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World Radio History

ALINCO

DJ-X3

CUARA

April 2004

On Sale March 25 Vol.62 No 4 (May issue on sale April 22)

Published by PW Publishing Limited Arrowsmith Court BROADSTONE Dorset BH18 8PW Directors: Stephen Hunt & Roger Hall

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Broadcast

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The latest receiver to emerge from the AOR stable is the subject of John Wilson's scrutiny this month. Aimed at the professional market the AR-ONE will undoubtedly stimulate interest in hobby quarters. Turn to page 23 to see why.

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Ian Wraith delves into the complexities of a software defined radio, explaining the differences and advantages of this new use of technology. Is this the future of

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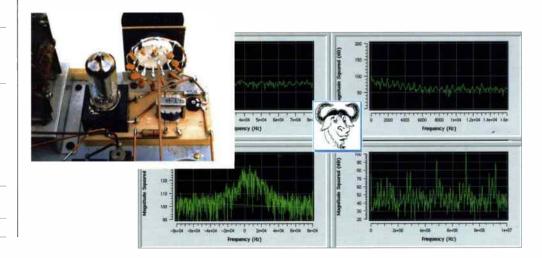
Lawrie Hallett G8VJH examines what could potentially amount to a very nasty source of r.f. interference for our hobby in the future. The use of the National Grid to supply Internet connectivity to the UK's homes.

38 Acorn 3 Upgrading The Acorn 1 SW Receiver

The Acorn 1 first appeared in SWM January 1994 and we recently had some enthusiastic calls from readers who were still eagerly awaiting the expansion details promised some ten years earlier. Robert A. Wilson FRSA takes up the thread.

71 **SWM** Club Listing

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





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cover subject: The stunning new AR-ONE from AOR.





Share your thoughts

For the latest radio news, see our web site www.pwpublishing.ltd.uk/swm/news/

Join in with the on-line action on the SWM Readers' E-mail Forum - send an E-mail to swm_readers-subscribe@yahoogroups.com to subscribe - don't miss the on-line action!

Coming Next Month in SWM May 2004

Listening to HF Aircraft - ACARS & FAX

- New! Beginner Series Getting Started
- Listen To The World Via Remote Radios Javoradio
- Keep on top of the world of monitoring with SWM
- and much more...

contents subject to change

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Subscriptions

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

Components For SWM Projects

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

Photocopies & Back Issues

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

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

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

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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.





comments

his month sees two new authors take up the reigns with SWM regular columns. The first being Martin Peters who, as announced last month, has agreed to compile 'LM&S'. Martin, as you know is hardly new to the pages of SWM, as he's been writing 'Bandscan Europe' since January 2001 and is a frequent contributor of features and reviews. However, he's now decided to accept the monthly commitment of our ever popular broadcast reports section. As all you 'LM&S' devotees will probably already have noticed, Martin has responded to the very familiar and long standing requests to feature a short wave table to ease readers' log checking. I hope that the new presentation meets with everyone's approval - please let me know your feelings. Don't forget, if you want to submit your logs to Martin, please don't be shy. Take a look at page 14 for more details.

A big welcome also to a brand new *SWM* contributor, **Ben Hogan**. Ben is our new 'SSB Utilities' author who's a very keen and knowledgeable utilities enthusiast and therefore well positioned to carry on the long tradition that's been forged over the years, first by the late **Peter Rouse** and then very ably continued by **Graham Tanner**.

A hearty SWM welcome to both our new scribes!

Diverse

This issue sees a huge contrast in the topics of interest to readers of *SWM*. Right up at the emerging technology end, **lan Wraith** looks at computer based reception systems, otherwise known as software defined radios. lan reckons that in ten years all radios will be like this.

We also have **John Wilson** looking at the very latest from AOR - the AR-ONE - a conventional receiver but one with very high specifications and price tag to suit. John also sadly informs us of his decision to no longer write reviews of new equipment for *SWM*, due to the continued move of products to digital technology. He has however, committed to write occasional features on more conventional techniques and equipment in the future, so it's not a total goodbye.

I wish John well and every success with his test lab activities and extend a huge thanks for his hard work and dedication over the past seven or so years of writing for SIAM

Right at the other end of the 'spectrum', **Robert A. Wilson** explains how to convert your 'Acorn 1' receiver into an 'Acorn 3' by adding both an r.f. and an audio stage.

Lawrie Hallett investigates the potentially massive threat of h.f. interference emanating from National Grid power lines with the possible introduction of high speed data transmission via this medium.

Such is the diverse mix that makes up *SWM*. We really do our best to cover all aspects of the hobby. I'm most grateful to those of you who take time send me your comments indicating that the mix is to your taste. If though, you disagree, I'd be just as happy to hear your suggestions regarding what we're missing.

Amateur 5MHz

5MHz operation is increasing as more amateurs equip their stations for this new band. Finland recently joined the UK

and USA with regular amateur activity on the 60m band. Club stations **OI3W** and **OI3AY** made the first amateur Finnish 5MHz contact on 27 January 2004. Welcome Finland!

The propagation with 50W and a dipole on the band is good for 50 to 320km range around midday, 1600km in morning and evening, with distances of over 3000km possible late at night and before sunrise.

So that you know where to listen, here's a list of world-wide 5MHz channels.

MHz	Ch. Ref	Location	Remarks
5.1675	167	Alaska	Emergency
5.1945	194	Germany	DRA5 Beacon
5.2585	258	UK	UK FA
5.2675	267	Canada	Beacon
5.2785	278	UK/Finland	UK FB
5.2885	288	UK/Finland	UK FC
5.2985	298	Finland	
5.3275	327	Canada	Experimental
5.3305	330	USA/Finland	
5.3465	346	USA/Finland	
5.3665	366	USA/Finland	
5.3715	371	USA/Finland	HFpack USA
5.3985	398	UK/Finland	UK FE
5.4035	403	USA/UK	HFpack USA,UK FM

The world-wide standard mode for amateur radio on 5MHz is u.s.b. Voice, digital and c.w. modes within a 3kHz bandwidth are allowed in UK for holders of experimental licences or NOV, and channels are often described by the centre-of-channel frequency, dial plus 1500Hz, or the formal 'Foxtrot' designators FA, FB, FC, FE and FM.

The DRA5 Experimental Beacon, operated by DARC transmits propagation data using c.w./RTTY/PSK31.

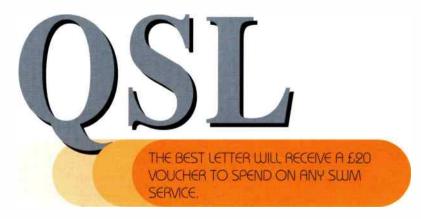
The Experimental Station VO1MRC operated temporary c.w. beacon on Ch 267, and voice QSOs on a specific schedule.

Finnish Club stations may apply for authorisation to operate the 5MHz channels with maximum power of 50W u.s.h. only

HFpack, the HF Portable Group, maintains daily and weekend scheds and a network of Echolink h.f. base stations in North America on 5.3715MHz. HFpack operators give priority to h.f. portable and mobile stations. They make all welcome, base, mobile and portable. In the event of an emergency, the HFpack net is activated on this channel. For more information see **www.hfpack.com**

The 5MHz channels are a shared resource with many users. Radio amateurs are secondary users and must yield 24 hours-a-day to primary stations who use mostly data. During evening and night time, as the propagation range is increased and interference is more likely.





Dear Sir

I have never been so astounded as to why such a letter like the one from Ronald Evans should have been awarded the 'Top QSL' in SWM for February 2004. His idea of s.w. radio and its general interest are very strange.

Surely, radio as every enthusiast knows, is radiated via space. The idea of listening to any station, whether it be broadcast, amateur or commercial, is to be able to pick it up via an antenna. Just to put your computer on and pick the appropriate website then listen to the programme, etc. at S9 plus with no QRM is just **not radio**. Whatever next?

The whole enjoyment for the majority of enthusiasts is to be able 'at times' when conditions are right to listen to the world, however weak the station may be. I have had much enjoyment and learnt a lot from your excellent *Short Wave Magazine* over the many years I've been reading it.

If you decide to take the minority into consideration and go over to 'Radio by telephone wire' then I for one will not be renewing my three year subscriptions ever again. Please keep your contents as they are at the moment, many like to see the old type of equipment even if they are to young to have seen it.

Keep up your traditions in the excellent magazine.

DAB (Essex) via E-mail

DAB, I'm glad to report that you'll be reading for many years to come! - Ed.

Dear Sir

With reference to the letter by Ronald Evans regarding old fashioned radio, I for one do not want pages and pages in a radio magazine of the Internet - how boring! Radio stations from the past are worth some space, this is where it all started.

I do have a computer, but one must remember not everyone has the technical knowledge to get the best from Internet radio, or the finances. Let Ronald listen to his radio on the Internet. Good luck to him.

Gerald Guest Dudley W. Midlands

Dear Sir

I agree with the views expressed by Ronald Evans in the February SWM about listening to 'flawless' broadcasts on the Internet, purely as a listener, but the DXer who uses anachronistic methods to listen to 'stations' in the USA for example is a completely 'separate' aspect of the 'hobby' and can co-exist.

With the new technology, we would have broadcasts so pure and flawless that to a DXer appear bland!

H. Richards Barton-Upon-Humber N. Lincolnshire

Dear Sir

Many, many thanks for the lovely Radio Shack PRO-82 scanner I won in your recent scanning competition. It arrived before Christmas, but I'm only just getting over the rush and dealing with things now. I've tried some other scanners in the past, but the PRO-82 is by far the easiest to use and programme.

After reading the manual and fiddling with it (not necessarily in that order!) I'm happily listening to passing aircraft. It may not have the widest range of frequencies or modes, but it's certainly an excellent beginner's scanner and appears to be sensitive - it has worked for me from poor sites such as indoors or in cars. I'd recommend it to anyone starting off in scanning.

It's the first time that I have won anything in a competition - hope my luck's changing! Keep up the good work with *SWM*, I've been subscribing for several years and its been great the whole time. I particularly like 'Decode' and JW's pieces - any chance of getting him to look at some of the old Heathkit receivers?

Best of luck for the New Year to you and all the staff.

Alistair Dunlop via E-mail

Alistair, I'm very pleased you are enjoying your prize. I like your suggestion regarding Heathkit. I'll see what can be done. - Ed. 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.

topas

Dear Sir

I was rather surprised by Ronald Evans' letter in SWM February 2004. After all, the title of the publication is Short Wave Magazine, so surely he should expect to find articles about short wave transmission in it. And PW is Practical Wireless, so why expect articles on wired broadcasting?

OK, I admit I am rather biased on this as I too am an ex BBC Transmitter Group engineer (not retired) and included both Rampisham and Ascension Island in my postings, but if Mr Evans had actually read the article on Rampisham, he would have found out the technology is anything but 1930s!

I too am an avid user of the Internet, (but not listening to broadcast material on it) and I buy associated Internet magazines related to that interest. If indeed Mr Evans has given up with all methods of radio based listening, then he should also give up reading SWM and let the rest of us enjoy the magazine as something that is part of our interest and covers the modes we do listen to.

My only criticism of the magazine is the ratio of advertising to editorial pages, which is far too low, but I guess that's economics.

Phill Gardiner Cowes Isle of Wight

Many thanks for your views Phill. The balance of Editorial to advertising is a combination of economics and publisher's policy with most magazines. - Ed.

Dear Sir

Logo change - SWM

Just before Christmas, when ordering some books from your Book Store, I mentioned this matter to them and was told it would be passed on. Lo and behold, I picked up my January copy and there in your Ed's Comments the matter is honestly addressed.

At my local emporium (WH Smiths) in October, November and December I asked for a copy, having been unable to find them, to be told if there were none on display, they were gone. By now I was suffering from withdrawal symptoms, so I tried another branch and not spotting a copy, asked the lady manager if there was a copy. Instantly she led me back to the stand and produced the December issue, which I did not recognise at first.

Asking how she knew instantly what I was looking for, I was informed that our scenario had been repeated so many times in recent months that she was aware of the problem! I have to say the original white, red and black logo did stand out against the hundreds of other brash multi-coloured covers on display. I suppose it reflected the superior standard of our magazine.

The January edition is an improvement in reverting to the original colours rather than the new brick and white. I wonder what other readers think?

Gerry Saunders Bournemouth Dorset

PORTABLE WILENWAS

Freq: 25-2000 Mhz Length: 900mm
This Desktop Internal Antenna comes with 3 vertical capacitor loaded coils, mounted on a unique helically wound tri-pod, to give its own ground plane for smooth reception. Complete with 5 mtrs of RG58 coax, terminated with a BNC. (Get the most from your scanner with the Tri-Scan III Desktop and enjoy great performance without the hassle of erecting an external one).

Our Price £39.95 plus £6.00 p+p



Freq: 25-2000 Mhz Length: 900mm

This discone style indoor antenna comes with 4 tuned stainless steel vertical whips, 8 ground plane 12" radials, plus 4 loaded horizontal 3" helical radials. Complete with heavy duty base 5 mtrs RG58 terminated with a BNC. (Don't loose those wanted signals while indoors. Use the Skyscan Desktop at your radio station, on the window seal or even in the loft for increased erformance)

Our Price £49.95 plus £6.00 P+P.

These two superb universal antennas, one for VHF/UHF & one for HF have internal tuned wound coils encased in a fibreglass tube with black covering. Includes two suction cups for easy fitting to any smooth surface, complete with 5mtrs of mini hi-spec coax terminated with a BNC. (With these antennas, take your hobby mobile in the car, at home on the patio or bedroom window. A perfect solution for sometimes awkward antenna instillations. Great results - No hassle)

Freq: 25-2000 Mhz Length: 515mm. Our Price £29.95 PLUS £6.00 P+P.

Freq: 0.05-30 Mhz Length: 770mm. Our Price £39.95 PLUS £6.00 P+P.

Freq:25-1800 Mhz Length:1400mm

This portable active antenna incorporates a easy fold away 300 0hm receiving element joining to a matching coil, wideband pre-amplifier (9v batt not inc) 4mtrs RG58, terminated in a BNC. (Don't loose performance by not choosing an external antenna! Install the in the loft, hang by the window, or even from a tree while out and enjoy upto 14dB Gain with the MAX-5 pre-amplified Active Antenna).

Our Price £49.95 PLUS £6.00 P+P.

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Freq: 0-40 Mhz Length: 25mtrs
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Our Price £39.95 plus £6.00 P+P

Freq: 0-40 Mhz Length: 25mtrs

This complete HF wire antenna system comes with 25 mtrs of high grade flexweave antenna wire, dog bone insulator, di-pole centre choke balun,guy rope,& 10mtr RG58 mil spec patch lead terminated with a PL259

Our Price £49.95 plus £6.00 P+P.

(Both these wire antennas have our own ferrite wound baluns that give an extra 2 "S points greater signal than some similar baluns. No ATU required as perfect 50 Ohm match is achieved over all 40mhz).

Balun only with S0239 socket and wing nut for wire

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COINC MORILE

Freq. 25-2000 Mhz Length. 620mm Dual coil capacitor trapped vertical coils, 3.5" magnetic base with rubber protection, 4mtrs RG58 coax cable, terminated with a BNC. (Don't loose those signals while on the move, the G.Scan II is the answer for continued high performance reception where ever when ever).

Our Price £24.95 plus £6.00 p+p.

Freq: 25-2000 Mhz Length: 650mm 4 tuned stainless steel vertical radials, 3.5" magnetic base with rubber protection, 4 mtrs RG58 coax terminated with a

BNC. (With not just one but four vertical radials, take your scanner in the car & enjoy superior reception with this dedicated antenna

Our Price £19.95 plus £6.00 p+p.

Freq TX: 144-146 430-440 Mhz Freq RX: 100-1300 Mhz Length: 300mm

Spring loaded black stainless whip, 1" super strong magnetic mount, 4mtrs of mini hi-spec coax, terminated with a BNC. (Ideal for "low profile" scanning while for those with transceivers with wideband receive, its the perfect choice for dual band TX and continued large scale reception).

Our price just £14.95 plus £3.00 p+p.







HVNOHETO VVLEVNVE

Freg:25-1800 Mhz Length: 400mm MRWV=1000 BNC fitting Our Price £19.95 plus £2.00 P+P

SMA fitting Our Price £22.95 plus £2.00 P+P (Going Out? Don't Miss Out! Replace your existing hand-held antenna with a Super Gainer one).

