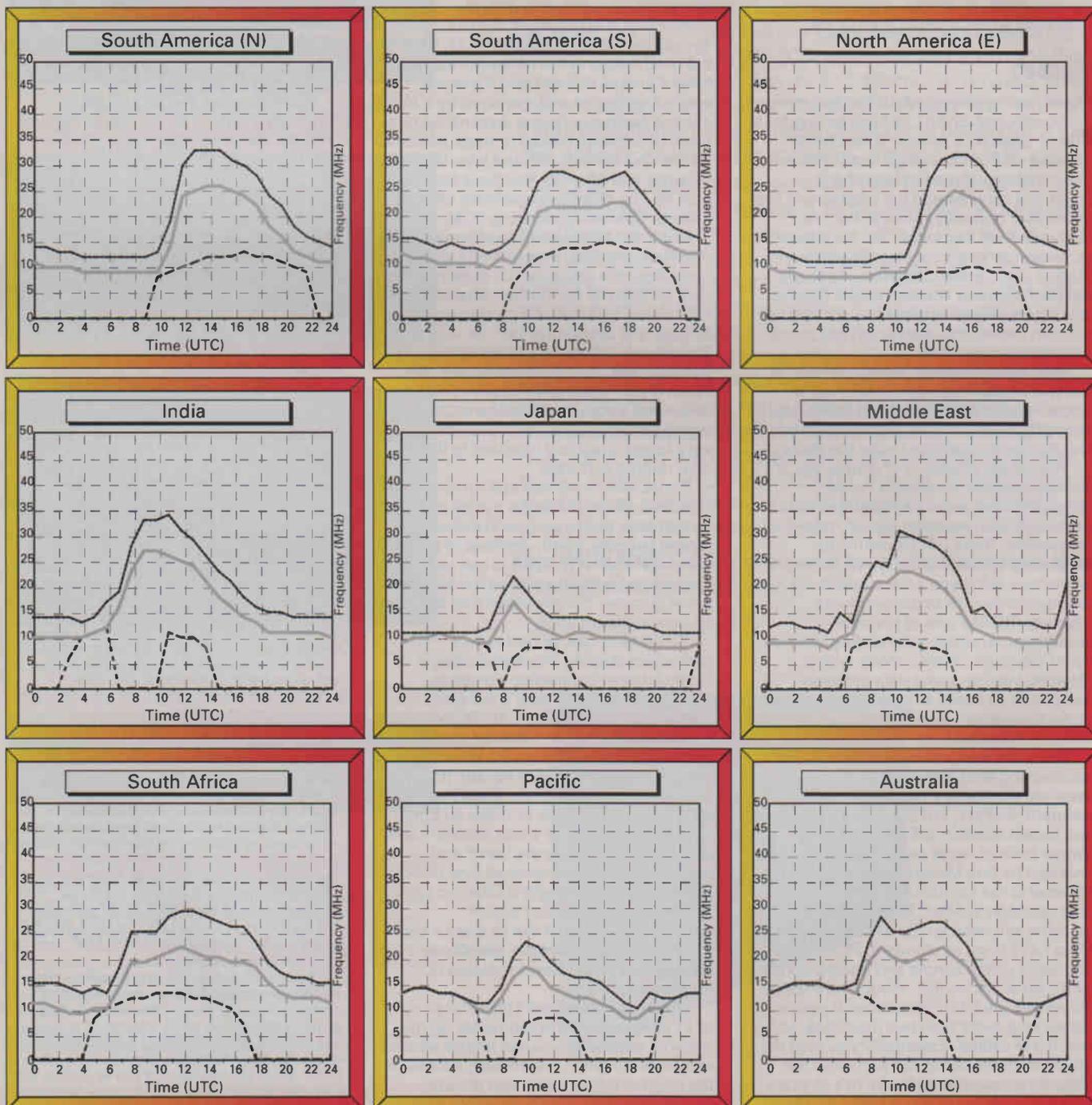
Lastly, the upper dashed line represents the maximum usable frequency (MUF), a 50%

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.

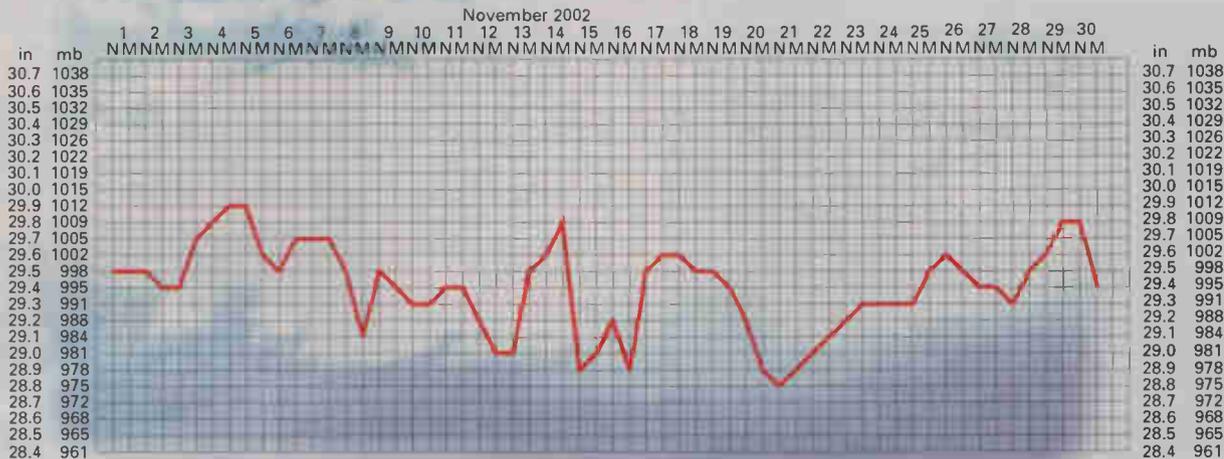
Good luck and happy listening.

January 2003
Circuits to London



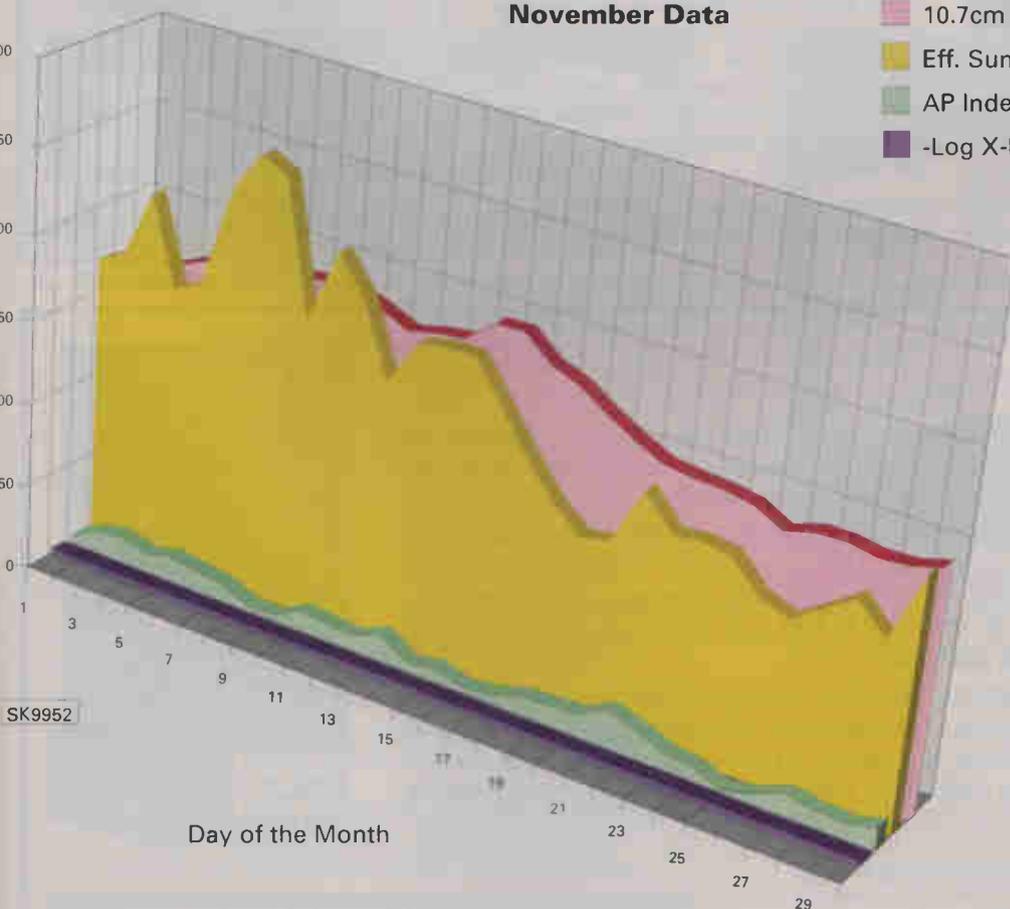
Propagation Extra

Ron Ham's barometric pressure chart, taken at Storrington, W. Sussex, November 2002.



November Data

- 10.7cm Flux
- Eff. Sunspot No.
- AP Index
- Log X-Ray



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.

1st Anniversary

OF THE FOUNDATION LICENCE

It is hard to believe but the M3 licence has now been with us for a year. Over 5500 people have taken up the new licence with ages ranging from 8 to 80 and over half the total being completely new amateurs. Even those who have been

amateurs for years



Top: Andrew Finch, M3FMA, with Scout leaders Nigel Hull and Christopher Chapman.

Right: Andrew (seen here with his parents) proudly shows his new Yaesu FT-817.

Bottom: Alan Betts, G0HIQ (RA), RSGB President Bob Whelan, G3PJT, Scout leaders Christopher Chapman, Nigel Hull and Martyn Medcal, and Yaesu (UK)'s Paul Bigwood, G3WYW, with Andrew.

and who have taken the simple Morse assessment to add to their licence are impressed. One amateur recently com-

mented "My MW3 call has given my amateur radio a new lease of life, I am like a kid with a new toy again!" The Foundation Licence is easily the fastest growing licence category ever in the UK and probably worldwide. The new licence is grabbing attention around the world and is a credit to both the RSGB and the Radio-communications Agency for the joint efforts in bringing in the new licence. The RSGB also takes a huge amount of credit for the implementation of the scheme through the tireless efforts of its affiliated clubs.

To commemorate the huge success of the Foundation Licence a special award was made by the RA, RSGB and Yaesu to the 5000th M3 licence holder. Andrew Finch, M3FMA, an 11-year old Scout from

Chelmsford became the 5000th licence holder after a course with the Chelmsford Scout Amateur Radio Fellowship (ScARF). Despite being dyslexic, Andrew managed to pass the multiple-choice exam at his first attempt, an outstanding achievement on his part. Andrew's pass also highlights the efforts of individual amateurs up and down the country who have been enthusiastically bringing new people into the hobby with the accessible new licence.

Hundreds of courses are being run up and down the country so access to the

exam has never been better. If you are an avid shortwave listener or just someone who is interested in the possibilities in amateur radio, take the opportunity and get your own Foundation Licence. A list of suitable courses and assessors can be found on our web site www.rsgb.org or you can phone 0870 904 7373 and ask for more information.

We all look forward to continued massive growth in amateur radio numbers in the years to come, but as a start the Foundation Licence has proved a huge success!

TEN THINGS ABOUT THE FOUNDATION LICENCE

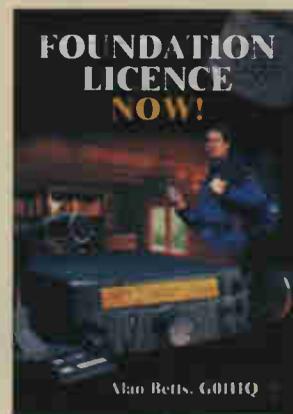
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3. Beginners can be on the air in a single weekend
4. A course fee for beginners is £10 (normally)
5. VHF licensees go straight to Foundation Licence with only a Morse Assessment (if held 1 year).
6. Morse Assessment is a short course NOT an examination
7. Your local club and the RSGB are holding Morse Assessment sessions right NOW
8. Morse Assessment fee is only £5 (normally)
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In addition to the basic book the RSGB is also providing free of charge an information and materials pack. The pack not only includes the new Foundation Licence application form but many other useful items such as current band plans etc., making this a very useful addition for every beginner to amateur radio.



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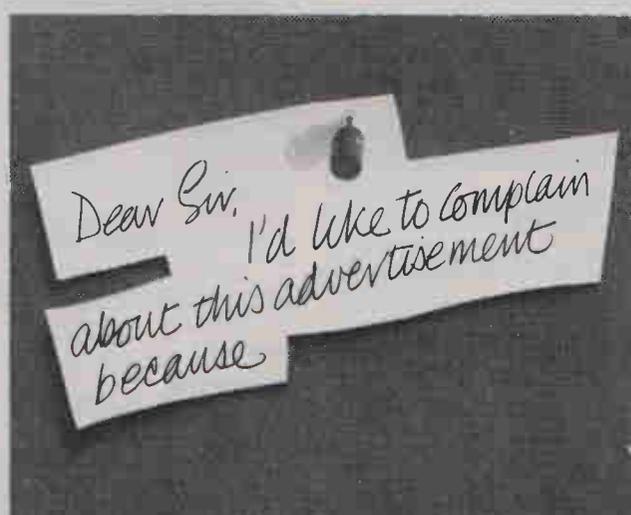
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ROYAL SIGNALS SCARBOROUGH ARC, G0RCS. Details from Mr A.W.W. Timme G3CWW. Tel: (01484) 842330.

SCARBOROUGH ARS, G4BP. Meets at the Scarborough Cricket Club, Pavilion, North Marine Road, Scarborough, North Yorks YO12 2TJ. Details from Mr D.P. Tipper G3JBR. Tel: (01723) 377296.

SCARBOROUGH SE GRP, G0X00. Details from Roy Clayton G4SSH. Tel: (01723) 862924.