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The most comprehensive frequency list for the UK. It covers thousands of frequencies from 26Mhz to 1.8Ghz. Our Price £19.50 PLUS £6.00 P+P.



Freq: 25-2000 Mhz Pwr: 9-15v imput (battery not included). Gain: 14dB Complete with joining lead with BNC (For use with any passive antennas ie SuperScan Sticks/Discones and with upto 14dB gain, bring those lost signals to life !!!)

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communiqué se montheu review of News and Products

Enhanced 999 Facility For Mobile 'Phones

fcom recently welcomed work carried out by the UK's telecommunications sector in developing technology that will help the emergency services to locate people calling 999 from their mobile phones. Enhanced location information will mean that callers in unfamiliar surroundings can be located and reached more speedily by the Fire, Police, Ambulance or Coastguard services.

The system has been developed by the UK's mobile operators - O2, Orange, T-Mobile, Vodafone and 3 - and by BT and Cable & Wireless, the companies that connect 999 calls dialled from mobile 'phones to the emergency services. The initiative was directed by Oftel, the previous telecommunications regulator whose responsibilities have now been assumed by Ofcom.

Peter Walker, Senior Adviser for Ofcom's Technology Strategy group, said: "Ofcom welcomes this joint initiative by the telecommunications sector. More than 43 million 999 calls are made each year and more than 50% of those are from mobile handsets. The enhanced service represents a major step forward in helping the emergency services to respond to calls from mobile users as speedily as possible".

The capabilities of the new system were recently demonstrated to representatives of the emergency services in London. The system has been developed because mobile users are not always able to readily identify the place from which they are making an emergency call, particularly when 'phoning from a vehicle to report an incident on a motorway or other road system.

The new system will allow approximate locations to be identified by control rooms as calls are connected. It will also help in the identification of hoax callers. Fixed line callers already benefit from the facility. A previous study of location information on fixed line calls showed that, on average, 30 seconds could be saved in the despatch of emergency vehicles for each call.

The enhanced system will also apply to the European Emergency Number, 112.

Competition Winners

ongratulations to Hugh McCallion in Co. Londonderry, N. Ireland, who is the winner of our Roberts RD-3 competition, which appeared in the February 2004 issue of SWM. Also congratulations to Andy Goloshof, from Tewkesbury in Glos., who is the winner of the bhi d.s.p. module, featured in the January 2004 issue of SWM. Thanks to all those who entered and commiserations to all who were unlucky this time!

Leicester Show

ue to the enormous success of the Superbikes Motorcyle Race event at Donington on the third weekend in September, the managers at Donington felt that they could not cope with the additional volume of traffic generated by having the Leicester Show event on the same weekend. It has taken some time to negotiate the changed date, which is now Friday 1 October & Saturday 2 October with the setting up day on Thursday 30 September.

For further information about the show as it becomes available take a look at www.lars.org.uk As usual stand bookings to John G4MTP on (01604) 790966, E-mail: g4mtp@lars.org.uk Flea market bookings to John G7RXS on 0116-284 1517, E-mail: seniorja@aol.com All other enquiries to Geoff G4AFJ on (01455) 828273, E-mail: geoffg4afj@aol.com

Icom UK Win

com (UK) Ltd. has recently won an International Distributor Award from Japanese manufacturer Icom Incorporated. In winning this, the company who are based in Herne Bay, beat other Icom agents from around the world.

It was at a recent international meeting that its founder and current chairman Dave Stockley together with Philip Hadler (Managing Director), Bob Stockley (Dave's youngest son and Sales & Marketing Director) and Barry Vane (Commercial Dealer Manager) were awarded this title. On winning, Dave said "I am very proud to have won this award. This success is very much a team effort with a great team of directors and a very motivated team of workers to support them".

Icom (UK) are now celebrating their 30th anniversary and Icom Inc. their 40th. Originally established in 1974 as Thanet Electronics, Icom (UK) Ltd. started as a retailer and trade distributor to the amateur radio market. The company has now become one of the country's leading distributors of radio communications products and with a reputation for providing the marine, aviation, amateur and business markets with high quality products and excellent service.

Visit Icom at www.icomuk.co.uk for further information.



Icom UK founder and current chairman Dave Stockley receiving award

9

Thinking Day On Air

he Thinking Day on Air took place on 21 February. The Dorset station G4VBP was organised by 'Brown Owl' Peggy Ganderton for Verwood Brownie Pack. The station was run by Peter MOPTR and operated in the 7MHz band. Most of the contacts made where in the UK including several other Thinking Day on the Air special event stations. Their most local contact was Foxlease Guide Centre GB2FOX in the New Forest, the furthest away was OK1MSO

It was a day of achievement for all the Brownies who attended G4VBP with all of them successfully gaining their 'Communicator Badge'. Brownies from 1st and 4th Verwood, 1st Pimperne, 3rd Broadstone St. Johns' and 1st Ferndown Guides, Peter MOPTR, Dick and Peggy Ganderton watch with interest, as John G4FDS is busy on the microphone.



communiqué

Silent Key - G3MWF

he key of G3MWF fell silent on 23 January 2004 with the passing of Ray Marden.

Ray could be described as a kind, gentle and generous person, he was a stalwart of Amateur Radio well before gaining his licence in the mid-1950s. He always tried to put back into the hobby that which he had gained, so many people had helped him to get on the air, so it was only fair, he used to say, that he should do the same for others.

Among those who helped him and with whom he became close friends was the late **Paul Essery G3KFE** to whom Ray gave assistance when Paul took on the role of Editor of *Short Wave Magazine* during the days when it was based at Welwyn in Hertfordshire. Ray also wrote articles for the magazine.

Being licensed in the mid-fifties just some 10 years after the end of World War II like many others, G3MWF first came on the air using a war surplus receiver, a CR100 and a home-brewed Top Band c.w./a.m. transmitter. The antenna being a long wire tuned by the Pi-Network in the output of the transmitter. However, before a signal could be radiated the licensee had to possess an accurately calibrated frequency reference, which in the case of G3MWF was again, home-brewed.

A first class draughtsman by trade Ray easily developed the skills of home construction with other 'Top Band' and h.f. projects being undertaken and produced to prize winning standards. As the years passed, activity in general slowly progressed up the radio spectrum and Ray became active on both 4 and 2m. Home-brew a.m. for 2m and a modified valve p.m.r. set for 4m. It is interesting to note that 4m was a fairly active band in those days, especially when it came to contests,

which Ray avidly supported despite loosing his 4m beam when a mast blew down one wet and stormy night across Bedfordshire hilltop!

It was with some surprise in the 1980s that the locals learnt that Ray had purchased a piece of commercial equipment, a second-hand KW2000B. This was the first of three carefully decided purchases that allowed Ray to migrate to s.s.b. activity and still enjoy his first love, c.w. It also allowed him to be an active member of RAFARS nets and



keep in contact with his contemporaries around the UK.

Ray was a long time member of the Southgate Radio Club and held the office of Treasurer. He coached many of the clubs members through their 12w.p.m. c.w. proficiency test.

Everyone involved in Amateur Radio tends to specialise in one of its many facets and Ray was no exception to this, ECM being his topic. This involved consideration to the antennas used, balanced feeders being preferred. A stock of filters was also always to hand as was ready advice and assistance to those who were in need!

Ray had other interests including photography, kite building (he experimented with kite borne antennas) and model engineering.

Latterly he was looking forward to trying some of the newer data modes.

He leaves lots of friends but just one relative, his sister Merta to whom we extend our sympathy and support.

New 'Phone Number

artin Lynch & 5ons have changed their telephone number to 0845 2300 599 (FAX number is now 0845 2300 339). The new easy to remember number will also only cost the price of a local call from anywhere in the country, so dialling ML&S is now even cheaper than before. All other services from ML&S remain the same, the only thing that has changed are the telephone numbers.

Martin Lynch, Managing Director commented, "Our customers have dialled the same number for over 14 years, however, this time it will cost them less and the number has been chosen so it's easy to remember". The new numbers are effective immediately.



Don't Move - Just Listen

he DAB era has definitely arrived and you can now listen to the vast number of DAB exclusive programmes without having to move from the comfort of your chair! **Roberts** have launched another first with a new table top model, complete with remote control - Gemini 6. The sound reproduction is extraordinary too, with the unique long throw loudspeaker system.

The joy of DAB is the number of additional stations that are available, tune into BBC Seven, BBC Five Live Sports Extra, Jazz FM, Classic FM and Capital Gold plus many more. The other great advantage of DAB is that there's no need to remember frequencies, simply select the station by name with the easy-to-read scrolling text.

The Gemini 6 is the latest in the Roberts range and offers something totally different with its long throw loudspeaker design plus a comprehensive remote control for ease of use. This radio has a very contemporary look and has been designed to sit neatly on a table top.



It's rectangular in shape with a stylish cherry veneer finish with all the features on the front panel in support of a large illuminated display.

Over 80% of the UK should receive DAB coverage by the end of the year, but if you are in an area where the signal is not yet available, just switch to analogue and tune into f.m. with RDS.

The Gemini 6 features: DAB and f.m. with RDS display, long-throw loudspeaker, full remote control, ten presets, deep bass boost switch, clock/date display, tone control, headphone socket. The Gemini 6 costs £180. For stockist details, telephone (01709) 571722 or go to www.robertsradio.co.uk

WRN Transmits At The BRITS

or the second year running, World Radio
Network (WRN) provided live, pan-Europe
satellite distribution of this year's BRIT Awards
on behalf of Somethin' Else, the UK's biggest
radio production company. Somethin' Else
handled the audio production and co-ordinated
the distribution of this major annual music event.

The Awards ceremony audio was fed live from the venue directly to WRN's Central London Master Control Room from where it was simultaneously distributed to radio stations across Europe in high quality digital stereo using WRN's radio multiplex service on the *Hot Bird 6* satellite.

Richard Jacobs, WRN, said, "We were delighted to provide this *ad-hoc* satellite service to Somethin' Else once again. Our experienced technical team handled all aspects of the transmission ensuring a smooth distribution process to stations across the Continent".

Steve Ackerman, Somethin' Else said, "Once again we chose to work with WRN to distribute the BRITS following the success of last year's event. The transmission went very smoothly. Their service is cost-effective and reliable".

WRN's satellite services are regularly used for distributing one-off events to radio stations around the world. Previously, WRN has distributed the 2003 BRITS Awards, the 2002 MTV Staying Alive Concert on World Aids Day, the 2002 Grammy Awards, the 2001 MTV Europe Music Awards and Sir Paul McCartney's A Concert for New York from Madison Square Garden.



April 18: The Yeovil & DARC are holding their 20th QRP Convention at the Digby Hall, Hound Street, Sherborne, Dorset. Doors open from 1000. There will be a talk-in on S22, three lectures by notable speakers, trade stands, Bring & Buy, excellent catering and parking facilities. More information from Derek MOWOB on (01935) 414452 or E-mail: m0wob@tiscali.co.uk

April 18: The West of England Vintage Wireless Fair is to be held at the Willand Village Hall, five minutes from J27 on the M5. Doors open 1030 till 1500. There will be numerous stalls, including Radio, TV, Gramaphones and a Bring & Buy stall. A mini auction is to be held at 1330. There will be home-made refreshments and free parking. Admission is £2.50, accompanied under 16s free of charge. More information on (01392) 860529 or (01749) 676635.

April 18: The Cambridgeshire Repeater Group Annual Rally is to be held again at Bottisham Village College, Bottisham, which is six miles east of Cambridge, access is via A14 and A1303. Features include a large hall, car boot sale and a Bring & Buy. Doors open 1030 and admission is £1.50. There will be refreshments and a talk-in on S22. More information from Paul Dyke G0LUC on (01462) 683574, E-mail: g0luc@btInternet.com or visit www.gb3pl.ord.uk

April 25: The 5th Annual Radio & Electrical Equipment Sale is to be held at the Aldridge Community Centre, Anchor Meadow, Middlemode Lane, Aldridge, West Midlands. Tables are £6 and admission is £1 (including free raffle). Doors open 1000. There will be a large car park, refreshments, RSGB book stand and much more. More information from Doug G4LQY on (01543) 571269.

April 25: The Lough Erne Amateur Radio Club are hosting the 23rd Enniskillen Amateur Radio Show in the Killyhevlin Hotel, Enniskillen, Co. Fermanagh, Northern Ireland. Doors open at 1200. There is a big car park and good food. Admission is £3 and includes a free ticket for the raffle, with valuable prizes. There will be a Bring & Buy with no fee, Amateur Radio, Electronics, Computers, etc. Traditional large attendance expected from all over Ireland, north and south. More information from Herbie Gl6JPO on 028-6638-7761 or E-mail: hng@ntlworld.com

Annual Constructors Contest

he **Bangor and District Amateur Radio Society** meet on the 1st Wednesday of every month in 'The Stables', Groomsport at 2000. On Wednesday 7 April 2004 at 2000 the Society are holding their annual constructors contest. Bring something you've built and you could be in with a chance to win a prize!

There will also be an 'ARGONI update' by **Mike GI4XSF**, which will be a short talk on the progress that has been made with Northern Ireland's first ATV and 6m repeaters. As always, visitors and new members are most welcome. More information from Mike GI4XSF on **0284-277 2383** or visit the club's website at **www.bdars.com**

Lord Mayor Pays Tribute To Volunteers

he Lord Mayor of Chester has publicly thanked a group of amateur radio enthusiasts committed to providing a communications lifeline in the event of a major emergency. The Radio Amateurs' Emergency Network (RAYNET) is a national network of volunteers ready to step-in and help local authorities and emergency services maintain a link with each other and the outside world in the event of a crisis incident. They particularly come into their own in a situations where telephone communications are lost or overlanded.

Local RAYNET members recently visited the offices of all the district councils in Cheshire to test their equipment as well as being invited by the Lord Mayor of Chester, Councillor **Barry Cowper**, to the Town Hall to be thanked for their work. The Lord Mayor said: "It's important that we recognise the vital work that RAYNET does behind the scenes in Chester and I was delighted to invite members to the Town Hall to talk to them about their role and thank them officially on behalf of the district. All of RAYNET's members are volunteers who donate their time and expertise to serve the public interest by ensuring effective communications can be maintained during an emergency".

RAYNET was set up following the East Coast Floods in 1953. Hundreds of people died and many families lost their homes during the floods, which highlighted the need for a well-organised amateur radio network to back up councils and emergency services during such incidents. Radio enthusiasts from Cheshire were among the first to join the network.

Greg Mossop, RAYNET group controller for the Chester and Ellesmere Port area, said: "Cheshire was at the forefront when the network was first formed 50 years ago, so obviously we're very pleased that our work is being



(L to R): David Mullock (G7GFC), Jane Mossop (G1GWS), Greg Mossop (G0DUB), David Hicks (G6IFA), Lord Mayor of Chester, Councillor Barry Cowper, Alan Hopkinson (G8OJQ), Graham Pemberton (G7NEH), Lady Mayoress of Chester, Gwynn Cowper.

recognised. Our role is to provide a fall-back system or safety net during an emergency, so even if conventional communication lines like telephone links are lost, contact can still be maintained. We regularly test and develop our skills by taking part in emergency exercises with the local authorities and by providing back-up radio communications at public events".

To find out more about RAYNET, visit the national website at www.raynet-uk.net

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AB has revolutionised radio with its interference free crystal clear sound, fast auto tuning. As the coverage area expands throughout the UK, more and more of us can get the huge variety of stations available.

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An I.c.d. screen displays station and programme information. With eight presets available to programme your favourites, an alarm, clock, sleep function f.m. and DAB, Nevada say that the radio offers excellent value for money. The KT-B is mains or battery operated, so it will be a welcome companion to the garden shed for endless hours of Talk Sport or BBC Radio 7, the dedicated comedy station only available on DAB Radio.

Costing £79.99, contact Nevada on 02392 313090 or visit their website at www.nevadaradios.co.uk for more information.



The Darker Side Of Denim

enim will never go out of fashion as styles and shades are ever changing. Hot on the heels of the Stonewash Denim Revival, Roberts has now launched its popular Revival portable radio in new Dark Denim - proving that denim isn't just for wearing!

Roberts' retro style Revival is the UK's

most popular portable radio enjoyed by both style gurus who appreciate this iconic design and keen radio fans. The Roberts Revival Dark Denim costs £100 and is also available



in Stonewash Denim and an assortment of colours in both leathercloth and suedette.