THE VINTAGE & MILITARY ARS, RS183536. Details from H.A. Aspinall.

YORK ARS, G3HWV. Meets at the Guppy's Enterprise Club, 17 Nunmerly 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. Stanfield G0EYV. Tel: (01670) 513026.

SOUTH YORKSHIRE

FINNINGLEY ARS, G7HAH. Details from John Fennell G4HOY. Tel: (01427) 872522.

MALTY & DARS, G4SKM. Meets at the Centenary Hall, Clifford Road, Hellaby, Rotherham. Details from Keith Johnson G1PQW. Tel: (01709) 798098.

MEXBOROUGH & DARS, G4BTS. Meets at the Harrow 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 Giossop G0SPH.

TYNE & WEAR

HUGHTON-LE-SPRING ARC, G3NMD. Meets at the Dubmire Royal British Legion, Dubmire, Fenehouses, Tyne & Wear DH4 6LJ. Details from Foster Aungles G0ABF. Tel: 0191-584 4673.

SOUTH TYNESIDE ARS, G0XOWK. Meets at the Boldon Scout Hut, Grey Horse Car Park, Front Street, Boldon. Details from William Wilson M0BWI. Tel: 0191-421 9924.

TYNEMOUTH ARC G0NWM. Meets at the Linskill Centre, Linskill Terrace, North Shields, Tyne & Wear. Details from Mr G.N. Thompson G0SBN.

TYNESIDE ARS, G3ZQM. 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 G4F5Q.

HALIFAX & DARS, G2UG. Details from Mr S.P. Ortmayer G4RAW. Tel: (01422) 203062.

KEIGHLEY ARS, G0KRS. Meets at the Cnckct Club, Inghow, Keighley, West Yorkshire. Details from Mr I. Tompson M1BGY. Tel: (01274) 723951.

LEEDS & DARS, G4LAD. Meets at The Radio Shack, Yarnbury (Horsforth), RUF Conferences, Brownberrie Lane, Horsforth, Leeds LS18 5HB. Details from Mr E. Howden G0IBU.

NORTH WAKEFIELD RC, G4NKC. Meets at the East Raffles Cnckct Club, Nr Wakefield. Details from Mrs Olga Parker 2E1ASV. Tel: 0113-253 9087.

OTLEY ARS, G3XNO. Meets at The RAOB Club, Westgate, Otley, West Yorkshire. Details from Jack Wootton G0SNV. Tel: (01274) 636197.

PONTERFAC & DARC, G3FYQ. Meets at the Carleton Community Centre, Pontefract, West Yorkshire. Details from Colin Wilkinson G0NQE. Tel: (01977) 677006.

SPEN VALLEY ARS, G3SVC. Meets at the Old Bank Hall, Amthill, Shefford, West Yorkshire. Details from Mr J.R. Wide 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 RPTG GP, G0KNR. Details from Mr Mike Charlton G0GXZ.

WHITE ROSE ARS, G3XPF. Meets at the Moortown RFC, Moss Valley, Kings Lane, Leeds LS17 7NT. Details from Mr M. Wilson G7SDW. Tel: 0113-273 6039.

MIDLANDS BEDFORDSHIRE

DUNSTABLE DOWNS RC, G4DDC. Meets at the Chuses House, 77 High Street South, Dunstable, Beds LU6 3SF. Details from Phil Seaford G8XTW. Tel: (01525) 384419.

SHEFFORD & DARS, G3FJE. Meets at the Church Hall, Amthill, Shefford, Beds. Details from John West. Tel: (01462) 812749.

ST SWITHUN'S ARC, M0AJV. 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 Coleridge Community College, Redegun Road, Cambridge. Details from Ron Huntsman G3KBR. Tel: (01223) 501712.

DUXFORD ARS, G82WV. Meets at Building 177, Imperial War Museum, Duxford Airfield, Cambs. Details from Mrs B.L. Pope. Tel: (01279) 656149.

GTR PETERBOROUGH ARC, G4EHW. Meets at the 6th Form Building, Stanground College, Farset Road, Fletton, Peterborough. Details from Alan D. Ralph G8XKH.

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, Rookswood Road, March, Cambs PE15 8DP. Details from Mr J. Brathwaite G3PWK. Tel: (01353) 698885.

PETERBOROUGH R & ES, G3DQW. Details from Mr V. Edwards G8NGZ.

WISBECH AR & ELEC. CLUB, M5ARC, G8NED. Details from Alan Bndgeiland.

DERBYSHIRE

BOLSOVER ARS, G4RSB. Meets at the Blue Bell, High Street, Bolsover, Derbys. Details from Colin Morns G0RXT. Tel: (01246) 822856.

BUXTON RA, G4SPA. Meets at the Leewood Hotel, Buxton. Details from Derek Carson G4IHO. Tel: (01298) 25506.

DERBY & DARS, G2DJ. Meets at 119 Green Lane, Derby. Details from Martin Shardlow G3SZJ. Tel: (01332) 556875.

EREWASH VALLEY ARG, G0PCX. Meets at the Stitwell Arms Public House (between Horsely Woodhouse and Woodside). Details from Peter Russell M0AQI.

MOUNT ST MARY'S ARC, G4MSM. Meets at the College, Spinikhill, Sheffield. Details from Rev. P. McArdle G0DAG. Tel: (01246) 812230.

NOTTS & DERBY BORDER ARC, G4NID. Meets at Marpool United Reform Church, Chapel Street, Marpool, Ilkeston. Details from Graham Bromley GAUTN. Tel: (01773) 834308.

NUNSFIELD HOUSE ARG, G3EFO. Meets at the Nunsfield House, Boulton Lane, Abushton, Derby. Details from William F. Smith G7PJJ.

STH DERBYS & ASHBY W ARG, G0SRC. Meets at the Moira Replan Centre, 17 Ashby Road, Moira, Swadincote, Derbyshire DE12 6DJ. Details from Mrs B. Walley. Tel: (01283) 760822.

STH NORMANTON, ALFRETON & DARC, G0PCO. Meets at the New St Community Centre, New Street, South Normanton, Derbyshire. Details from Peter Gething M0CQL. 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, G4AYM. Meets at the Churchdown School, Churchdown. Details from Mr A.J. Martin. Tel: (01452) 618930.

SMITHS INDUSTRIAL 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 G3L0.

WHITE NOISE LISTENING GOWNL. Details from Adrian Deane G7KOC.

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 Lily End WMC, Bromsgrove, Worcs. Details from Barry Taylor G0TPG. Tel: (01527) 542266.

ROTHWICH ARC, G4PVO. Meets in the Community Hall, Doitwich Spa, Worcs. Details from Hector Wragg M1BIV. Tel: (01905) 794399.

HEREFORD ARS, G3YDD. Meets at the Civil Defence HQ, Magistrates Court, Gao Street, Hereford. Details from Tim Bndjigand-Taylor G0JWJ. 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 at the Red Lion Inn, St Anne's Road, Malvern, Worcs. Details from Dave Hobro G4MVE. Tel: (01905) 351568.