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The KT-B DAB digital radio in charcoal grey or pretty in pink!

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REVIEWED

- Kevin Romang G4SKN reports on the performance of the Buddipole portable antenna system
- The latest mobile dual-bander from Icom the IC-E208 is tried and tested by **Richard Newton GORSN**



Build the Three Digit Counter designed by Tim Walford G3PCJ as an additional building block for the PW Dipper.



DOING IT BY DESIGN

Tony Nailer G4CFY presents his bi-monthly column designed to get you back on the bench and building - this month he looks at the biasing and design of transistor amplifiers

IT'S A CLASSIC

Ben Nock G4BXD gets all nostalgic over the Eddystone 940 receiver

● Amateur Radio Waves ● Bargain Basement ● Club News ● Keylines ● News ● Radio Scene ● Valve & Vintage

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- Martin Peters 11 Filbert Drive, Reading RG31 5DZ
- E-mail: lms@pwpublishing.ltd.uk

t has been a genuinely poignant experience to read your letters - addressed to Brian and subsequently passed to me - all wishing him well for 2004. I never had the opportunity to meet him, but the obvious warmth conveyed in what you wrote speaks volumes for the affection in which Brian was held.

Kevin has asked me to carry the column forward, and this, with your continued support I hope to do. I have already received a couple of letters offering your best wishes. Thank you.

I've taken the opportunity to alter the presentation of the listings a little. The short wave logs are now shown in tabular form. I hope this style will provide an easy look-up table for you as you trawl up the bands in search of new finds.

The country codes are of the internationally recognised 1, 2 or 3 character variety. We can print the full listing for your retention in a future 'LM&S', if you'd find that helpful. Where a station has been reported as being relayed from another country, this will be reflected as a two-part country code. BBC World Service via Singapore will turn out as G/SNG. Not all contributors are aware of the TX site so treat the country code column in the listings with caution.

Language codes are simply the first three letters as spelt: Eng for English, Man for Mandarin, etc.

I intend to include the name of each service in the long and medium wave listings in addition to the transmitter site. More useful to compare what you are hearing with a log that includes, for example, France Info, not just Clermont-Ferrand? Please help me out here, where you can. I can always backfill any holes using the documentation I have around me.

I don't have space to include programme details so there's no need to provide this, but please do indicate which language was being carried when logged.

Long Wave Table

Simon Hockenhull, Bristol.

Shilla Hughes, Morden. Thomas Williams, Truro. Richard Reynolds, Guildford. Jim Edwards, Wigan.

Ernie Strong, Ramsey, Cambs. Eddie McKeown, Newry.

kHz	Country	Station	Power	Listener
153	D	Donebach DLF	500	ABCDF*G*H
153	ROU	Bod	1200	C* F*
153	ALG	Bechar	1000	F* G*
162	F	Allouis France Inter	2000	BCDF*GH
171	RUS	Bolsakovo R Rossii	600	A C* E F* G* H
171	MRC	Nador Medi 1	2000	A* B* F* G
171	RUS	Radio Chechnya	1200	G
177	D	Oranienburg DLRB	500	AF*GH
183	0	Saarlouis Euro 1	2000	BC*DF*GH
189	ISL	Gufuskalar	150	A* F* G*
189	1	Caltanissetta	10	F*
189	GEO	Tblisi	500	G*
198	UK	Droitwich BBC R4	500	€* G H
207	D	Munich DLF	500	A° B C° D F° G H
207	ISL	Eidar	100	F* G*
207	MRC	Azilal	800	F* G* F* H*
216	F	Radio Monte Carlo	1400	ABC* DF* GH
225	POL	Radio 1	1000	ABC" EF" GH
225	TUR	Van	600	F*
234	LUX	Beidweiler	2000	BDF*GH
234	ARM	Gavar	500	F*
243	DNK	Kalundborg DR1	300	ABCDF*G*H
252	ALG	Tipaza	1500	ABCDEF*G*H
261	RUS	Taldom	2500	A* F* G* H
270	TCH	Toploina CRO1	1500	ABCEF*H*
279	BLR	Sasnovy BR1	500	ABC° EF° G° H°

If you're not 100% sure as to the identity of a station, say so. I'll incorporate it into the list as a 'presumed'. Better safe than sorry.

Please update me with details of your equipment and antennas so that others can get a feel for the type of gear required to 'net' those more exotic catches.

It occurred to me that a number of you have been contributing to this column for many years. I guess I must have read some of your names a hundred times or more. Now I don't know about you, but I'm intrigued to know a little more about the legendary **Sheila Hughes** from Morden. So, Sheila and the rest of you, why not send in a hundred words about yourself including any other interesting areas of your life, what best you enjoy about the listening hobby and how you started out. Maybe include a photo, preferably surrounded by your radios, but of course it's not mandatory.

Andrew Abraham wrote from Birmingham with some medium wave loggings, some of which were made possible by virtue of the fact that his local Classic Gold outlet on 990kHz went off the air for an hour or so one night for a spot of scheduled maintenance. It's shame all UK a.m. and f.m. stations don't have a synchronised close down for a few hours every so often, just to enable a little more DX to filter through!

Back to reality and thanks to **Simon Hockenhull** in Bristol for some comprehensive loggings. Simon was away for a week on a health and safety course, (straight back, bend your knees), so was unable to get in as much listening as he would have liked. He's noticed a reduction in signal strength from a number of major players on medium wave, and this has been confirmed in the latest *WRTH*. Rome **846kHz**, down from 1200 to 60kW and Vienna **1476kHz**, down from 600 to 60kW, to name but two. Thanks for the info Simon - now included in the listings.

Jim Glen's medium wave logs from Dunfermline show that most stations were clustered around the south east of England but stations closer to home, such as Radio Newcastle, remain unheard. Jim reminds us not to forget to check out the so-called 'X band', 1.600-1.800MHz. This is used for broadcasting in the USA and, as it's clear of high-powered broadcasts here in Europe, can provide some hassle-free transatlantic DX. Best of luck with the Foundation exam, Jim. Let us know how you got on and when we can tune into the 'Voice of Fife'.

Many of you noticed a wide variation in signal propagation during January: up one day, down the next. **Bernard Curtis** from Stalbridge noticed excellent reception from Radio New Zealand most mornings but poor from the USA and, on occasion, impossible from near neighbours Russia, on the lower bands. Which, all in all, adds to the intrigue - not to mention, challenge - of this hobby of ours.

Bernard took issue with **Ronald Evans**' thought provoking letter in February's *SWM*. While Bernard does have access to the Internet, he uses it mainly as a tool for gathering information and tends not to listen on-line to the various broadcasters. I guess that international radio stations' audiences fall into two

Local Radio Table

kHz	Service	kW	Listener
558	Spectrum, London	1	B E D* E
603 630	Capital Gold, Littleboume BBC 3CR	0.1 _Q.2	B D* E
657	BBC Radio Cornwall, Bodmin	2	Ď
666 666	Classic Gold, Exeter BBC Radio Yorkshire	0.34 0.5	B D* E D E
729	BBC Essex, Manningtree	0.2	ABDE
738	BBC Hereford & Worcester, Worcester	0.037	ABDE.
75 <u>6</u> 756	Magic Maldwyn, Newtown BBC Badio Cumbria, Carlisle	0.63	. B € D*
756	BBC Radio Cumbria, Carlisle BBC Radio 4, Redruth	2	D
765 774	BBC Essex, Chelsmford BBC Radio Kent, Littleboume	0.5 0.7	ABD°E .
774	BBC Radio Leeds, Farnley	0.5	Ď
774	BBC Radio 4, Plymouth	1.	D
792 801	Classic Gold, Bedford BBC Radio Devon, Barnstaple	0.275	BDE BD°E
828	Classic Gold, Luton	0.2	B D* E
828 837	Classic Gold, Boumemouth BBC Asian Sound, Leicester	0.27 0.5	8 B D*
855	Sunshine 855, Ludlow	0.15	A B
855 873	BBC Radio Norfolk BBC Radio Norfolk, West Lynn	1.5 0.3	D E A D E
936	Classic Gold, Wiltshire	Q.18	D*
936	Fresh AM, Hawes	1	E
945 945	Classic Gold, Derby Capital Gold, Bexhill	0.2 0.7	D*
954	Classic Gold, Hereford	0.16	BE
954 963	Classic Gold, Torbay Asian Club, Hackney	0.4 0.95	E D°
972	Asian Club, Southall	1	βE
990	Classic Gold, Wolverhampton	0.09	F*
990 999	BBÇ Radio Devon, Exeter Radio Solent	1	В В
999	Valley Radio, Aberdare	0.3	B C*
.999 1017	Classic Gold, Nottingham Classic Gold, Shropshire	0.25	C. DE
1026	Radio Cambridgeshire	0.03	AD°E
1026	BBC Radio Jersey	1	B D
1026_ 1035	Downtown Radio, Belfast BBC Radio Sheffield	1.7 1	Ç*
1035	Easy Radio London	. 1.	B* E
1116.	Valley Radio, Ebbw Vale	1	B E
1116 1116	BBC Radio Derby BBC Radio Guernsey	0.5	Ď.
1125	BBC Radio Wales	1 _	D.
1152 1152	Capital Gold, Birmingham Classic Gold, Amber	3 0,83	B E
1152	LBC, London	23.5	E
1161 1161	BBC Southern Counties Radio Magic 1161	1 0,35	D* É E
1161	BBC 3 Counties Radio	0,53	Ď
1170	Swansea Sound	0.58	B
1170 1170	Capital Gold, Portsmouth Classic Gold, Ipswich	0.12	D*
1242	Capital Gold, Maidstone	0.32	C. D
1251 1260	Classic Gold, Bury St Edmunds Sabras Sound, Leicester	0.76 0.29	DE.
1296	Radio XL, Birmingham	. 10	B D
1305	Premier Capital Gold, Southwick	0.5_ 0.5	E .
1323	Classic Gold,	0,6	Ĕ
1350	Cambridge University Radio (RSL)	0.0001	A* D* E
1359 1359	Classic Gold, Chelmsford BBC Radio Solent, Boumemouth	0.28 0,85	C. D
1359	Classic Gold, Coventry	0,27	DE
1368 1368	Manx Radio Southern Counties Radio	. 20 .0.5	D E.*
1368	BBC Lincolnshire	2	Ē
1386	Carillion, Loughborough (RSL)	0.0001	E F*
1413 1413	Premier Fresh AM, Skipton	0.5	E
1413	BBC Radio Gloucestershire	0.5	E
1431	Classic Gold, Southend Classic Gold, Reading	0.35 0.14	A* B* C* E
1449	BBC Radio 4, Redmoss	2	D
1449 1458	BBC Radio Cambridgeshire BBC Asian Sound, Birmingham	0.15 5	C* E B
1458	Surrise, London	125	BC*E
1485	BBC Southern Counties Radio,	1 2	D
1485 1485	BBC Radio Humberside Clasic Gold, Newbury	1	D* .
1485	BBC Radio 4, Carlisle BBC Radio Stoke	1 .	D CODE
1503 1530	BBC Radio Stoke Capital Gold, Worcester	0,52	_A°B°C°DE
1530	BBC Radio Essex, Southend	0.15	, D .
1548 1557	Capital Gold, London Capital Gold, Southampton	97.5 0.5	D° E
1566	BBC Somerset Sound, Taunton	0,6	В
1,566	County Sound, Guildford	8.0	B*
1575 1584	Stoke Manderville Hospital Radio (RSL Turkish Radio, London	0.0001 0.2	B* E
1584	Turkish Radio, London BBC Hereford & Worcester, Woofferton BBC Radio Nottingham	n 0.3	В
1584 1602	BBC Radio Nottingham BBC Radio Kent	0.25	D°E .
		0.20	
Α :	Sheila Hughes, Morden.		

A Sheila Hughes, Morden.
B Simon Hockenhull, Bristol.
C James Glen, Dunfemline.
D Richard Reynolds, Guildford.
E Emie Strong, Ramsey, Cambs.
F Andrew, M3UOK.

camps: those that mainly listen for the programme content and those that enjoy the technical challenge of picking up and recovering the signal against the odds. I actually listen to Internet radio a fair deal but never to international broadcasts. It's Smooth Jazz FM from California for me. And with Broadband Internet it's in perfect stereo.

Peter Pollard in Rugby dropped us a line with a

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Medium Wave Table

IVIC	alulli vvavc	Idult		
kHz	Tx site (service)	Country	kW	Listener
531	Akreburg	FRO	100	G
531	Ain-El-Beida	ALG	600/300	C*
531	Beromunster	SUI	500	B* C* F G*
531	RNE via?	E	10-25	C*
540	Sidi Benour	MRC	600	C*
540	Wavre	BEL	150/50	ABC*FG
549	Les Trimbles	ALG	600	C G*
549	Sasnovy	BLR	1000	C*
549	UCB Europe	IRL	?	Č
549	Thurnau	D	100	B*
549	DLF via?	Ď	100	A
558	RNE5 via?	E	10-50	Α
566	UBC Europe	IRL	?	C
567	Tullamore	IRL	500	BC*DG
576	Barcelona	E	50	C*
576	Mulaker (SDR)	Ď	500	B* C* G
585	Madrid (RNE1)	Ē	200	B* FG*
585	Paris	F	8	C
594	Frankfurt	D	1000/400	8° CFG
594	Muge	POR	100	C*
594	Oujda	ALG	100	Č*
603	Seville (RNE R5)	E	50	Č*
603	Lyon	F	300	Ğ
603	Newcastle (BBC R4)	G	2	AC
612	Athlone	IRI.	100	B* C D* G
612	RNE 1 via?	Ë	10	C. D.
621	Wayre (RTBFI)	BEL	80	ABC*G
630	Tunis Diedeida	TUN	600	G*
639	RNE1	E	10	Ĕ
639	Praha - Libice	TCH	1500	B* C* G*
648	Orfordness	G	500	ABCG
657	Wrexham BBC Wales	Ğ	2	ABCG
657	Madrid (RNE5)	Ĕ	20	B° G°
666	MesskirchRhod (SWF)	Ď	150	B* F G
666	Lisbon	POR	135	C*
675	Lopic (Arrow Cl Rock)	HOL	120	ĂBĊG
684	RNE 1 via?	E	500	C* G*
693	Droitwich (BBC)	Ğ	150	ABC
702	Monte Carlo	MCÓ	40	C* G*
702	Presov	SVK	200	Č*
711	Rennes	F	300	AB*C*FG
711	COPE	E .	?	C*
720	BBC R4	Ğ	0.75	BCG*
729	Cork	IRL	10	CD
729	RNE 1 via?	E .	10-100	B°.
738	Barcelona (RNE 1)	Ē	500	C* G
738	Paris	Ę	4	C*
747	Flevo	HOL	400	ABCFG
756	Braunschweig (DLF)	D	800/200	C*G
765	Sottens	SUI	500	D G*
774	RNE 1 via?	E	20-100	C.
774	Abis	EGY	500	Č*
783	Leipzig	D	100	C* G
7.09	Loibrid	U	100	,9 · Q .

kHz	Tx site (service)	Country	kW	Listener
792	Limoges	F	300	G
801	Ajlun	JOR	2000	C*
801	Munchen-Ismaning	D	300	C*
810	Madrid (SER)	Ĕ	20	Č*
810	Westerglen	Ğ	100	ČG
819	Batra	EGY	450	C* G*
819	Trieste RAI Uno	l	25	Ğ*
819		Ė	5	C.
	San Sebastian	E F		Ğ
837	Nancy		200	Ů.
837	COPE via?	E	2-50	Ć*
846	Rome (RAI Due)	<u>Į</u> .	60	G*
8 55	RNE 1 Murcia	E	300	Č.D
864	Paris	F E	300	ĊG
864	RNE 1	E	5	C*
873	Frankfurt (AFN)	D	150	A* B* D E* G*
873	SER	Ε	_20	B*
882	Washford (BBC Wales)	G	100	A B _. C
891	Algiers	ALG	600/300	B° C G°
891	Antalya	TUR	600	C*
891	Hulsberg	HOL	20	C*
900	Milan	1	600	B* G
909	BBC R5	G	140	BC
918	Domzale	SVN	600/100	G
927	Wolvertem (VRT)	BEL	300	ABCG
936	RNE 5 via?	,E	10-20	C*
945	Toulouse	F	300	B* C* G
954	Brno	TCH	200	C.
954	Madrid (Ci)	E	20	B* C*
963	Pori	FNL	600	Ğ
972	Hamburg (NDR)	D	100	A B° G°
981	Algeirs	ALG	600/300	G*
990	Berlin	D	100	B° C° E° G
990	Bilbao		10	C.
999	Madrid (COPE)	E	50	B* C* D* G*
1008	SER via?	Ë	?	C*
1017	Rheinsender (SWF)	Ď	600	B°C°G
1017	RNE 5 via?	Ĕ	10	C.
1026	SER via?	ξ	2-10	Ď.
1044	Dresden (MDR)	Ď	20	°C* G
1044	Sebaa - Aioun	MRC	300	Č*
1044	San Sebastian (SER)	E E	10	C° B
1053	Talksport via?	Ğ	19	ABC
1062	Radio Uno via?	1	2-25	C.
1062	Kalunborg (DR2)	DNK	250	B* C* G*
1071		G	1-500	ABC
	Talksport via?	E	5	
1071	Bilbao	Ē	5-10	B° G B° Ȱ
1080	SER Talliana di sia?	G	2-400	ABC
1089	Talksport via?	SVK	50	B* G*
1098	Nitra (Jarok)			
1107	AFN via?	USA/D	1 <u>0</u> 0.5-2	G A D C
1107	Talksport via?	G E		ABC
1116	SER_	E BEL	5 20	C B. C.
1125	La Louviere		1	
1125	BBC Radio Wales	G CRO	100	CG_ B*
1125	Deanovic		2	C
1134	COPE via?	E	۷,	<u>v</u>

kHz	Tx site (service)	Country	kW	Listener
1134	Zadar (Croatian Radio)	CRO	600/1200	
1143	AFN via?	USA/D	1-10	G*
			7	Ç.
1143	Heidelburg	D		
1179	Solvesborg (SR1)	S	600	A° B C° G°
1179	Valencia (SER)	E	50	C* G*
1188	Reichman	D	. 5	C*
1188	_ Marcali VOA/RFE	USA/HNG	500	A* B*
1197	Virgin Radio	.G	0.2-2	BC
1197	Munich VOA/RFE	USA/D	300	AB*
1206	Bordeaux	F	100	A* B* C G
1215	Virgin via?	G	0.32-20	QABC .
1233	Virgin via?	G	0.1-0.5	BC
1242	Marseille	F	150	G
1242	Virgin via?	G	0.5-2	C
1269	Neumunster (DLF)	D	600	A B° C°
1278	Strasbourg	F	300	B* G*
1287	Litomysl	TCH	150	C*
1287	Lerida SER	E	10	B* C*
1296	Orfordness (BBC)	Ğ	500	Č G*
1296	Valencia (COPE)	Ĕ	10	B*
1314	Kvitsov	NOR	1200	ABC*G
1323	W'brunn (VOR)	RUS/D	800/150	B* G
1332	Rome	1100/0	300	B* G*
1341		G	100	B° C D° G
1341	Lisnagarvey (BBC)	Ë	2	C.
	Tatasa (SER)		600	B* D*
1359	Madrid	E G		
1368	Manx Radio		20	B D*
1377	Lille	F	300	BCG
1386		RUS	1200	G
1395	Trintelhaven 10FM	HOL	120	ABCFG
1404	Brest	F	20	CG
1422		D	1200/600	AB°CG
1440	Marnach (RTL)	LUX	1200	ACD°G
1467	Monte Carlo (TWR)	MCO	1000/400	В*
1476	Wien-Bisamburg (ORF)	AUT	60	B° G°
1485	SER	E	2-5	B*
1494	Clermont-Ferrand	F	20	B Ģ."
1512	Wolvertem	BEL	300	A*B*D*FG
1521	Koscişe	SVK	600	B*
1530	Vatican Radio	CVA	150/450	B° G°
1539	Mainflingen (ERF)	D	350/700	B* C G*
1557	Nice	F	300	C G*
1575	Genoa (RAI Due)	1	50	G*
1575	SER	E	5	B*
1584	SER	Ĕ	2	B*
1593	VOA viaKuwait	USA/KWT	150	A*
1602	Vittoria	E	10	B*
1611	Vatican Radio	CVA	100	ϰ G°

A	Harry Richards, Barton-or	n-Humber.		

A Harry Richards, Barton-on-Humbe Fred Wilmshurst, Northampton, C Ernie Strong, Ramsey, Cambs. D Sheila Hughes, Morden, E Andrew M30UK. F Rhoderick Illman, Oxted. G Simon Hockenhull, Bristol.

choice selection of short wave loggings. All confirmed except for 7.385MHz at 1645 on January 16, which Peter is fairly certain, was English out of Tibet. No one else logged this particular station but I've no reason to doubt it so give it a try.

Don't forget the time change on 28 March. Most broadcasts to Europe will track local time, which means that they will be an hour earlier with respect to UTC. Be prepared for the usual shunt up to the higher frequency bands that most broadcasters make to take advantage of

the summer propagation. I hope to include a number of summer schedules next time.

I leave you this month in the hope that all our regular contributors will continue to file your regular, excellent reports. 'LM&S' can only be as good as the support you offer, so whatever you have, large or small, please keep up the good work and send it in. I want to include items of short wave news in the column so if you have anything you think may be of interest feel free to forward it to me and I'll write it up, space permitting.

If you're on the Internet, then you can forward me your findings on-line - preferably in *Excel*. Please note the corrected E-mail address on the banner. Anything sent to my old Virgin account will, I'm afraid, have been lost. If you've never been moved to send in news of your catches, why not start now? I'd love to hear from you. Just take a look at the listings and SINPO reporting format we use on these pages and send me all your loggings.

See you next month.

Tropical Band Table

MHz	UTC	Station	Country	Listener
3,200	2035	TWR Manzina	SWZ	A
3.210	0715	WWCR Nashville	USA	CE
3.223	0115	AIR Simla	IND	Ä
3.255	0345	BBC World Service	G/AFS	AH
3.279	0245	La Voz Del Napo	VEN	A
3.280	0607	Radio Ilucan	PRU	В
3.291	0614	Guyana	GUY	В
3.320	2325	Radio Sondagranse	AFŚ	В
3,320	2350	SABC Meyerton	AFS	A
3,365	1715	AIR Delhi	IND	A
3.390	0055	AIR Gantok	IND	A
3,915	2240	BBC World Service	G/SNG	ABCDH
3.945	1545	AIR Gorakphur	IND	A
3.950	2315	PBS Xinjiang	CHN	A
	1850	Radio Taipei International	TWN/G	ËĘ
3.955	2204	Radio Korea International	KOR/G	ΕĖ
3.965	2026	Radio France Int'l	F	EH
3.965		Radio Taipei International	TWN/F	
3.975	2024	Radio Budapest	HNG	EFH
3.990	1550	PBS Xinjiang	CHN	Α
3.995	2200	Deutsche Welle	D	CDEH
4.005	2230	Vatican Radio	CVA	DΗ
4.190	2250	CNR Minority Prog	CHN	A
4.330	1715	PBS Xinjiang	CHN	A
4.460	1555	CHN Radio 1	CHN	A
4.460	2250	CPBS 1 Beijing	CHN	Α .
4.500	1705	PBS Xinjiang	CHN	A
4.635	2300	Radio Tajikistan	TAJ	DH .
4.750	2230	PBS Xizang	CHN	A
4.750	2245	Quinghai PBS	CHN	В
4.750	0050	AIR Port Blair	INO	Α
4,755	0145	Radio Educacao Rural		Α
4.760	1645	Radio Kashmir	IŅD	В
4.760	0638	Radio ELWA	LIB	В
4,765	0055	Radio Emissora	В	Α
4,765	0105	Radio Rural Santarem	В	Α
4.770	2235	FRCN Kaduna	NIG	ABOE
4.775	1545	AIR imphal	INO	Α
4.783	2315	RTM Bamoko	MLL	ADEH
4.790	1652	Azad Kashmir	LIB	В

MHz	UTC	Station	Country	Listener
4.800	1603	Radio Lesotho	LSO LSO	В
4.800	1650	CPBS 2 Beijing	CHN	ABDE
4.800	1655	AIR Hyderabad	IND	AB
4.800	2050	LNBS Masern	LSO	H
4.805	0110	Radio Dif Do Amazonas	В	Α
4.810	1907	Voice of Armenia	ARM	EGH
4.815	0120	Radio Difusora Londrina	В	Α
4.820	1644	Radio Kashmir	IND	В
4.820	1715	Xizang Lhasa	CHN	ABDE
4.820	2200	Radio Botswana	BOT	DH
4.820	0115	AIR Kolkatha	IND	AB
4.830	1700	AIR Jammu	IND	ΑB
4.830	2256	Mongol RTV	MNG	В
4.830	2355	Radio Tachira	VEN	Α
4.835	2205	RTM Bamoko	ML	ABDEFGH
4.840	1735	AIR Mumbia	IND	AB
4.845	2205	ORTM Nouakchott	MTN	ABDEH
4.845	0105	Radio Cultura Ondas Tropical	no B	Α
4.850	0045	AIR Kohima	IND	Α
4.860	1730	AIR Delhi	IND	ABÇH
4.865	0140	Radio Alvorado Londrina	В	A.
4.875	0115	Radio Dif Roraima	В	A
4.880	1613	AIR Lucknow	IND	В
4.885	2350	Radio Clube Do Para	В	AB
4.895	2254	Mongol RTV	MNG	В
4.895	0055	AIR Kurseong	IND	ABD
4.906	2305	Xizang TB	CHN	ABDE
4.910	1725	AIR Jaipur	INO	Α .
4.910	1755	Radio Zambia	ZMB	ABD
4.915	2015	GBC 1 Accra	GHA	ABDEH
4.915	2345	Radio Anhanguera	В	Α
4.915	0615	Radio Nacional	В	В
4,920	1710	AIR Chennia	. INO	ABO
4.920	1725	Xizang TB Lhasa	CHN	ABDE
4.925	2305	RRI Jambi	INS	В
4.930	2035	TR3 Asgabat	TKM	Н
4.930	2230	AIR Shimla	IND	D
4.940	1730	AIR Guwahati	IND	AD .
4.950	1634	AIR Ranchi	IND	В
4.950	2015	VOA Sao Tome	USA/STP	ABCH
4.950	0045	AIR Srinigar	INO	Α
4.960	0105	AIR Ranchi	INO	Α
4.960	0515	VOA Sao Tome	USA/STP	ABE

MHz 4,965 4,985 4,980 5,001 5,010 5,010 5,015 5,020 5,025 5,025 5,025 5,026 5,026 5,026 5,030 5,030 5,040 5,050	0617 1645 2132 0235 1725 1540 2215 2310 0120 2215 0915 1645 0439	Station Christian Voice AIR Shillong Kampala Radio Uganda PBS Xinjiang Radio Brasil Central AIR Intanger Radio Nepal RTV Malagasy AIR Thiru puram Radio Brazil Tropical Radio Pioneira WWCR Nashville WWCR Radio Pakistan Radio Pakistan Radio Parakou CKNR Radio Burkina Radio Barkina Radio Burkina Radio Burkina Radio Burkina Radio Burkina Radio Aparecida AIR Jepore Voice Of The Strait AIR Aizawl Radio Tanzania PBS Guangxi PBS Xinjiang WWCR Nashville Radio Pakistan Manchester WWRB	ZMB IND UGA CHN B IND NPL MDG IND B B USA PAK UZB UGA BEN CHN BFA BFA IND CHN CHN USA CHN UZB UGA UZB USA	Listenee D A A B B A A B B A A B B A B B A B
5.080	1645	Radio Pakistan	PAK	A

Jim Edwards, Wigan. Richard Reynolds, Guildford. Bernard Curtis, Stalbridge, Vic Prier, Seaton. Michael Casey, Manchester. Stanley Evans, Hailsham. John Parry, Cyprus. Simon Hockenhull, Bristol. Sheila Hughes, Morden. Fred Wilmshurst, Northampton.