REDDITCH RC, G4ACZ. Meets at the WRVS Centre, Ludlow Road, Redditch, Worcs. Details from Mr R.J. Mutton G3EVT. Tel: (01789) 762041.

VALE OF EVESHAM ARC, G0ERA. Meets at the BBC Club, High Street, Evesham, Worcs. Details from Mr A.C. Lindsay G4NRD. Tel: (01386) 41508.

LEICESTERSHIRE

1F ATC, G7MCD. Details from Sqn Cmdr Adnan Utung G1WZQ.

BEAUMONAR ARC, G3BMR.

DEMONTFORT UNIVERSITY, G3SDC. Open to past and present students. Details from Mr R.G. Trittenington. Tel: 0116-257 7059.

HINCLEY AR & ES, G3VLG. Meets at the United Services Club, St. Mary's Road, Hincley. Details from Mr R.A. Bennett G8BFF. Tel: (01455) 846493.

LEICESTER RS, G3LRS. Meets at Gilroes 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, Shenshed, Loughborough, Leics. Details from Chns 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.I. Dyson G0JWJ. Tel: (01827) 830437.

WELLAND VALLEY ARS, G4WRV. Meets at the Village Hall, The Green, Great Bowden, Leics. Details from The Secretary.

LINCOLNSHIRE

FIVE BELLS GROUP G4SIV. Details from Mr B.K. Tainal G4ODA.

GRANTHAM RC, G0GRC. Meets at the Kontak Social Club, Barrowby Road, Grantham, Lincs. Details from the secretary. Tel: (01476) 657436.

LINCOLN SHORT WAVE CLUB, G5FZ. Meets At The Railway Club, Triton Road, Lincoln. Details from Mrs Pam Rose G4S10. Tel: (01427) 783556.

RAF CONINGSBY ARC, G3LQS. Meets at Essex Block, RAF Coningsby. Details from Peter Hanson G0WVY.

RAF WADDINGTON ARC, G0RAF. Meets at Pwysie Inn, Fossebank, Saulby Road, Lincoln. Details from Robert Pickles G3VCA. Tel: (01522) 528708.

SPALDING & DARS, G4D5P. Meets at The Old Fire Station, Spalding, Lincs. Details from Raymond Pearson G8ELV. Tel: (01775) 711953. Web: www.sdars.org.uk

SPILSBY ARS, RS91468. Details from Clive Ironmonger G6HYF. Tel: (01790) 752712.

NORTHANTS

KETTERING & DARS, G5KN. Meets at The Lilacs Public House, 39 Church Street, Isham, Kettering, Northants NN14 4 1HD. Details from Fay Bewley G6AKS. Tel: (01536) 390954.

MID NORTHANTS AR EXP GOING. Details from Lionel Parker G5LPL

NORTHAMPTON RC, G3GWB. Meets at the British Timken, Social & Athletic Club, Cotswold Avenue, Duston, Northampton. Details from Norman Miller G0GBZ. Tel: (01327) 349188.

NORTHAMPTON SCOUT ARG, G6NDS. Meets at Overstone Scout Activity Centre, Northampton. Details from Ian Riwett G8WPU.

PARALLEL LINES CG, G4LIP. Details from Mr PS. Lidsay G4C4A.

NOTTINGHAMSHIRE

ARC OF NOTTINGHAM, G3EKV. 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 Olterton, 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 G4J5M.

MANSFIELD ARS, G3QOC. 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 G8TBF.

SIEMENS ARC, G8XKL, G8IGQ. Meets at the GPT Sports Ground, Beeston, Nottinghamshire. Details from Chns Archer G4VFK. Tel: 0115-943 3367.

SOUTH NOTTS ARC, G0QAU. 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, Oswestry. Details from Ant Asley G0WAOA. Tel: (01691) 860545.

SALOP ARS, G3SRT, M1AXW. Meets at the Telepost Club, Railway Lane, Abbey Forgeate, Shrewsbury. Details from John Burnford G0GTN.

TELFORD & DARS, G3ZME. Meets at the Dawley Bank Community Centre, Dawley, Telford, Shropshire. Details from Mr M. Vincent G3UKV. Tel: (01921) 255416.

STAFFORDSHIRE

BURTON ON TRENT & DARS, G3NFC. Meets at the Stapehill Institute, Main Street, Stapehill, Burton-on-Trent, Staffs. Details from Mr M.W. Cotton G4HBY.

CANNOCK CHASE ARS, G65SW. Meets at the Four Crosses Inn, Watling Street, Hatherton, Cannock. Details from Arnold Matthews G3FZW. Tel: (01543) 262495.

CHAD RC, G4CAR. Meets at the Swinfen Officer's Club, Swinfen, 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 Creden Works, Blythe Bridge, Stoke-on-Trent, Staffs ST11 9LJ. Details from Mr B.J. Butcher G4HKH. Tel: (01782) 395793.

NEWCASTLE-U-LYME SCOUT AR COM GR, G7UQG. Meets at the Queens Head, Sandford Street, Lichfield. Details from Roger Smethers G3NLY. Tel: (01543) 672762.

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, Watling Road, Sutton Coldfield, West Midlands. Details from Paul G. Turner G7MWD. Tel: 0121-350 4263.

WARWICKSHIRE

AVON VALLEY ARA, MORAD. Details from Mr Peter Bradham G0WJK. Tel: (01905) 724531.

MID WARWICKSHIRE ARS, G3UDN. Meets at the St. John Ambulance HQ, 61 Enscote Road, Warwick. Details from Bernard Pittaway. Tel: (01926) 420913.

RUGBY ARS, G4APD. Details from Tony Humphries G0OLS. Tel: (01455) 552683.

STRATFORD-UPON-AVON & DRS, G0SOA. Meets at the Home Guard Club, Tiddington, Stratford-upon-Avon, Warcs. Details from Ron Horsley G0MRH. Tel: (07970) 148204.

WEST MIDLANDS

ALDRIDGE & BARR BEACON ARC, G0NEQ. Meets at the Aldridge Central Hall Community Centre, Middlemore Lane, Aldridge WS9 8AN. Details from Mr C.J. Baker G0NOL. Tel: (01922) 636162.

COVENTRY ARS, G2ASF. Meets at the Binley Church Hall, Brinklow Road, Coventry. Details from John Beech G8SEQ. Tel: (01203) 673999.

DUDLEY ARC, G4DAR. Meets at the Community Centre, Sedgley, Central Library, St James Road, Dudley. Details from Tony Lucas G4LVA. Tel: (01384) 277925.

HILLCREST ARS, G0SPM. Meets at The College, Simms Lane, Netherton, Dudley, West Midlands. Details from Mrs Megan Fleetwood G0TME. Tel: (01384) 294804.

KYNOCH R & TVS, G3HPP. Meets at the Club Workshop, IMI Ltd., Spondonfield, Perry Bar, Birmingham. Details from Mr G. Nicholls. Tel: (01922) 635376.

MIDLAND 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, Didsbury, Warley, West Midlands B68 9DP. Details from Stuart Collins M0BTO. Tel: 0121-561 4663.

SIERRA HOTEL ARCG, G0OBS. Details from Warwick M. Hall G4WMM.