B C D E

Short Wave Table	MHz UTC Service 7.115 0105 IRSerbia & Montenegro	Country Lang SINPO SWL YUG 44533 SH	MHz UTC Service Country Lang SINPO SW 9.690 1944 Voice of America USA Eng 33333 P	L
MHz UTC Service Country Lang SINPO SWL	7.120 1940 Radio Nederland 7.120 2010 Radio Nederland	HOL Eng 33233 P HOL/MDG Eng 34423 VP	9.690 2004 Voice of America USA/GRC, Eng 35443 MC 9.705 1415 Voice of America USA/MRA Can 34554 JP	
5.745 0910 WHRI USA 53443 BC 5.775 1955 IRRS I Eng 25444 PW	7.120 1911 Radio Nederland 7.125 0427 Voice of Russia	HOL 34222 EM RUS 45544 SH	9.710 0855 Radio Vilnius LIT 33333 TW 9.710 0955 Radio Vilnius LIT Eng 45544 FW	
5.775 2104 IRRS I 44232 EM 5.800 2008 Radio Bulgaria BUL Ger 55555 P	7.170 2240 China Radio Int'l 7.170 2240 China Radio Int'l	CHN/RUS Eng 44344 GG CHN 25232 EM	9.710 0840 Radio Australia AUS Eng 44333 SE 9.710 0935 Radio Vilnius LIT Eng 54544 SE	
5.800 2230 Radio Bulgaria BUL Eng 45555 FW 5.800 2100 Radio Bulgaria BUL Fre 55555 VP	7.180 0424 Voice of Russia 7.185 2130 Radio Tashkent	RUS/UKR 45544 SH UZB 43243 EM	9.715 1344 Radio Tashkent UZB 33433 EM 9.730 1340 Voice of Vietnam VTN/AUT Eng 44333 SE	
5.800 2200 Radio Bulgaria BUL Eng 34434 GeG 5.800 2237 Radio Bulgaria BUL 45554 EM	7,190 1154 VIRI 7,210 1930 Radio Tirana	IRN Eng 35444 FW ALB Eng 54434 VP	9.730 1623 Voice of Vietnam VTN 44333 EM 9.735 2130 Deutsche Welle D Ger 34333 TW	
5,825 0927 WEWN USA Eng 34333 P 5,825 0910 WEWN USA Eng 54445 BC	7.210 1948 Radio Tirana 7.250 0859 Vatican Radio	ALB 44243 EM CVA 44434 RI	9.740 1045 BBC World Service G 44333 TW 9.740 1005 BBC World Service G/SNG Eng 25444 PW	
5,825 0905 WEWN USA Eng 44433 SE 5,840 2235 Radio Ukraine Int'l UKR Eng 35444 FW	7.250 2200 Radio Romania Int'1 7.250 0740 Vatican Radio	ROU Eng 44444 VP CVA Eng 54544 SE	9.740 1529 BBC World Service G/SNG Eng 24432 MC 9.740 1415 BBC World Service G/SNG Eng 44554 JP	
5.840 2234 Radio Ukraine Int'l UKR 35343 EM 5.850 2142 Radio Canada Int'l CAN/S 45333 SH	7.250 2050 Vatican Radio 7.250 2244 Radio Romania Int'l	CVA 55555 EM ROU 34322 EM	9.740 1455 BBC World Service G/SNG 44233 EM 9.755 1936 RAI Int I 33533 SH	
5.850 2109 Radio Canada Int'l CAN Eng 33333 P 5.850 2145 Radio Canada Int'l CAN 44333 TW	7.255 0110 Voice of America 7.265 0858 Sud West Rundfunk	USA 45534 SH G Ger 44444 RI	9.755 0822 RDP International POR Por 44444 RI 9.755 0824 RDP International POR Por 55555 MC	
5.850 2200 Radio Canada Int'l CAN/S Eng 45544 FW 5.850 2100 Radio Canada Int'l CAN Eng 44444 GeG	7.265 2100 Sudwestfunk Rohrdorf 7.275 1915 Radio Exterior Espana	D Ger 53344 VP E Spa 43444 P	9.755 1936 RAI ! Eng 25342 MC 9.755 1735 Swiss Radio Int'! SUI 42322 EM	
5.850 2115 Radio Canada Int'l CAN/S Eng 43333 SE 5.850 2103 Radio Canada Int'l CAN 44232 EM	7.280 1624 Voice of Vietnam 7.290 1920 Voice of Russia	VTN 22222 EM CVA Eng 33333 P	9.760 1945 Voice of America USA Eng 33333 P 9.760 1905 Voice of America USA/MRC Eng 54445 BC	
5.865 1945 Voice of Greece GRC 45433 SH 5.875 1650 BBC World Service G Tur 44444 RI	7.290 1825 Voice of Russia 7.300 2150 Voice of Russia	RUS Eng 43334 BC RUS 44444 EM	9.760 1749 Voice of America USA/GRC Eng 34453 MC 9.770 2145 Radio Canada Int'I CAN 45433 SH	-
5.875 1930 BBC World Service G Rus 54445 BC 5.890 2052 Vatican Radio CVA Eng 44444 P	7.315 1500 Voice of Russia 7.325 0030 Radio Vilnius	RUS Eng 34333 ShH LIT 45344 EM	9,770 1230 Deutsche Welle D Bul 44444 Ri 9,770 2205 Radio Canada Int'I CAN Eng 44444 ShH	
5.890 1715 Vatican Radio CVA Eng 42232 VP 5.890 2050 Vatican Radio CVA ENG 44444 EM	7.330 2055 Radio Vlaanderen Int'l 7.330 2042 Radio Vlaanderen Int'l	BEL 44444 TW BEL/RUS Eng 33452 MC	9.770 2155 Radio Canada Int'l CAN Eng 35444 FW 9.770 2102 Radio Canada Int'l CAN 34232 EM	
5.915 1947 Radio Slovakia Int'l SVK 44444 SH 5.915 1934 Radio Slovakia Int'l SVK Eng 44444 P	7.330 2041 Radio Vlaanderen Int'l 7.340 2151 Voice of Russia	BEL 44243 EM RUS 44333 EM	9,780 1300 KNLS USA 24222 EM 9,780 2134 VIRI IRN 45243 EM	
5.915 2340 Radio Prague TCH 44444 TW 5.915 1931 Radio Slovakia Int'l SVK 43443 EM	7.345 1930 Radio Slovakia Int'l 7.345 1940 Radio Slovakia Int'l	SVK Eng 55555 VP SVK Eng 44334 BC	9.785 1050 Radio Nederland HOL 22222 TW 9.785 1035 Radio Nederland HOL 33333 TW	
5,930 0754 Radio Prague TCH Ger 44444 P 5,930 1703 Radio Prague TCH Eng 45555 PW	7,345 1932 Radio Slovakia Int'l 7,350 0355 Voice of Russia	SVK 44444 EM RUS/CVA 44544 SH	9.785 1003 Radio Nederland HOL 24232 EM 9.790 1947 Radio France Int'I F Fre 33323 P	
5.930 2100 Radio Prague TCH Eng 44444 GeG	7.355 0742 WYFR 7.390 1925 Voice of Russia	USA 34222 EM RUS Fre 34433 P	9.805 1,154 Radio Free Europe/Liberty USA/D Rus 44344 Rt 9.815 1,234 RDP International POR Por 44444 Rt	
5.940 1840 Radio Austria Int'l AUT Ger 44344 P	7.400 0347 Radio Bulgaria 7.400 0008 Radio Bulgaria	BUL 45533 SH BUL 55555 EM	9.820 1950 Swiss Radio Int'l SUI Eng 44544 P 9.830 0826 Croatian Radio CRO Cro 54444 RI	
5.945 2140 Radio Austria int'I AUT Ger 44444 TW	7.410 1900 All India Radio 7.410 1935 All India Radio	IND Eng 44434 VP USA Eng 54444 BC	9.840 1105 WHRI USA Eng 25343 FW 9.840 1030 WHRI USA Eng 23422 VP	
5.965 1943 RAI Int I 44534 SH	7.410 2107 All India Radio 7.415 2102 Voice of America	IND 23212 EM USA/BOT Eng 35443 MC	9.840 2104 China Radio Int'l CHN 23222 EM 9.840 1257 WHRI USA 34232 EM	
5,965 0805 Radio Vlaanderen Int'l BEL/D Eng 55555 SE 5,965 0800 Radio Vlaanderen Int'l BEL 55555 EM	7.425 0912 WEWN 7.490 0855 WJIE	USA Spa 24232 RI USA Eng 24432 RI	9.845 0741 WSHB USA 44222 EM, 9.865 1530 Vatican Radio CVA/UZB Eng 25342 MC	
5.965 1935 RAI I 555555 EM 5.975 2307 BBC World Service G/ATG Eng 35544 FW	7.490 0033 VVoit. 7.490 0908 Radio Caroline 7.500 2240 Radio Bulgaria	G Eng 34233 RI BUL Eng 55555 ShH	9.865 1540 Vartican Radio CVA 34243 EM 9.870 0833 Trans World Radio MCO/F Eng 44434 RI	-
5.975 2315 BBC World Service G/ATG Eng 33333 GG 5.975 2200 Radio Romania int'l ROU Eng 55555 VP	7.500 2008 Radio Bulgaria	BUL Ger 55555 P BUL Fre 55555 VP	9.870 1520 Radio New Zealand Int'l NZL 22222 TVY 9.870 1500 Radio New Zealand Int'l NZL Eng 34553 JP	
5.975 2143 BBC World Service G 22322 EM 5.975 2243 Radio Romania Int'l ROU 35344 EM	7.500 2238 Radio Bulgaria	BUL 35443 EM USA 22331 Ri	9,870 0745 Trans World Radio MCO 55555 EM 9,880 0831 Radio Prague TCH Fre 43433 RI	
5,985 0821 Radio Vlaanderen Int'l BEL Dut 44444 Rl 5,985 2025 RAI I 43443 EM	7.505 1907 Voice of Korea	KRE 24122 EM	9.880 0805 Radio Prague TCH Eng 55555 SE 9.880 0804 Radio Prague TCH 55455 EM	
5.995 1830 Radio Polonia POL 35522 SH 5.995 1830 Radio Polonia POL Eng 43333 ShH	7.505 0853 AFRTS (u.s.b.) 7.560 1901 Radio Ezra	35233 EM	9.885 2302 Swiss Radio Int'l SUI Eng 34233 P 9.885 2302 Swiss Radio Int'l SUI Ita 44333 TW	,
5.995 1805 Radio Polonia POL Eng 35444 FW 5.995 1825 Radio Polonia POL Eng 54445 BC	7.570 0750 WEWN 7.580 0855 WHRA	USA Eng 53443 SE USA 44444 RI USA 44433 TW	9.885 1055 Radio New Zealand Int'l NZI 22222 TW 9.885 1032 Radio New Zealand Int'l NZI 44444 TW	
6.000 0340 Radio Havana Cuba CUB 34533 SH 6.000 1835 Radio Polonia POL Eng 34243 P	7.580 2320 WHRI 7.580 2307 WHRA	USA Eng 25444 FW	9.885 0925 Radio New Zealand Int'l NZL Eng 25343 FW 9.885 0940 Radio New Zealand Int'l NZL Eng 44444 BC	
6.005 1750 Deutschland Radio Berlin D Ger 42233 VP 6.005 2125 BBC World Service G/SEY 33333 BC	7.580 0055 WHRA 7.910 1544 VIRI	USA 44434 BC IRN 24222 EM CHN Chi 23322 VP	9.885 0735 Swiss Radio Int'l SUI 44232 EM 9.885 0836 Radio Nederland HOL Dut 44433 RI	-
6.005 2145 BBC World Service G/ATG 42222 EM 6.010 1950 Sri Lanka Broadcasting CLN/G 44344 EM	7.935 2020 China National Radio 1 9.325 1303 Voice of Korea	KRE 35233 EM	9.895 1955 Radio Nederland HOL Eng 44434 P 9.895 1452 Radio Nederland HOL Eng 45545 MC	
6.010 2030 Radio Romania Int'l ROU 23222 EM 6.015 2320 Voice of Turkey TUR Eng 44444 GG	9.330 2203 WBCQ 9.345 2130 Kol israel	ISR Heb 42333 VP	9.895 1910 Radio Nederland HOL 34232 EM 9.910 1542 All India Radio IND 22222 EM	
6.015 2300 Voice of Turkey TUR 45554 EM 6.025 2205 Radio Budapest HNG 44434 SH	9.355 2255 Taipei Radio Int'l 9.355 2246 Radio Taiwan Int'l	TWN 34132 EM	9.915 1714 BBC World Service G Ara 4433 RI 9.950 2210 Adventist World Radio USA 32222 TW	
6.025 1855 Radio Budapest HNG Ger 53455 P 6.025 2215 Radio Budapest HUN Eng 45544 PW	9.370 2135 WTJC 9.400 0346 Radio Bulgaria	USA Eng 25444 FW BUL 45534 SH	9.950 2105 All India Radio IND 35343 EM	
6.025 2210 Radio Budapest HNG Eng 55445 GG 6.025 2000 Radio Budapest HNG Eng 42333 VP	9.400 0010 Radio Bulgaria 9.410 2153 BBC World Service	BUL 44233 EM G/CYP 45534 SH GRC Gre 55545 VP	9,960 2055 Voice of Armenia ARM Eng 55455 P 9,960 2040 Voice of Armenia ARM 44444 EM 9,970 0839 RTBF BEL Fre 24333 RI	
6.035 2203 Voice of America USA/STP 44333 SH 6.035 2210 Voice of America USA/STP Eng 45444 FW	9.420 2100 Voice of Greece 9.430 1336 Radio Sweden Int'l	S 55555 EM	9.990 2156 Radio Cairo EGY 4533 SH 9.990 2206 Radio Cairo EGY 22222 TW	,
6.040 1829 Voice of America USA 33533 SH 6.040 1823 Voice of America USA/MRC Eng 54444 BC	9.445 1935 All India Radio 9.445 1855 All India Radio	IND Hin 54444 BC	9.990 2155 Radio Cairo EGY Eng 35544 FW 9.990 2140 Radio Cairo EGY Eng 43333 BC	
6.040 1834 Voice of America USA/MRC Eng 34454 MC 6.045 1840 Voice of America USA Eng 34333 P	9.445 2106 All India Radio 9.470 1935 Voice of Russia	RUS Eng 33222 P	9.990 2115 Radio Cairo EGY 4554 EM 11.335 1301 Voice of Korea KRE 35222 EM	
6.055 1930 Voice of Turkey TUR Eng 55545 VP 6.055 1940 Voice of Turkey TUR Eng 54445 BC	9.470 1906 Bible Voice Network 9.475 1618 Radio Australia	G 43343 EM AUS 44433 SH AUS 34233 EM	11,585 1800 Kollsrael ISR Eng 44423 VP 11,585 2010 Kollsrael ISR Eng 25433 MC	
6.055 2004 Voice of Turkey TUR Eng 45455 MC 6.055 1930 Voice of Turkey TUR 44444 EM	9.475 1450 Radio Australia 9.485 1159 The Overcomer Ministry	USA/D Eng 35555 MC AUS 34323 SH	11,600 0832 Radio Prague TCH Fre 24432 RI 11,600 0755 Radio Bulgaria BUL Eng 55555 SE	
6.055 0005 Radio Exterior Espana E 53443 EM 6.060 0115 RAI Domestic I Ita 34533 SH	9.500 2004 Radio Australia 9.500 1904 Radio Australia 9.510 1945 Radio Tirana	AUS 43433 EM ALB 34132 EM	11.615 1703 Radio France Int'l F Eng 25444 MC	
6.065 0959 Radio Sweden Int'l S Swe 34433 RI 6.065 2137 Radio Sweden Int'l S Swe 22222 TW 6.075 1817 Pentsche Welle D Ger 55555 P	9.525 1321 Radio Polonia 9.525 1319 Radio Polonia	POL 35322 SH POL Eng 34343 P	11.645 1715 Radio France Int'l F Eng 55445 BC 11.655 1920 Radio Nederland HOL/MDG Eng 33222 VP	
6.085 1745 Bayerischer Rundfunk D Ger 44434 VP	9.525 1315 Radio Polonia 9.525 1330 Radio Polonia	POL Eng 53443 SE POL 45454 EM	11.655 1999 Radio Nederland HDL 44343 EM 11.660 1831 Radio Australia AUS 35322 SH	
6.100 1931 IR Serbia & Montenegro YUG 44344 SH 6.100 2200 IR Serbia & Montenegro YUG 44322 SH 6.100 1938 IR Serbia & Montenegro YUG 6 no 45455 MC	9.525 2132 Voice of Turkey 9.535 1940 Radio Thailand	TUR 44243 EM THA Eng 33433 P	11.660 1500 Radio Australia AUS 34333 TW 11.660 1358 Radio Australia AUS 32222 TW	
6.100 1930 IR Serbia & Montenegro YUG 44232 EM	9.535 1900 Radio Thailand 9.535 1912 Radio Thailand	THA Eng 34423 VP THA 34232 EM	11.660 1508 Radio Australia AUS 33333 TW 11.660 1515 Radio Australia AUS Eng 43233 VP	
6.105 0615 Voice of America USA/STP Eng 43333 ShH 6.110 2210 IRSerbia & Montenegro FRY/BIH Eng 45444 FW 6.110 2039 Radio Romania Int'i ROU 32432 EM	9.565 1318 Test TX from Merlin 9.570 1733 Radio Romania Int'l	G 44444 TW ROU 44444 EM	11.660 1445 Radio Australia AUS Eng 54444 BC 11.660 1632 Radio Australia AUS Eng 24443 MC	
6.115 0342 Radio Tirana ALB 45432 SH	9.575 2144 All India Radio 9.585 1620 Radio Budapest	IND 24232 EM HNG 42442 EM	11.660 1627 Radio Australia AUS 44243 EM 11.675 1420 China Radio Int'I CAN Eng 45433 SE	
6.140 0819 Deutsche Welle D Eng 34333 RI	9.585 1909 China Radio Int'l 9.590 1449 Radio Australia	CHN 54243 EM AUS 24122 EM	11.690 1630 Radio Jordan JOR 45423 SH 11.690 1500 Radio Jordan JOR 33333 TW	,
6.140 0917 Deutsche Welle D Eng 35444 MC	9.595 2035 Radio Exterior Espana 9.595 2044 Radio Exterior Espana	E Eng 43333 P E Eng 34453 MC	11.690 1708 Radio Jordan JOR Eng 54444 FW 11.690 1449 Radio Jordan JOR Eng 35545 MC	1
6.155 0357 Voice of Russia RUS 33423 SH	9.595 2241 Radio Exterior Espana 9.610 1102 The Overcorner Ministry	E 24122 EM USA/D Eng 34454 MC	11.690 1455 Radio Jordan JOR Eng 54533 SE 11.700 0930 China Radio Int'l CHN Chi 34433 RI	
6.155 1325 Radio Austria Int'I AUT 44444 TW	9.610 1702 The overcome rounisary 9.610 1544 VIRI 9.645 1713 Voice of America	IRN 34232 EM USA/CLN Eng 25443 MC	11.700 1230 Radio Bulgaria BUL Eng. 34434 Get 11.700 1240 Radio Bulgaria BUL Eng. 55444 BC	