SOLIHULL ARS, G3GEL. Meets at The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. Details from Paul Gaskin G8AYV. Tel: 0121-783 2996.

SOUTH BIRMINGHAM RS, G3OHM. Meets at Hampstead House, Fairfax Road, West Heath, Birmingham. Details from The SBR5 Secretary.

STOURBRIDGE & DRS, G6OI, G6RSR. 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 G0PNI. Tel: 0121-561 2884.

WEST MIDLANDS POLICE ARC, G0COP, G1WMP. Details from Steven Jones G6RLT.

WILLENHALL & DARS, G4ETW. Meets at The Liberal Club, Villiers Street, Willenhall, West Midlands. Details from Dave Bradbury. Tel: (01902) 411252.

WOLVERHAMPTON ARS, G8TA. Meets at the Electricity Board Sports Club, St. Marks Road, Chapel Ash, Wolverhampton. Details from Mrs J. Smith. Tel: (01902) 751936.

WORDSLEY RC, G4WRA. Meets at the Brnk Maker's Arms, Mount Pleasant, Brierley Hill, West Midlands. Details from Andy Evans G1PKZ.

LONDON & CENTRAL BERKSHIRE

ARBORFIELD ARC, G3IHH. Details from Mrs E.W. Harding 2E1AUQ.

BRACKNELL AEC, G4BBA. Meets at the Coopers Hill Community Centre, Bagshot Road, Bracknell, Berks. Details from John Eilerton G3N3C.

BURNHAM BEECHES RC, G3WVR. Meets at the Farnham Common Village Hall, Victoria Road, Farnham Common, Bucks. Details from Mrs Eileen Chislett G8ELI. Tel: (01628) 625720.

MAIDENHEAD & DARC, G3WVI. Meets at the Red Cross Hall, The Crescent, Maidenhead, Berkshire. Details from Neil Savin G0SVN. Tel: (01628) 626210.

NEWBURY & DARS, G5XV. Meets at the Rugby Club, Monk's Lane, Newbury. Details from Mark Slade M0CUK. Tel: (01488) 638985.

READING ARC, G3ULT. Meets at the Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. Details from Mamoh Standen G0JMS. Tel: 0118-972 3504.

BUCKINGHAMSHIRE

AYLESBURY VALE RS, G4VRS. Meets at the Hanwick Village Hall, Aylesbury, Bucks. Details from Mr L.L. Copley G0DFC.

CHESHAM & DARS, G3MDG, G1MDG. Meets at the White Hill Centre, Chesham, Bucks. Details from Mr J.J. Theobald G0WVW. Tel: (01442) 832169.

CHILTERN ARC, G3CAR. Details from Roy Page G4WNL. Tel: (01494) 534216.

MILTON KEYNES ARS, G3HUI. Meets at Room 202, Fauldner House, Bloxhatch Park Museum, Wilton Avenue, Bloxhatch, Milton Keynes. Details from Matt Preston. Tel: (01908) 379739.

MILTON KEYNES SCOUT ARS, G0SMK. Meets at The Quarnes, M.J.K. Scout Campsite, Cosgrove. Details from Mr PA. Orchard G0RYZ. Tel: (01908) 648186.

GREATER LONDON

ADDISCOMBE ARC, G4ALE. Meets at the Lon Inn, Powsons Road, Croydon. Details from Mr Q.G. Collier G3WFR. Tel: 0208-653 6948.

BARKING R & ES, G3XBF. Meets at the Parkside Community Centre. Details from Bill Chever G0JQK. Tel: (01708) 474443.

BROMLEY & DARS, RS89030. Meets at the Victory Social Club, Kechill Gardens, Hayes, Bromley. Details from Alan G. Messenger G0TUK.

CLIFTON ARS, G3GHN. Meets at the Wdbrooke House, Community Centre, 90 Mycenae Road, London SE3 7SE. Details from Mr J. Veaney G7BKH.

CRYSTAL PALACE & DRC, G3VCP. Meets at the All Saints Church, Parish Rooms, Beulah Hill, London. Details from Bob Burns G30UU. Tel: (01737) 552170.

DARENTH VALLEY RADIO, G0KDV. Meets at the Crockenhill Village Hall, Swanley, Kent. Details from Mr K.W. Halls G8VJK. Tel: (01322) 663022.

ECHELFOUR ARS, G3UES. Meets at the Community Centre, St. Martin's Court, Kingston Crescent, Ashford, Middlesex. Details from Robin Hewes G3TDR. 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, G4HRK. Meets at the Fairlytes Arts Centre, 51 Billet Lane, Hornchurch, Essex.

RS OF HARROW, G3EY. Meets at the Harrow Arts Centre, Uxbridge Road, Hatch End, Middlesex. Details from Mr C. Fnel G4AUF. Tel: (01895) 623130.

SILVERTHORNE RC, G3SRA, G2HR, G8CSA. Meets at the Chingford Adult Education and Community Centre, Frday Hill House, Simmons Lane, Chingford, London E4 6JH. Details from Dave Christy G0KHC. Tel: 0208-504 2831.

SOUTH LONDON COLLEGE ARS, G3HFY. Meets at the Lambeth College, Norwood Centre, Knights Hill, West Norwood, London. Details from Mr M. Knott G0WCR.

SOUTHGATE RC, G3SFG. Meets at the Winchmore Hill Cricket Club, First Lane, London N21 3ER. Details from Mr D.F. Berry G4DFB.

ST DUNSTONS COLLEGE ARS, G4SDC. Details from Sam Kennard G4OHK. 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 Clay 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.

HODDESDEN RADIO CLUB, G0TNS. 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, G82RST. Meets at Tolmers Scout Camp, Tolmers Road, Cuffley, Herts EN6 4JS. Details from Mill Luens G2CKB. Tel: (01992) 558493.

STEVENAGE & DARS, G3SAD. Meets at the Stevenage Day Centre, Chells Way, Stevenage, Herts SG1 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 Craine G3PMF. Tel: (01923) 262180.

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 Whitbourn G0SWE.

KINGSTON & DARS, G3KIN. Details from Mrs Mary Ashdown G0BQV.

REIGATE ARS, G5UK, 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 ARTS, 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 & DRS, G4GQR. Meets at the Roast Beef Bar, Brighton Racecourse, Elm Grove, Brighton. Details from Mr P.J. Fellingham.

CROWBOROUGH DARS, G0CRW. Meets at the Plough & Horses, Walsheas Lane, Jarvis Brook. Details from Mrs M. Clark. Tel: (01892) 663666.

EAST SUSSEX AMATEUR TV GROUP, RS178475 was G8VX. Details from Keith Ellis G8HGM. Tel: (01323) 720220.

SOUTHDOWN ARS, G3WQK. Details from Jim Harris G4DRV. Tel: (01323) 728479.

THE ORZ ARC OF SUSSEX, G83VC. 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, Wildern, Andover, Hants. Details from Mr R.S. Coimani G0WYD.

BASINGSTOKE ARC, G3TOR, G8JYN. Meets at the GEMS Social Club, Lister Road, Basingstoke, Hants. Details from Bob Brown M0KJJ.