6.180 1914 Deutsche Welle D/RWA 24422 SH	9.645 1713 Voice of America 9.645 1715 Vatican Radio 9.645 1433 Voice of America	CVA Eng 45443 MC USA/THA Eng 35553 JP	11.705 1433 Voice of America USA/PHL Eng 33453 MC 11.725 2330 Radio Cairo EGY 35433 EM)
6.195 2315 BBC World Service G Eng 44444 ShH	9.650 1130 Radio Korea Int'l 9.650 1130 Radio Korea Int'l	KOR/CAN Eng 44333 ShH KOR 34243 EM	11,730 2005 Radio Free Europe/Liberty USA/MRC Cro? 44444 RI 11,730 1109 Radio Japan J Eng 15442 MC	
6.195 2125 BBC World Service G 34333 TW	9.655 2312 Voice of Turkey 9.655 2300 Voice of Turkey	TUR Eng 25343 FW TUR 45554 EM	11.740 1248 Radio Japan J Chi 24332 RI 11.740 0730 Vatican Radio CVA Eng 43443 Shi	
6.195 1838 BBC World Service G Eng 25443 MC 6.195 2144 BBC World Service G/CYP 54344 EM 6.735 2173 Volice of Bussia RUS 34433 TW	9,660 2145 Adventist World Radio	CVA Ltn 44444 P USA/AUT Eng 25444 PW	11,740 1541 All India Radio IND 44242 EM 11,755 1228 YLE Radio FNL Fin 44434 RI	
6.235 2115 Voice of Russia RUS 33333 TW	9,660 2101 Adventist World Radio 9,660 2100 Adventist World Radio	USA/AUT Eng 34443 MC USA/AUT 44444 EM	11.760 1304 BBC World Service G/OMA Eng 23553 MC 11.775 1726 RDP International POR Por 33342 RI	,
7.105 2056 Radio Belarus BLR Eng 33443 P	9.665 0931 China Radio Int'l 9.675 2000 Radio Cancao Nova,	CHN 23321 RI	11.775 0720 Radio Romania Int'l ROU Eng 55544 SE 11.800 1309 Radio Polonia POL Eng 24242 P	
7.105 1900 Radio Santec 44344 EM	Sao Paulo 9.680 2001 Radio Exterior Espana	B Por 34432 MC E Eng 34443 MC	11,820 0840 Voice of Russia RUS Eng 44434 RI 11,820 0800 Voice of Russia RUS Eng 44444 Shi	Н
7.105 2030 Radio Romania Int'l ROU 21222 EM 7.105 2130 Radio Minsk BLR 45343 EM 7.110 0941 Radio Tirana ALB Alb 34332 RI	9.680 2240 Radio Exterior Espana 9.685 1744 BBC World Service	E 25222 EM G/AFS Spa 24443 MC	11,820 1320 Radio Polonia POL Eng 43443 SE 11,820 1330 Radio Polonia POL 45454 EM	
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ı	/IHz	UTC	Service	Country	Lang	SINP0	SWL	MHz	UTC	Service	Country	Lang	SINPO	SWL	MHz	UTC	Service	Country	Lang	SINPO	SWL
	1.835 1.845		IR Serbia & Montenegro Radio France Int'l	YUG F	Fre	34222 35455	SH MC	15,240 15,240	1320 1601	Radio Australia Voice of America	AUS USA/MRC	Eng	22222 45545	TW MC	19.010 19.010	1155	Voice of America Voice of America	USA/CLN USA	Dar	35444 45243	MC EM
	1.855	2108 1022	Radio Japan Radio Australia	AUS		25122 11111	EM TW	15.265 15.270	1115 0920	Radio Romania Int'I Voice of Armenia	RDU	Fre Eng	44454 55544	P SE	21.455 21.455	1645 0954	WYFR BBC World Service	USA G	Eng	34433 55444	TW
		0900 2030	Radio Australia RAI	AUS		22212 34132	EM EM	15.300 15.310	1241 1415	Radio France Int'l BBC World Service		Fre	24322 35533	SH	21.455 21.465	1220	HCJB (y.s.b.) Radio Pakistan	EQA PAK	Eng	45334 44423	BC Ri
1	1.885	1152	Radio Free Europe/Liberty China Radio Int'l	ÙSA/D CHN	Rus	55444 35433	ŘÍ	15,310 15,330	1330 0905	BBC World Service KTWR		Eng	44454	JP	21.465	1100	Radio Pakistan	PAK	Eng	54444	ShH
1	1.900	1015	Adventist World Radio	USA/GUN		43333	ShH	15.370	1159	UAE Radio, Dubai	UAE	Ara	35233 24332	EM RI	21.465 21.465	1025 0850	Radio Pakistan Radio Pakistan	PAK PAK	Urd	44333 54434	TW
1		2130	Adventist World Radio Radio Tashkent	USA/GUN UZB		34333 43232	TW EM	15.395 15.395	0845 1608	UAE Radio, Dubai UAE Radio, Dubai	UAĘ	Ara Eng	32332 34233	RI P	21,465 21.465	1015 1101	Radio Pakistan Radio Pakistan	PAK	. Urd Eng	45333 25453	BC MC
1	1,930		Swiss Radio Int'l Radio Marti	SUI USA	Eng Spa	22222 25444	VP FW	15,395 15.395	0830 1044	UAE Radio, Dubai UAE Radio, Dubai	uae Ara	Ara Eng	43433 25432	VP MC	21,4 <u>6</u> 5 21,470	1101	Radio Pakistan BBC World Service	PAK G/ASC		35233 25322	EM SH
	1,930 1,935	2031 1528	Radio Marti Radio Canada Int'l	USA	Spa	34442 24222	MC EM	15.400 15.400	0750 1615	BBC World Service BBC World Service		Eng Eng	44444 35444	ShH FW	21.470 21.470	1011	BBC World Service BBC World Service	G/SEY G/SEY	Eng	32432 44334	RI BC
			Radio Romania Int'I RDP International	ROU POR	Por	34233 44444	EM RI		0800 1950	BBC World Service BBC World Service	G/ASC	Eng Eng	44434 35433	VP MC	21.470 21.470	1445	BBC World Service BBC World Service	G/ASC G/ASC	Eng Eng	25454 43333	MC SE
	1,990	2003	Radio Kuwait Tunisian Radio	KWT TUN	Ara	44333 44344	SH Ri	15,400	0750 1502	BBC World Service BBC World Service		Eng	43433 43243	SE EM	21,470	1501	BBC World Service	G/AFS	. Q19	24222	EM
1	2,010	1016	Voice of Russia	RUS	Ger	34433	RI	15,405	1058	HCJB	EQA	Eng	33222	TW	21.490 21.495	1500 1009	BBC World Service Saudi Radio	G/AF\$	Ara	24212 44333	EM Ri
1	2.035	1700	BBC World Service Deutsche Welle	G D	Tur Fre	23332 44333	RI Ri	15.415	0840 0803	Radio Australia Radio Australia	AUS	Eng	43333 25212	SE EM	21.505 21.530	0820 1042	Saudi Radio Radio Free Europe/Liber	ARS by USA/GRO	Ara Aze	44434 54444	VP Ri
			Radio Cairo Radio Nederland	EGY HDL	Ara	44444 15221	RI EM	15,420 15,440	131 <u>4</u> 1825	BBC World Service BBC World Service	G/SEY G/ASC		25322 55444	SH BC	21.540 21.560	1039	Radio Exterior Espana Deutsche Welle	E D	Spa Kis	34433 44333	BI BI
		1422 0830	Radio Nederland Trans World Radio	HOL/UZB MCD	Eng	35433 44444	SH ShH	15.480 15.485	1036 1147	VIRI BBC World Service	IRN.	Eng	24222 34333	EM Ri	21.570 21.570	1142 1028	Radio Exterior Espana Radio Exterior Espana	E	Spa Spa	24422 33332	SH
		0818	Trans World Radio	ALB HDL/UZB	Eng	45444 35443	FW MC	15.485 15.485	1029 1456	BBC World Service BBC World Service		Eng	35444 44243	MC EM	21.575 21.590	1031	Radio Farda	USA/CLN USA/D	Far	33433 34333	RI BC
- 1	2.070	0744	Trans World Radio Radio Nederland	MCO HOL	- F/8	54554 44233	EM EM	15.495 15.500	1629 1319	Adventist World Radio	USA/GUM		24112	EM	21,590	1500	Brother Stair The Overcomer Ministry	USA/D	Eng	25444	MC
- 1	2.080	2025	Voice of America	USA MNG	Hau	44444	Ď.	15.515	1012	BBC World Service Voice of America		Chi	44533 33322	SH RI	21,605 21,605	0847 1105	UAE Radio, Dubai Deutsche Welle	D D	Ara Eng	43433 43333	RI ShH
- 1	2.085	1025	Voice of Mongolia Voice of Mongolia	MNG		21111 23111	TW	15.520	1244 1210	Radio Ukraine Int'I Radio Ukraine Int'I		Eng	35533 54433	SH SE	21.605 21.605	0830 1035	UAE Radio, Dubai UAE Radio, Dubai	uae uae	Ara Eng	54444 54544	VP SE
1	2.095	1103	BBC World Service BBC World Service	G G	Eng. Eng	34333 33453	RI MC		1537 1254	WYFR Radio Ukraine Int'I	usa ukr		45243 44233	EM EM	21.610 21.630	1025	Radio Exterior Espana Radio Sawa	E USA/MRO	Spa Ara	34333 54434	RI RI
			BBC World Service BBC World Service	G G/ASC		44232 24132	EM	15.530 15.530	1100 1250	Radio New Zealand Int'l Radio New Zealand Int'l		Eng Eng	44433 43333	TW SE	21.650 21.650	1134 1109	Deutsche Welle Deutsche Welle	D/KAZ D/KAZ	Eng Eng	33343 35444	RI MC
1	2,105	1708	Voice of Greece Voice of Greece		Gre	44434 24132	RI EM		1303 1532	Radio New Zealand Int'l Sudanese Radio		Eng	44554 44344	JP EM	21.655 21.660	1236 1430	RDP International	POR	Por	33332 15521	RI
1	2.130	1710	Adventist World Radio WWCR	USA USA	Swa .	34433 24422	RI	15,540	1729	RDP International	POR	Por	33422	BL	21.660	1022	BBC World Service BBC World Service	G/CYP G/THA	Eng	34433	SH RI
1	2.160	1335	WWCR	USA	Eng Eng	34343	FW	15.550	1730 1034	Voice of America VIRI	USA/BOT IRN		44434 24222	RI EM	21.660 21.660	0940 1502	BBC World Service BBC World Service	G/THA G/CYP	Eng Eng	25343 15442	FW MC
1	2.172	1718	WWCR WWRB	USA	Eng Eng	33223 24322	BC Rt	15.565	0830	Swiss Radio Int'l BBC World Service	SUI G	Eng	24122 34423	VP.	21,660 21,660	1455 1454	BBC World Service BBC World Service	G/CYP G/CYP	Eng	44444 25212	SE EM
1	3,600	0755	Radio Sweden Int'l Radio Bulgaria	S BUL	Swe	44344 55544	RI SE			BBC World Service BBC World Service		Eng Eng	24432 45454	MC JP	21.670 21.685	1007	Saudi Radio Radio France Int'i	ARS F/GUF	Qor Fre	34333 34333	RI
			Radio Bulgaria Global Catholic Network	BUL. USA	Eng	45544 15442	EM. MC	15,575	1005	BBC World Service			24443 44243	MC EM	21.700 21.705	1018 1016	UAE Radio, Dubai Saudi Radio	UAE ARS	Ara Ara	42332 43444	RI RI
- 1	3,620	1709	Radio Kuwait	KWT	Ara Ara	44434 23322	RI VP	15.580	2000	Voice of America Radio Exterior Espana	USA		35444 54444	MÇ	21.705	0950	Saudi Radio	_ARS	Ara	44444	VP
- 1	3.620	1840	All India Radio	IND	Ald	44334	BC	15.585	1400	Radio Exterior Espana	E	Spa	45454	JP	21.740	1111	The Overcomer Ministr Saudi Radio	ARS	Eng Oor	15443 22332	MC RI
1	3.635	1629	Voice International	AUS AUS	·	15221 24222	EM EM	15,595		Vatican Radio	CVA		44444 32242	TW VP	21.745	095 <u>8</u> 1050	Radio Prague Radio Prague	TCH TCH	IŞ Cze	24444 44444	TW
1	3.645	1711	Deutsche Welle	USA/MRC D	Fre	55545 34434	BC RI		0730	Radio Nederland Radio France Int'l	HOL F/GAB	Eng	23122 44333	EM SE	21.745 21.745	1015 1130	Radio Prague Radio Prague	TCH	Eng	25444 35343	PW EM
					Chi Ara	22321 34444	RI RI					Gre	55545 45444	VP EM		0956, 0958	Swiss Radio Int'l Swiss Radio Int'l	SUI SUI	Ger Fre	24433	RI TW
		0844	UAE Radio, Dubai	UAE	Ara Eng	33332 43333	RI ShH	15.665	1013	Voice of America	USA		23432 45334	RI BC	21.770 21.770	0845 0852	Swiss Radio Int'I Swiss Radio Int'I	SUI SUI	Eng	25343 15442	FW
1	3.675	1045	UAE Radio, Dubai	uae		22222	TW	15.700	1200	Radio Bulgaria	BUL	Eng	34434	GeG	21,770	Q850	Swiss Radio Int'l	ŞUI	Eng Eng	44433	MC
1	3.675	1335	UAE Radio, Dubai	UAE	Ara Eng	33323 53433	VP ŞE	15.825	1536	WWCR	USA USA		54444 24132	BC EM	21.790	0830 0859	Swiss Radio Int'l Voice of Russia	SUI RUS		15221 25442	MC
1	3.695	1244	WYFR	USA	Far Eng		RI			Radio Sweden Int'l Radio Sweden Int'l	S S		45322 24122	SH		0845	Voice of Russia YLE Radio	RUŞ FNL		44433 34433	SE TW
				SVK E	Eng	55444 44444	șe Tw				IND IND		44333 33222	TW TW	21.800	1450 1100	YLE Radio Radio Sweden Int'l	FNL S	Fin Swe	33333 34433	TW
				AUT USA	Eng	34333 34333	TW ShH	17.510	1000	All India Radio	IND IND	Eng	44423 23222	VP EM	21.820	1040 1251	Radio Japan Radio Australia	ÄUS	lta	44444 24312	TW EM
_1	3.760	1602	WHRI	USA	Eng Eng	35444	FW. MC	17,515	1242	Vatican Radio	CVA	Man	44434	RI	21,840	1140	Deutsche Welle	D	Ger	25432	SH
1	3.765	1547	Vatican Radio	CVA	-	35533	SH	17.535	1045	Kol Israel	ISR	Heb	34333 34333	TW.	25.820	1000 1215	Vatican Radio Radio France Int'l	CVA F		35433	TW
1:	3.765	1750	Vatican Radio	CVA		34333	RI TW_	17.560	1350	WHRA	USA	Eng	54434 45454	VP JP	25.820	1215 1200	Radio France Int'l Radio France Int'l	F F	Eng	34333	P TW
Ť,	3.765	1751 1	Vatican Radio	CVA	Eng Eng	35454	FW MC				usa J/uae i		44243 43443	EM ShH		1255 1200	Radio France Int'l Radio France Int'l	F		35333 55334	GG BC
	3.780	1004	Deutsche Welle	CVA D	Ger	44333	EM RI	17.585 17.610	1050 0836	Radio Japan BBC World Service			54444 34433	șe Ri	25,820	1200	Radio France Int')	F		35132	EM
					Ger Swe		TW Ri		0822	BBC World Service Radio France Int'l		Eng	35544 24222	MC EM			rd Curtis, Stalbridge - R McKeown, Newry.	ealistic DX4	00 + out	door long v	wire.
1	3.790	740	Swiss Radio Int'I		Eng	44333	SE EM	17.630	0845	Africa No 1	GAB I	re	21322 35444	VP MC	FW	Fred \	Vilmshurst, Northampto I Guest, Dudley.	n - JRC NRI)-525 + i	indoor wire	€.
13	3.810	1555 (Overcomer Ministry		Eng	35544	FW BC	17.640	1600	Voice of America	USA/MRC I	Eng	34434	GeG	GG	Geria	nt Gill, Llanfairfechan - I	Grundig Yacl	itboy.		
- 33	3.820	0954 (Croatian Radio	CRO	Cro	34444	RI	17.650	1936	World Harvest Radio		ng	24222 25433	MC.	MC	Micha	Parry, Cyprus. iel Casey, Manchester -	Roberts RC	328 + Ho	wes CTU9	ATU
1;	3.830 '	550 (Croatian Radio	CRD	Cro	35533	MC SH	17.670	1134	Deutsche Welle		ng	24122 24332	EM Ři	P	Peter	or loop dipole. Pollard, Rugby.				
13	3.830	550 (Croatian Radio		Eng	35544	FW	17.690	2905	China Radio Int'l	USA/GRC / CHN I	ng	44444 54333	ri Se		ICF-76	rick Illman, Dxted - Kei 300DS.	wwod R-50	00 + wir	e or Sony i	AN1/
			IRRS AFRTS (u.s.b.)	usa/isl						Radio Japan Channel Africa	J[ng	43333 44333	BC_ SE	SE SH	Stanle Simor	ey Evans, Hailsham. Hockenhull, Bristol - R	berts R876	+ whin/	AKD HF3 +	
					Eng Eng					Channel Africa Radio France Int'l	AFS		35232 55445	EM		indoo	wire. Hughes, Morden - Pan				
15	.105	305 I	Radio Romania Int'I	ROU		25432	EM	17.820	1445	Radio Canada Int'I	CAN		55444 44433	BC BC SE		L/Son	y ICF-7600DS + whip. as Williams, Truro - Gru			OI IIIVGICGO	,
15	115	235	HCJB	EQA	Eng	43333	ShH	17,820	1602	Radio Canada Int'l	CAN		44233	EM			er, Seaton.	nuly racino	oy 400.		
15	5.120 (1830	Voice of Nigeria	NIG	Eng	34423	VP	17.830	0820	BBC World Service		ng	35333 34323	SH VP	The C	INID/	Sanda ta waad fi			A-A1	
15	.135 (920 (China Radio Int'	CHN	Ind	34433	RI .	17.830	1458	BBC World Service	G/ASC		35444 44232	MC EM) code is used fo ere is an explana				
15	155 1	347_\	Voice of Turkey	TUR		55555	EM.		0850	Radio Pakistan	PAK (Jrd	54444	VP	. spor	-, "	un vapiuli	01			
15	.160 (913 \ 911 8	Voice of Turkey BBC World Service	TUR	Aze	34333	RI	17.850	612	Radio France Int'l	AUT		35333 34222	GG SH EM	Signa	Stre		3		oderate	•
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Deluxe SW ATU 0-30MHz, SO239 fittings.