FAREHAM & DARC, G3VEF. Meets at the Portchester Community Centre, Westlands Grove, Portchester, Hants. Details from Andrew Sinclair G0AMS. Tel: (01329) 235397.

HIGHFIELD PARK RC, G4WYD. Meets at Highfield Park RC, National Air Traffic Service, Highfield Park, Heckfield, Hants RG27 0LD. Tel: (01734) 225019.

HORNDEAN & DARC, G4FBS. Meets at Lovedean Village Hall, Lovedean Lane, Lovedean, Hants. Details from Stuart Swain G0FYX. Tel: (01705) 472846.

ITCHEN VALLEY ARC, G0IVR. Meets at the Scout Hut, Brickfield Lane, Chandlers Ford, Eastleigh, Hants. Details from Sheila Williams G0VNI. Tel: (01703) 813827.

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) 550111.

SOUTH HAMPSHIRE INT. TELE SOC., G3DIT. Meets at G3JZV's QTH, Space is limited. Details from Rev. T.R. Morimer G3JZV. Tel: 02392 649254.

SUBMARINE ARC, G3BZU. Meets at HMS Collingwood, Newgate Lane, Fareham, Hants PO14 3AS. Details from Mr W.S. Blyn G0PPI. Tel: (04329) 232386.

THREE COUNTIES ARC, G4WWR. Meets at the Bramshott Parish Inst. & Club, Hestley Road, Liphook, Hants. Details from Damian Kamm G7RFV. 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 Brckfields Horse Country Centre, Newnham Road, Binstead, Isle of Wight. Details from Mr Pebody.

ISLE OF WIGHT RS, G3SKY. Meets at The Old Cafe, Whitecalf Bay, Holiday Park, Bembridge. Details from Alan Reeves G4ZTQ. Tel: (01983) 294309.

OXFORDSHIRE

BANBURY ARS, G0BRA. Meets at St. John's Church Social Club, South Bar, Banbury, Oxon. Details from Mr R.S. Marsden G1VSY. Tel/FAK: (01295) 253509.

HARWELL ARS, G3PIA. Meets at the Social Club, Harwell Laboratory, Didcot, Oxon. Tel: (01235) 222750.

OXFORD & DARS, G5LO. Meets at the Grove House Club, George Street, Summertown, Oxford. Details from Mr D. Walker G3BLS. Tel: (01865) 247311.

VALE OF WHITE HORSE ARS, G5RPF, G4WVH, G6WVH. Meets at The Fox, Stevenston. Details from Ian White G3SEK. Tel: (01235) 531559.

WEST SUSSEX

CHICHESTER ARC, G2NIM. Meets at the St. Pancras Hall, Chichester. Details from Graham Swann G0W5D.

CRAWLEY ARC, G3WSC. Meets at the Tilgate Forest Rec. Centre, Hut 18, Tilgate Forest, Crawley, West Sussex. Details from Mr J.S. Spence G0PFI.

HORSHAM ARC, G4HRS. Meets at the Guide Hall, Denne Road, Horsham, West Sussex. Details from Alistair Watt G3ZBU. Tel: (0

SALTASH & DARC, G4GXK, G8SAL. Meets at the Top H Hall, Warraton Road, Saltash, Cornwall. Details from Brian Giles. Tel: (01752) 844321.

ST AUSTELL ARC, G0ECC. Meets at Polair School. Details from Reg Pears G4TRV. Tel: (01276) 72951.

DEVON

APLEDORF & DARC, G2FKO. Meets at the Apledore 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) 33756.

DARTMOOR RADIO CLUB, G1RCD, G0DRG. Meets at the Yelverton War Memorial Village Hall, Meavy Lane, Yelverton, Devon. Details from Ron Middleton G7LLG. Tel: (01822) 852586.

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, Maripool Hill, Exmouth.

NORMAN LOCKYER OBSERVATORY, G0AQC. Meets at the Norman Lockyer Observatory, Salcombe Hill, Sidmouth. Details from Ron Hanson G0NOC. Tel: (01395) 515349.

NTE (PAIGNTON) ARS, G0OSH. Meets at Paignton Community College, Upper School, Waterleaf Road, Paignton. Details from Rod Maude G0SWM. Tel: (01803) 521066.

SOUTH DEVON ARC, G4SSD. Meets at the Hillhead, Kingswear, Devon. Details from John May G0CDB. Tel: (01803) 522995.

TORBAY ARS, G3NJA. Meets at the Highweek Family & Social Club, Highweek, Newton Abbot, Devon. Details from John Oway G3RMA. Tel: (01803) 556425.

UNIVERSITY OF PLYMOUTH ARS, G0UOP. Details from Alan Santillo G0XAW.

DORSET

BLACKMORE VALE ARS, G4RBY. Meets at Shaftesbury Club for Young People, Coppice Street, Shaftesbury, Dorset SP7 8PF. Details from Mr A. Mamott G0GFL. Tel: (01258) 860741.

BOURNEMOUTH ARS, G2BRS. Meets at the Kinson Community Centre, Kinson, Bournemouth, Dorset. Details from Len Rayner M0AXI. Tel: (01202) 895134.

CHRISTCHURCH ARS, G0MUD. 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, G4RRF. Meets at the Flight Refuelling Social Club, Merley, Wimborne, Dorset. Details from Martin Axon ZEDDFZ. Tel: (01202) 693334.

POOLE RS, G4PRS. Meets at the Bournemouth & Poole CFE, Constitution Hill Site, Poole, Dorset. Details from Phil Mayer G0KKL. Tel: (01202) 709093.

PORTLAND ARC, G0VOP/G7VOP. Meets at Clifton Hotel, Grove Road, Portland. Details from Kerry Moms G1WIK. Tel: (01305) 788591.

SOUTH DORSET RS, G3SDS. Meets at the Church Hall, Chickwell, Weymouth, Dorset. Details from John Rose M0BQQ. Tel: (01305) 832057.

SWANAGE & PURBECK ARC, M0BLJ. 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, G3DVC. Meets at the German Signal Station, Rue Baal, La Moye, St Brethead. Details from Mrs Anne Mourant M0BJU. Tel: (01534) 734948.

SOMERSET

PRESTON COMMUNITY SCHOOL ARC, G0PCS. Details from Craig Douglas G0HDI. Tel: (01935) 71131.

TAUNTON & DARS, G3XW. Meets at The Memorial Hall, Trull, Taunton. Details from David Rosewar M0CIF.

WEST SOMERSET ARC, G0QW. 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, G3GMH, G8BYE. Meets at the British Red Cross HQ, 72 Grove Avenue, Yeovil, Somerset. Details from George Davis G3CDO. Tel: (01935) 425669.

ESSEX

BRAINTREE AR & CCC, G4JXG. Meets at the Braintree Hockey Club, Church Street, Bocking, Braintree. Details from Keith Farthing ZEOARS. Tel: (01376) 347736.