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Allows two antennas to be connected to one receiver without interaction.

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Ant A (0-30MHz) Ant B (30-2000MHz) | insertion loss

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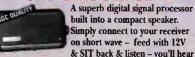
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Comments from John Griffiths Putting the DC 2000 up gave me a tremendous boost to all signals with the ancient AR-2000 coming alive! Signals were well received and I found that I wandered out of airband.

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Disposition Francisco Research Hz-110MH

It's unobtrusive and can be mounted almost anywhere!

High intercept point, low noise Stainless steel construction

Static discharge protection (when earthed) Height: 40cm, Dia: 35mm

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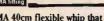
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Frequency counter covers 10MHz-3GHz. Incl's nicad. charger, antenna.

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SMA 40cm flexible whip that is ideal as replacement.

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A fully adjustable desk top stand for use with all hand-

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Includes 8.33kHz spacing

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ICOM IC-R8500

Next generation wideband receiver for the true perfectionist. 0.1-2GHz. (All mode). The IC-R8500 is not simply a scanner, it's a professional quality communications receiver with versatile features from high speed scanning to computer control. (Requires software/lead). Includes free power supply.

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Never before has one hand portable offered so much

- ★ Covers 100kHz-3GHz (all mode)
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- * 8-33kHz steps for the new airband spacing
- * Reaction tune capability
- * Includes nicads/charger/antenna and car lead.

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A high performance fully featured receiver covering the frequency range of 10kHz-3GHz. This revised version has even greater inhanced performance offering professional quality at an affordable price.

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

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Superb wideband receiver (all mode) with over 50,000 memories capable of holding text. 20kHz-1750MHz. Incl's remote control/power supply/PC lead and software. RRP: £899.00. Our in-house comparison tests have shown this unit to out perform those of double its price - a true professional receiver!

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

Years of practice and this model still outsells almost any other handheld in its range.

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Superb high-speed scanner featuring alpha tag and much more.

BATTERIES AND CHARGER INCLUDED

"Icom quality at a very affordable price"

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Delivery £10



GRE PSR-225

500 channel. 25-1300MHz. (25-550/760-1300MHz) AM/FM/WFM selectable. Includes power supply.

RRP £349 OUR PRICE £199.99

Delivery £10



ALINCO DJ-X3

Micro-handy scanner. 100kHz-1300MHz. 700 memories/stereo FM (earphones)/attenuator/bug detector/audio descrambler. AM/FM/WFM/ Selectable tuning steps (incl's 8.33kHz).

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Delivery £10

Optional battery pack and drop in charger £39.99

Soft case	£15.99
PC interface	£42.95



BEARCAT UBC-278

New base scanner with built-in clock radio. 25-956MHz (with gaps) 88-108MHz (WFM) 500kHz-1720kHz (AM). Fully programmable. Ideal for the bedroom. RRP £349 OUR PRICE £139.95
Delivery £10

Bandscan

- Martin Peters 11 Filbert Drive, Reading RG31 5DZ
- E-mail: martin.peters@pwpublishing.ltd.uk

be begin this month with news that over half of all UK households now enjoy access to digital TV, according to a recent press release from the newly formed, London-based Ofcom. The report estimates that by the end of December 2003, digital TV penetration had reached more than 50% of all UK households for the first time.

Uptake on Freeview increased by 41%, with the addition of over 866,000 households during the last quarter. The total number of households receiving Freeview at the end of the year was estimated to be close to three million.

At the end of March, Ofcom will be submitting a full report to the Secretary of State for Culture, Media and Sport on the progress towards digital switchover. The report will be published on the Ofcom website. For a link to this and other sites of interest please go to www.pwpublishing.ltd.uk/swm/bandscan/

Creating Community Radio

Still with Ofcom, February 17 saw their announcement proposing the creation of community radio, a new sector of radio broadcasting for the UK. This third tier of radio should "add to the rich mix of services already provided by the BBC and commercial radio sectors", continued the press release. Services will be small scale, operated on a non-profit basis and should have a positive impact on their communities.

Ofcom considers that most cities and conurbations are likely to have frequencies for at least one or two community services initially. Community radio stations should typically use frequencies that are not viable for commercial services and will probably be limited to service areas not exceeding five kilometres.

Each year, for a period of 12 weeks, interested parties should be able to apply by post for a licence - no need for a presentation or a face-to-face interview. Yet more local radio, then, coming to a hamlet near you.

40th Anniversary

Offshore radio fans are preparing for the upcoming 40th anniversary of the launch of Radio Caroline. The station is planning a series of events to mark the occasion, including a birthday bash in Westcliff-on-Sea. Word on the street is that the BBC has commissioned a TV documentary about the station. A rare treat indeed.

A 28-day RSL was being planned for the Bristol area during February, and over the Easter weekend, BBC Radio Essex will 'turn over its a.m. frequencies' to offshore broadcasts from the Light vessel MV18, off the coast of Harwich. This probably doesn't mean that BBC Essex will close down its medium wave facilities in order that Caroline can be heard, rather that the station will take a programme feed from the ship and relay the content over the BBC Essex transmitter chain.

Radio Caroline is also available via satellite to anyone with a Sky satellite system (or anyone with a digital receiver and dish pointed to 28°E) or on the WorldSpace satellite system, although this last option requires a yearly subscription. Caroline's website has been relaunched and you can go visit via the links page.



• As predicted in last time's Bandscan Europe the MV Hatzvi, home to Arutz 7, the world's only offshore pirate station, was taken to Greece and broken up for scrap following the station's closure late last year. A land-based licence has been applied for in Israel.

Legal Battle

Still offshore, well, kind of. The final legal battle hitherto frustrating the plans of Isle of Man International Broadcasting (IMIB) PLC for a long wave radio station on 279kHz has been won - the judgement handed down on February 24.

A lone objector lodged a multi-faceted complaint, claiming that the station's licence had been issued unlawfully, that planning permission for a studio complex had not been obtained and that the generators used to provide power on the offshore transmission platform would cause a disturbance at night.

After documents proving the existence of planning permission were presented to the court and hearing that full checks had been made by the Communications Commission prior to awarding the licence, the court decided that the objector had failed to prove any of his

claims and dismissed his petition.

After the hearing, IMIB founder Paul Rusling commented, "With this legal obstacle cleared we can now complete our funding arrangements and plan for the launch of the radio station. The economic climate now is much more favourable than it was two years ago, so the delays caused by the objections, while very frustrating and expensive, may well have helped us. We have had a lot of interest from investors in recent months, possibly due to the large upturn in radio advertising in the UK. We can now look forward to the launch of the radio station towards the end of this year, or perhaps early next".

He later went on to assure residents in the north of the island that the longwave transmission facility proposed for the station will not present any safety risks. The antenna is to be of the Crossed-Field variety, which, as far as I am aware, is unproven, either at high power or on longwave. We watch with interest.

Long Wave News

Whilst with longwave, by the time you read this, Ireland's RTE expects to have activated their mammoth 500kW 252kHz outlet in Clarkestown. The transmitter, which formerly carried the infamous Atlantic 252, will now relay RTE1. Most of us in central and southern England should still be able to catch the co-channel Algiers with judicious positioning of a ferrite or loop antenna.

In its latest raft of cuts, Washington-based Voice of America announced the complete cessation of ten European broadcast streams. Bulgarian, Estonian, Czech, Hungarian, Latvian, Lithuanian, Polish, Romanian, Slovak and Slovenian were all being cut off as of the end of February. Ukrainian and Armenian face a reduction in programming hours. Station director David Jackson said that VOA must "shift its focus to new audiences and new priorities".

Further, a press release from the AFGE, the union representing US government employees at the Voice of America, claims that in the next budgetary round, VOA English will also be axed. A huge step, if true.

AM Radio

Finally, a radio station broadcasting from a ship, moored between Sweden and Finland on the Åland Islands, hopes to begin broadcasting sometime during the summer. The station, AM Radio, has been awarded a licence for a 300kW transmitter on 603kHz. So far, a 25kW transmitter (and mast) has been purchased. These will have to be installed on the vessel and retuned to 603kHz.

If you like looking at radio ships, there's an opportunity to see the MV *Communicator* online while she's tied up in Lowestoft. Rumour has it that the proposed Radio London operation will use her as a transmission platform for its 1008kHz outlet.

Have a great spring.

The surprising AR-ONE

• Product: AR-ONE Receiver

• Price: £3599

Contact: AOR (UK) Ltd. (01773) 880788.

• Web: www.aoruk.com





The latest receiver to emerge from the AOR stable is the subject of

John Wilson's scrutiny this month. Aimed at the professional market the AR-ONE will undoubtedly stimulate interest in hobby quarters. Read on to see why.

n my day-to-day employment in the EMC world, I am fortunate to see some exciting equipment from all fields of the electronic and mechanical worlds, but it was whilst testing the new AR-ONE receiver for its CE marking compliance that I thought that this receiver was more than worthy of bringing to the attention of the readers of *Short Wave Magazine*. Straight away I have to tell you that this will be rather like Jeremy Clarkson commenting on the latest Ferrari when all we can afford is a Ford Focus, because the AR-ONE is intended for the professional market and commands a commensurate price tag. However, as an example of what is possible with good engineering design, the AR-ONE shows its pedigree, as does the Ferrari (but you won't have to take the AR-ONE back to Modena for an oil change).

Clean and functional rear end.



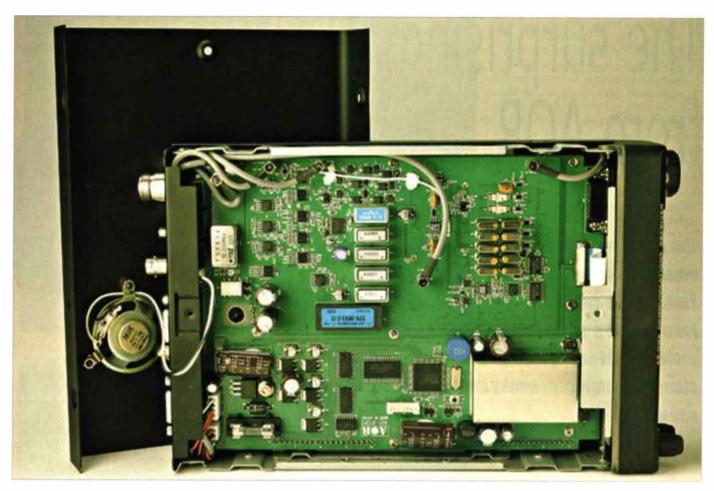
Modest Appearance

The receiver is very modest in its appearance and looks at first glance rather like 'just another scanner', an impression which is dispelled when you first pick it up and feel the weight - 2.2kg, or in old money just under 5lbs. A glance at the rear panel betrays the use of top quality connectors, including an N-type for the antenna connector. Why an N-Type?; because this receiver tunes all the way up to 3.3GHz, that's why. At the other end of the spectrum the AR-ONE tunes all the way down to 10kHz; that's correct, 10kHz to 3.3GHz without any breaks - are you reading carefully? An SMA connector provides for connection of an external 10MHz frequency standard, and a BNC outlet gives access to the 10.7MHz i.f. for feeding an external display such as the AOR SDU series. This output can also be re-configured from the front panel to feed out the 455kHz i.f. signal instead of 10.7MHz which makes it perfect for using with specialist external data decoders. Two 9-pin RS-232 connectors provide for external control of a single receiver or, by daisy-chaining, control of up to 99 receivers if you can afford it! The necessary TX/RX transposition is done internally between the connectors, so straight-through RS-232 cables can be used.

The provision of an input for an external master reference betrays the need for professional multi-receiver systems such as precision direction finders to have every receiver in the system certainly on-frequency, but also possibly in-phase. I have wondered before if receivers with d.s.p. back-ends and consequent digital processing delays can guarantee to have demodulated outputs in phase, or even in time coincidence, and it is interesting to find that the AR-ONE uses analogue filtering and demodulation throughout its architecture. Since every oscillator frequency in the AR-ONE is derived from the same 10MHz source, I would love to have two or three receivers tracking the same input frequency whilst using a single 10MHz reference and see how closely they are phase coincident at the demodulated output.

Classic Method

Not that the AR-ONE is short of receive bandwidths; the standard configuration gives 6dB bandwidths of 500Hz, 3, 6, 9, 15, 30, 110, 220 and 300kHz, which should cover most usages for the receiver. The necessary filtering is carried out at both 10.7MHz and 455kHz intermediate frequencies which is the classic method of ensuring that selectivity is as close to the antenna socket as possible, whilst at the same time minimising noise fed to the



Under the top cover.

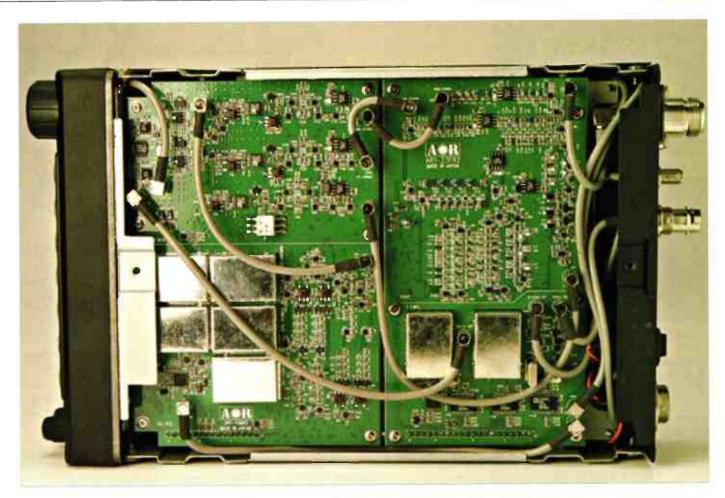
demodulators by having the second stage filters at the end of the 455kHz i.f. chain. Some of you may remember my analogy of selectivity being like a fence across a prairie, with the fence having a single gate controlled by a solitary Red Indian. Approaching him across the open prairie is a herd of buffalo gradually gathering speed, and it is the gate keeper's job to select from the herd the only white buffalo and get it through the gate. The herd represents the broad spectrum of big signals hitting the first i.f. stages in a receiver, and the gate is the first filter (at 10.7MHz). Fine - the white buffalo gets through but is accompanied by two more because the gate is a bit wide and these gallop along the next prairie, growing in size and speed until a second fence with a matching width gate (455kHz) and another Red Indian. Selection of the white buffalo is easy from the three coming at him, and only the white buffalo (the wanted signal) gets to the demodulator (or abattoir as the case may be).

Now imagine the situation if the first fence and gate had not been present and the entire herd arrived at the end of the prairie (the i.f. chain) at full tilt. The weight would simply overwhelm the second gate keeper and the whole damned lot would arrive at the abattoir (demodulator) at the same time. This is precisely what happens in receivers having no selectivity before a d.s.p. back-end, and the result is that the d.s.p. system is often overloaded by signals, which are effectively outside the bandwidth chosen, and the demodulated signal sounds simply dreadful. In case you think that 'white man speak with forked tongue', it's worth noting, as I did recently, that Ten-Tec who know a thing or two about receivers are offering crystal bandpass roofing filters to fit immediately after the first mixer in the receiver of their top-end transceiver. This provides the first 'prairie gate' after which the chosen signals proceed on their happy way to be sorted out by the d.s.p. at the other end of the prairie (sorry, i.f. chain). Well, AOR have done all this by the best possible method and although it calls for no less than 17 separate i.f. filters, the results are very good indeed.