CHELMSFORD ARS, G0MWT. Meets at the Marconi Social Club, Beehive Lane, Chelmsford, Essex. Details from David Bradley M0BQC. Tel: (01245) 602838. E-mail: cars@g0mwt.org.uk

CLACTON RADIO CLUB, G3CRC. Details from Mr D. Fitzpatrick M0CHL.

COLCHESTER ARS, G3VCO. Meets at the Colchester Institute, Sheppen Road, Colchester. Details from Frank R. Howe G3RF. Tel: (01206) 851189.

DENGIE HUNDRED ARS, G0UTT, G7SDH. Meets at the Henry Samuel Hall, Maryland, Essex. Details from Mrs Christine Wade. Tel: (01621) 722986.

HARLOW & DARS, G6UT. Meets at the Mark Hall Barn, First Avenue, Harlow, Essex. Details from Len Brackstone G7UFF. Tel: (01279) 832700. FAX: (01279) 864973.

HARWICH ARIG, G0GRH. Meets at the Park Pavilion, Barrack Lane, Harwich. Details from Eugene Kraft G4FTP.

LOUGHTON & EPPING FOREST ARS, G4QNP. 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 G0TMM. Tel: (01268) 741229.

STANFORD-LE-HOPE & DARC, G4SLH. Meets at the St Joseph Parish Rooms, Scrutton Road, Stanford-le-Hope, Essex. Details from Ken Thompson G4PAD. Tel: (01375) 671238.

VANGE ARS, G3VCX. 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, Etham, London SE9. Details from Richard Perzyna G8BTB. Tel: (01689) 602948.

DOVER RADIO CLUB, G3YMD. Meets at the Dover Grammar School for Boys, Astor Avenue, Dover. Details from Brian Hancock G4NPM. Tel: (01304) 821007.

EAST KENT RADIO SOCIETY, G0EKR. Meets at St. Bartholomew's Church Hall, Herne 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 G0MTJ. Tel: (01233) 732656.

HILDERSTONE ARS, G0HRS. 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 G4WCZ.

MADSTONE YMCA ARS, G3TRF. Meets at YMCA Sports Centre, Melrose Close, Madstone, Kent. Details from Colin Wilson G0VAR. Tel: (01622) 736636.

MEDWAY ARTS, G5MM, G6MMW. Meets at Tunbury Hall, Catkin Close, Tunbury Avenue, Walderside, Chatham. Details from Mr J. Hale G3FTH.

NORTH KENT RS, G4CWX. Meets at The Pop-in-Parlour, Graham Road, Bexleyheath, Kent. Details from Mr A.V. Fnbbs G8MLQ. Tel: (01474) 356694.

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, G0XOX. Details from Mr K. Churchill M1CZA. Tel: 0208-301 5067.

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 N1 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. Bestford G3NHU.

GRESHAM'S SCHOOL ARC, G3XPX. Details from Rev. R.N. Myerscough G3PXX.

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, G82MC. Details from Keith J. Martin G0GFO. Tel: (01263) 588506.

SUFFOLK

BURY ST EDMUNDS ARS, G2TQ. Meets at the Cuford School Cuford, 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) 642599.

FRAMLINGHAM COLLEGE ARC, M0CBB. Tel: (01728) 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 G7CYY. Tel: (01394) 420226.

LEISTON ARC, G0TUQ. Meets at Leiston Town Athletic Assn., Victory Road, Leiston, Suffolk. Details from Sam Lydiate G4IFD. Tel: (01728) 832999.

LOWESTOFT DRS, G3JRM. Meets at The George Barrow Hotel, Oulton Road, Lowestoft. Details from Phil Holden G0JSG. Tel: (01502) 585448.

MARTLESHAM RS, G4MRS. Meets at the BT Laboratories, Martlesham Heath, Ipswich, Suffolk. Details from Darren Hatcher. Tel: (01473) 644475.

SUDBURY & DRA, G0SWI, G7SRA. Meets at the Old School, Wells Hall Road, Great Cornard, Sudbury, Suffolk. Details from Bryan Pantton G1TWY.

SUFFOLK DATA GROUP, G87MXM. Details from Peter Pryke G8HUE. Tel: (01473) 631313.

NORTH WALES

CLWYD

CONWAY VALLEY ARC, G6WTM. Meets at the Studio, Penrhos Road, Colwyn Bay, Clwyd. Details from Mr R.W. Evans G6WPM. Tel: (01745) 855068.

HALKYN & DARS, G6W3HRG. Details from Mr D. Austn G6W1XHG.

NORTH WALES RS, G6WNR. Meets at the Old YMCA, Queen's Drive, Colwyn Bay, Clwyd. Details from Ted Shipton G6WDSJ. Tel: (01745) 336939.

WREXHAM ARS, G6W4XW. Meets at the Community Centre, Maesgwyn Road, Wrexham. Details from Mr P. Moran G6W0WR.

GWYNEDD

MEIRION ARS, G6W4LZP. Meets at the Royal Ship Hotel, Dolgellau, Gwynedd. Details from Gervase Chavasse G6W4URJ. Tel: (01341) 421028.

PORTHMADOG & DARS, G6W0VI. Meets at The Yacht Club, The Harbour, Porthmadog, Gwynedd. Details from Mr G. Cadwaladr M4WDFN.

THE DRAGON ARC, G6W4TTA. Meets at the Ebenezer Church Hall, Lon Fael Graig, Llanfaiwl, Isle of Anglesey. Details from Stewart Rolfe G6W0ETF. Tel: (01248) 362229.

POWYS

POWYS ARC, G6W4HVN. Meets at the ATC HQ, Park Lane, Newtown, Powys. Details from Mrs Jean Brown ZW1CEZ. Tel: (01686) 640814.

SOUTH WALES

DYFED

ABERPORTH YMCA, G6W4SZV. Meets at the Hut B17, The Airfield, Aberport. Details from Mr G. Caruther G6W4HGT. Tel: (01239) 811205.

ABERYSTWYTH & DARS, G6W0ARA. Meets at the Scout Hut, Plasrug Avenue, Aberystwyth. Details from John Woodward G6W4DK. Tel: (01970) 890687.

CARMARTHEN ARS, G6W4YCT. Meets at The Aelwyd Race Cafe, Carmarthenshire County Council, Tregynwr Road, Llangunor, Carmarthen SA31 3BS. Details from Mr W.D. Hughes G6W4ZL. Tel: (01267) 231359.

CLEDDAU ARS, G6W0SYG. Details from Trevor Perry G6W4XQK. Tel: (01646) 600725.

LLANELLI ARS, G6W0EZQ. Meets in the Furnace Community Hall, Furnace Square, Llanelli. Details from Roy Jones G6W0KZK. Tel: (01554) 820207.

PEMBROKESHORE RS, G6W0EJE. Meets at Furzy Park Community Centre, Furzy Park, Haverfordwest, Pembrokeshire. Details from Ian M. Jones M6W0CAB. Tel: (01437) 763028.

GWENT

ABERGAVENNY RS, G6W4GFL. Meets at the Hill Residential College, Pen-y-Pound, Abergavenny, Gwent. Details from Glyn Hughes G6W0DQY. Tel: (01633) 483186.

BLACKWOOD & DARS, G6W6GW. Meets at the Oakdale Comprehensive School, Oakdale, Blackwood, Gwent. Details from John Evans G6WBIT. Tel: (01495) 225178.

EBBW VALE COLLEGE RS, G6W0IWW. Meets at the Gwent Tertiary College, Ebbw Vale Campus, College Road, Ebbw Vale, Gwent. Details from Mr T. Hayden G6W0HCN. Tel: (01495) 305192.

NEWPORT ARS, G6W4EZW. Meets at the Brynngas Community Centre, Brynngas Road, Newport, Gwent. Details from Paul Nicholls.

PONTYPOOL ARS, G6W3RNH. Meets at the Settlement, Rockhill Road, Pontypool, Gwent. Details from Graham Smith G6W0OZL.

MID-GLAMORGAN

BRIDGEND & DARC, G6W4LNP. Meets at the Club Bymynydd, Bymynydd, Bridgend. Details from Alun Hughes. Tel: (01656) 721574.

HOOVER (MERTHYR) ARC, G6W3RDB. Meets at the Hoover Sports Pavilion, Hoover Ltd., Penrhebach, Merthyr Tydfil, Mid Glamorgan. Details Robert Cummings G6W0RVG.

MID GLAMORGAN ARC, M6W0CNA. Meets at Aberkenfig Sports & Social Club. Details from Mervyn Carey G6W4VSE. Tel: (01656) 734668.

SOUTH GLAMORGAN

BARRY ARS, G6W3VKL. Meets at Sully Sports & Leisure Club, South Road, Sully, S. Glamorgan. Details from Richard Mortimore G6W4BVI. Tel: (01446) 738756.

HIGHFIELDS ARC, G6W4LFO. Meets at the Highfields Physically Handicapped Centre, Allensbank Road, Cardiff. Tel: (01222) 561542.

WEST GLAMORGAN

PORT TALBOT (BS PLC) ARS, G6W3EOP. Meets at the British Steel PLC Sports & Social Club, Mangam, Port Talbot, West Glamorgan. Details from Mr J. Chinnock M6W0AGE.

SWANSEA ARS, G6W4CC. Meets at the Applied Sciences Building, Swansea University. Details from David Williams G6W4BNJ. Tel: (01792) 519046.

SCOTLAND WEST & WESTERN

CENTRAL REGION

FALKIRK & DARS, G6M0FR. Details from Scott Waterall G6M0KBU.

STIRLING & DARS, G6M6NX. Meets at Bandedeath Industrial Estate, Throsk, Nr Stirling. Details from John Shery G6M0AZC. Tel: (01324) 824709.

DUMFRIES & GALLOWAY

WIGTOWNSHIRE ARC, G6M4RY. Meets at the Ard Unit, Stranraer Academy, Stranraer, (entrance from Cairnpoll Road). Details from Neil Macdonald G6M4LQS.

STRATHCLYDE

AYR ARC, G6M0AYR. Meets at the Cridal Leisure Centre, Ayr. Details from Peter Sturgeon M6M0BQP.

CENTRAL SCOTLAND FM GROUP, RS38728. Details from Thomas Stalker M6T7ZU. Tel: (01698) 816793.

DALRY ARC, M6M0ARG. Meets at The Turf, In Dalry Court, Hill Street, Dalry. Details from Alex McKeenan M6M0ABM. Tel: (01294) 823295.

DUNOON & DARS, G6M0CDD. Meets at the Edward Street Community Centre, Edward Street, Dunoon. Details from A.B. Horton G6M0BUL. Tel: (01369) 840217.

HELENSBURGH ARC, G6M4HEL. Details from G. Capstick G6W07AF. Tel: (01436) 675922.

INVERCLYDE ARC, G6M0GNK. Meets at the Cardwell Bar, Cardwell Road, Gourcock, Strathclyde. Details from Andrew Givens G6M3YOR. Tel: (01475) 638226.

KILMARNOCK & LOUDOUN ARC, G6M0ADX. Meets at the Hurford Community Centre, Cessnock Road, Hurford. Details from Steve Campbell G6M4O5S. Tel: (01560) 483800.

LARGS & DARS, G6M0VKG.

LORN ARS, G6M0LRA. Details from T. Olsen G6M0EQW. Tel: (01866) 2580.

MID LANARK ARS, G6M3PXK. Meets at the Newarthill Community Ed. Cent., High Street, Newarthill, Motherwell, Lanarkshire ML1 5GU. Details from John Neary G6M0XFK. Tel: (01698) 822860.

MILTON OF CAMPSIE ARS, G6M0MOC. Meets at The Red Cross Hall, Kirkintilloch. Details from John MacKenzie G6M0HJU. Tel: (01360) 312954.

PAISLEY ARC, G6M0PYM. Meets at the Paisley YMCA Hall, 5 New Street, Paisley PA1 1XU. Details from John Guggley G6M0TQA. Tel: 0141-889 6850.

SCOTTISH DIGITAL COMMS GRP, G6M7VSR. Details from Stuart Clink G6M1VBE. Tel: (01698) 884803.

WEST OF SCOTLAND ARS, G6S4AGE. Meets at the Multi Cultural Centre, 21 Rose Street, Glasgow. Details from Hon. Sec.

SCOTLAND EAST & HIGHLANDS BORDERS

BORDERS ARS, G6M0BRS. Meets at the St. John Ambulance Hall, Berwick-upon-Tweed. Details from A.M. McCreadie G6M0BPY. Tel: (018907) 50492.

GALASHIELS & DARS, G6M4YEQ. Meets at the Focus Centre, Galashiels. Details from Jim Keddle G6M7LUU.

KELSO ARS, G6M4KHS. Meets at the Abbey Row Community Centre, Kelso. Details from Margaret Chalmers G6M0ALX. Tel: (01573) 226372.

FFE

GLENROTHES & DARC, G6M4GRC. Meets at the Football Pavilion, Station Road, Thornton, Fife. Details from Alexander Adam G6M0FVD. Tel: (01592) 874374.

GRAMPIAN

ABERDEEN ARS, G6M3B5Q. Meets at the Red Cross HQ, 22 Queens Road, Aberdeen. Details from Robert Duncan. Tel: (01224) 896142.

BANFF & DARC, G6M0PXC. Meets at the Princess Royal Football Ground, Conference Row (Deveronvale F.C.), Banff. Details from Steve Roberts G6M4HWS. Tel: (01888) 551377.

MORAY FIRTH ARS, G6M3TKV. Meets at the Grant Arms Hotel, Fochabers. Details from Geoff Crowley G6M7SJC. Tel: (01542) 882818.

HIGHLAND REGION

FORT WILLIAM ARC, G6M0FRG. Details from R. Johnstone G6M1VGV. Tel: (01397) 70304

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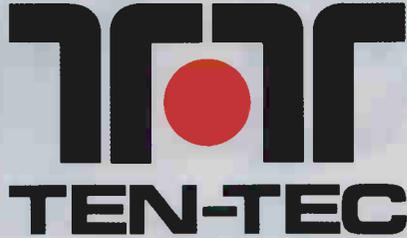
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