Sheer Cleverness

Selectivity at the front-end of the receiver has not been overlooked and there are no less than 19 filter networks taking care of this design aspect, and all this takes place before the first mixer. Actually there are three first mixers covering the spectrum from 0 to 480MHz, 480MHz to 1.696GHz and 1.696 to 3.394GHz. First signal conversion is cleverly done by using two high first i.f. stages at centre frequencies of 754 and 265MHz, which are selected as appropriate for each of the 22 different tuning ranges employed in the AR-ONE. I have to admire the sheer cleverness of the designer who made all this work so seamlessly in practice, and seamless it truly is, because you simply cannot tell from using the AR-ONE that all this trickery is going on inside when you idly tune around. With such a wide frequency range to cover it is clear that tuning rates have to be comprehensive, and AOR have provided no less than 17 different rates ranging from ultra-fine 1Hz right up to 500kHz, including the important 6.25, 12.5 and 25kHz for land mobile radio, together with 9kHz for European broadcasting. As a final killer touch, the user can programme the AR-ONE to tune in any step requirements by using the 'step size' function. This allows you to enter any step you want in 1Hz increments up to 1MHz, so if you really do need a step of 1234Hz you can have it. Frequency can also be entered directly from the keypad in steps again as fine as 1Hz if you want, but if you need to go to 8.864MHz, simply key in the numbers as I have written them, terminating the entry by the 'ENT' key and there you are - bang on frequency ensured by the high stability master frequency standard.

With a receiver of this type it is essential to have the facility to store channel information for ready recall, and the AR-ONE has 1000 memory channels arranged in ten banks of one hundred channels. Each memory channel contains information on frequency, mode, tuning step, frequency

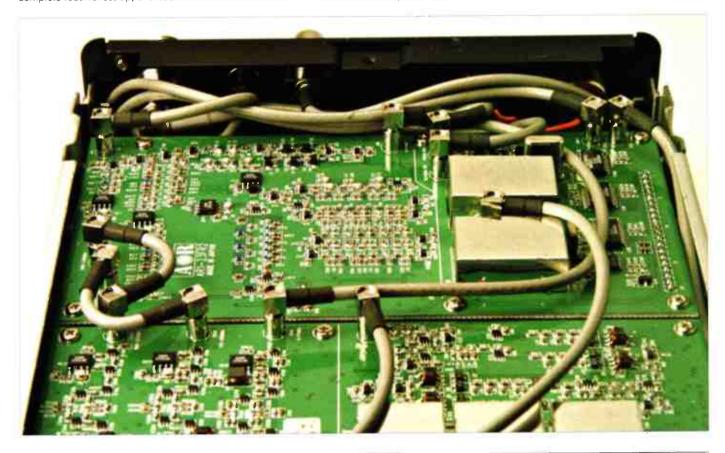


offset, the r.f. attenuator setting, and a text string of up to 12 characters. All memory contents are held in EEPROM so that the receiver will retain the information without requiring power or a backup battery. In addition to the 1000 memory channels there are ten 'v.f.o.' channels, each storing a complete receiver set-up, and each of these 'v.f.o.s' can be

recalled at any time and then used as tunable information stores. I used them during my testing to store the centre frequencies and appropriate modes for the h.f. airband frequencies, Band 2 f.m., 60kHz frequency signals, the 80m amateur band, and so on. A well thought out facility in the usual AOR competent style.

Removing the bottom cover reveals...

A closer look.



Sweep The Spectrum

Now if you have memory channels full of data, you need the facility to have the channels automatically scanned, and this is simply controlled in the AR-ONE as in other AOR receivers. All the usual scan functions are provided, together with the ability to build a "select scan" bank of active channels and access these separately. A powerful "search" system lets you sweep a spectrum between pre-chosen limits and contains all the desirable operating features including a flexible frequency skip system which makes the receiver ignore channels which are constantly occupied, such as f.m. broadcast or paging systems.

The AR-ONE is such a comprehensive device that you really need to study the complete handbook in order to get a grasp of its capabilities, but you can take it from me that after designing and manufacturing the very best in receivers for the last 25 years, AOR have put all their acquired skills into this one.

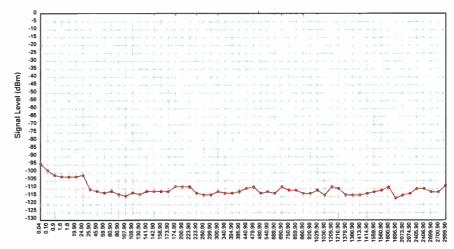
The r.f. performance was expected to be good, as laid out in the basic brochure and I subjected the test sample to a range of measurements in order to check the important facts. Because of the multiplicity of r.f. filters at the front-end of the AR-ONE, it was necessary to carry out sensitivity measurements at the lower and upper edges of the passband of each filter, and after more than 30 separate measurements I came to the conclusion that the AR-ONE did everything in the sensitivity stakes that the manufacturer's leaflet said. In fact, as is often the case, the sensitivity was better than specification, particularly at lower frequencies. When I first unpacked the AR-ONE, I connected a one metre telescopic whip to the antenna connector just to have a 'tune around' and get a feel for the controls. As one might expect, broadcast f.m. came booming in with very good audio quality, as did Shanwick on the h.f. ATCC frequencies. I was unprepared for what happened next, because I halfheartedly set the receiver to 60kHz, and to my astonishment there was Rugby loud and clear on this ludicrously small whip antenna. The measured sensitivity at 60kHz turned out to be -105dBm in u.s.b. mode, which is much better than I had any reason to expect. Checks on all other frequencies all the way to 2GHz (I don't have a 3GHz generator) showed that the sensitivity was maintained; in fact got better above 1GHz. Typical sensitivity for 12dB SINAD in s.s.b. mode with a 3kHz bandwidth ranged from -104dBm at 60kHz to -112dBm at 28MHz; -114dBm at 65MHz to -115dBm at 1GHz, then -116dBm to 2GHz. These are good figures for a wideband high performance receiver, and better than I expected bearing in mind the influence of the frontend filtering.

On Target

Dynamic range checked out as per the specification at >91dB, and the phase noise performance was also on target. All-in-all, the AR-ONE was excellent and has clearly been designed to fulfil a number of professional and semi-professional tasks rather than just being an exercise in chasing sensitivity at the expense of all other important parameters. The professional approach shows in features like the signal strength metering being switchable to read directly in dBm or dB μ V or in hobby type 'S' units. The measured values were very accurate when checked at several frequencies across the tuning ranges, and the values are available to a remote controlling computer which can also select the measurement parameter.

I did not have access to any control software when I had

AR-ONE Sensitivity (n.b.f.m. 12dB SINAD)



Receive Frequency (MHz

the AR-ONE but the manual shows that virtually everything can be remotely controlled via the RS-232 link and the receiver responds to remote commands with simple numerical values. Knowing the skill and ability of the AOR team in the UK, I have no doubt that dedicated software will soon be available and function as commendably as in all previous AOR receivers. I do know of many professional users of AOR equipment and I can see great potential for this unit in monitoring and surveillance applications. If you are looking for a really powerful receiving tool and can afford the cost, the AR-ONE will satisfy almost every need you could imagine, and it's a credit to the AOR designers that they have produced such a high specification receiving system (it's too comprehensive to be called simply a receiver) and packed it into such a small physical package.

As far as I can see, the only comparable receiver to the AR-ONE is the Rohde & Schwarz EB-200, and whilst this has the major additional feature of live spectrum display, the price is around four times that of the AR-ONE, so in the words of the TV football commentators - look away now!

The sensitivity plot as shipped with the review receiver.

Final Thoughts

This may well be the last time I shall be writing these reviews, so perhaps a few explanations are necessary. I have thoroughly enjoyed the years during which I have had the privilege of talking to you through the pages of this excellent magazine, and I thank Dick Ganderton and particularly Kevin Nice in allowing me a free rein in putting forward my personal opinions. However, my continued work running the EMC Test House down here in Devon and the increasing load which this has brought on to my shoulders does mean that there is such a thing as too much exposure to electronic testing. I also feel that there comes a time in every engineer's life when technology runs faster than the brain's ability to keep up and I think that at coming up to 66 years old, that time has come for me. I may be well versed in the analogue technology of the last 50 years, but that knowledge can only be applied to what may best be described as 'historic' equipment, so whilst happy to discuss the merits or otherwise of the AR88 or the RA1792, perhaps it's time for me to "Fold my tents and quietly steal away". I shall miss you all...happy listening.

Our thanks to AOR (UK) Ltd., 4E East Mill, Bridgefoot, Belper, Derbyshire DE56 2UA who supplied the AR-ONE receiver for review. The AR-ONE costs £3599 inc. VAT. For more information please visit www.aoruk.com or call: (01773) 880788.

An Introduction to Software Radio

Ian Wraith delves into the complexities of a software defined radio, explaining the differences and advantages of this new use of technology.

oftware radio is radically different from traditional radio and is something that has been used by the military and cellular telephone industry for several years but is only now starting to be used by radio hobbyists. In this article I am going to try and describe what software defined radio is, what advantages it has over traditional radio design and how this new technology means that the monitoring hobby is about to enter a new very interesting and exciting phase.

Until recently all radios were analogue ones. That means the radio signal arriving at the antenna is amplified, filtered and demodulated. All stages using analogue electronics such as resistors,

capacitors and transistors, even the integrated circuits (chips) used in these radios are still analogue ones, as they contain hundreds or thousands of transistors. Sure, there would be some digital electronics, for the radio's digital display, its various memories and its tuning, but the core of the radio would still be analogue.



Fig.2: The SDR-14
 Software Radio
 (photograph courtesy of RFSpace).

A software radio though is totally different, in that as soon as it's possible to do so the radio signal waveform is turned into digital information. This conversion uses a type of integrated circuit called an analogue-to-digital (A-D) converter. From this point onwards the radio information can be manipulated using mathematical formulas in computer programs. If you want to filter the information so only 3kHz

of it remains and the rest removed then this can be done using a program. Likewise if you want to demodulate an s.s.b. signal that is in the 3kHz of signal remaining then this can also be done in a software program as well.

Perfectly Good

Now at this point you're probably thinking, this is all very well but why? As the analogue type of radio is perfectly good and you just can't see the point of software radio. In answer to that consider the following. Imagine that as a short wave broadcast station DX chaser/listener, you're trying to monitor a weak DX station, which has stronger stations broadcasting



• Fig.1: The WiNRADiO WR-G303i Software Radio (photograph courtesy of WiNRADiO).

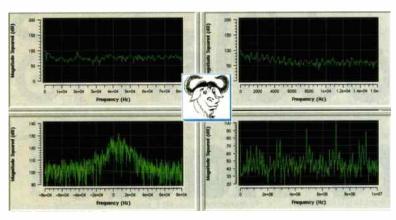
on nearby frequencies. Using your existing analogue receiver that probably has several filter settings, of perhaps 3 and 9kHz.

You find that the 9kHz setting is far too wide and the weak stations broadcast is covered by that of the stronger stations. Although the 3kHz setting gets rid of the interference it is far to narrow and makes the weak DX station too distorted to monitor. Now what you would probably like in this case would be an i.f. filter somewhere in between, perhaps 6kHz wide

At present, the only way you would have of getting a 6kHz filter bandwidth, would be to buy a 6kHz filter component, then warm up your soldering iron to unsolder one of the old filters and solder in the new filter. While this technique would work, it isn't exactly practical is it? However, in a

 Fig. 3: The complex electronics inside an SDR-14 (photograph courtesy of RFSpace).





 Some screen grabs from the GNU Radio project website, with the GNU general logo in the centre.

software radio there are no filter components to change and the filtering is just a function of the program. If you wanted a 6kHz filter then you would just tell the program and it would do it with no need for soldering! Another advantage of software radio is that it allows you to receive new types of modulation.

For instance at the moment short wave radios can generally only receive a.m. and s.s.b. modulation types. Right now digital broadcasting is taking place using a new type of modulation for short wave broadcast stations called Digital

Radio Mondiale (DRM). However, as current receivers only have the circuits for a.m. and s.s.b. they can't be used to monitor this type of broadcast. But a software radio only needs a new program to monitor DRM transmissions and doesn't need any new circuitry. Already a program has appeared that lets the only hobbyist software radio currently available monitor this new mode.

Fast Enough

Much of the theory behind software radio was developed in the 1950s and 1960s when computers were far to slow to actually be used for this purpose. By the 1970s some very expensive computers were fast enough for software radio but the only people who could afford to use them for this were the military and government agencies. In the 1980s electronics designers developed a new type of

integrated circuit (chip) called a Digital Signal Processor (d.s.p.). These are computer chips designed especially to be very fast at doing the certain kind of maths that is used in software radio. By the 1990s d.s.p. was often being used in software radios in mobile telephone base stations.

But d.s.p. systems weren't cheap and were very difficult to program, which meant very few radio hobbyists would use them. However, by the end of the 20th century the ordinary desktop personal computer (PC) contained a fast enough processor to be used for software radio and at last this technology could be used by radio hobbyists like us. OK so now you have read about the advantages of software radio and how your PC is fast enough to be used for this, you probably want to know how to get started in this exciting field.

The first software radio on the market aimed at the hobbyist is the WR-G303i, Fig. 1, produced by the Australian company WiNRADiO. The receiver itself is a circuit card that fits into a PCI slot on any modern PC. It can be tuned by the computer to any frequency between 9kHz and 30MHz, but unlike all the previous WiNRADiO receiver cards it doesn't contain any demodulation circuitry. Instead the card converts the radio signals present at the frequency selected by the user

down to a frequency of 12kHz. This low frequency is called the Intermediate Frequency (i.f.) and emerges from the WR-G303i on a connector which is then wired to the PC's soundcard 'line input' connector.

Now, this low frequency radio signal is turned into digital data by the PC's sound card. As the signal is now nothing but digital information the PC can filter it and demodulate it. The PC's soundcard is also used to output the demodulated audio from the radio signal to the PC's speakers. The WR-G303i comes with software for demodulating common modulation types and even has a slider control so the user can vary the filters bandwidth without being a programming expert. If you want more information on the WR-G303i, then you can't do better than read John Wilson's review of this receiver that appeared in the February 2003 edition of *SWM*.

Another software radio which is just going into production as I write this is the SDR-14, Fig. 2 and Fig. 3, from a new American company called RFSpace. This can be used in two different modes of operation. One where the SDR-14 is used to tune frequencies up to 30MHz and the other mode allows it to tune to frequencies up to 200MHz. When I say tune here I don't mean this in the traditional sense, instead the d.s.p. within the SDR-14 selects the frequency selected from digital data representing the radio spectrum. When the SDR-14 is tuned to a frequency then 150kHz of the radio spectrum

around that frequency is 'transferred' to the PC through one of the PC's Universal Serial Bus (USB) connectors.



 The website of RFSpace followed through to the SDR-14 page.

An Example!

But these ideas are often best shown with an example! Lets say the SDR-14's user tunes it to 7.5MHz, then all the radio spectrum from 7.425 to 7.575MHz is converted into digital data and sent to the PC. As all this data is available to the PC it means the user could monitor a numbers station broadcast using a.m. transmitting on 7.45MHz a military station transmitting using s.s.b. on 7.55MHz and decode an RTTY broadcast on 7.5MHz at the same time using just one PC and a single SDR-14! Another amazing feature of the SDR-14 is that it allows you to record sections of the r.f. spectrum to hard disk so that it can be monitored later.

So, you could tune your SDR-14 to 14.1MHz in the morning and it will record everything in the radio spectrum between 14.025 and 14.175MHz to your PC's hard disk. Then, when you come home at night you can replay the recording just like you would a video tape. This way you can hunt for signals and even rewind the recording if you miss something. Mind you if you record 150kHz bandwidth of radio signals for a full day the resulting file will be rather large (48GB) but large hard disks are quite cheap now.

Incidentally, this recording of radio signals for later analysis isn't new the military have been using this technique for several years to help them locate brief transmissions such as those from submarines. But this is the first time that the hobbyist has had this exciting capability. The SDR-14 comes with software for demodulating common modes and displaying the radio data in different ways. But also RFSpace are keen to encourage other programmers to write programs that use the SDR-14 and provide the information needed to do this for free.

The last software radio available to hobbyists that I am going to mention isn't a piece of electronics like the WiNRADIO WR-G303i and SDR-14 it is called GNU Radio and is best thought of as a software toolkit. The idea is that

 The opening page of the website of

WINRADIO.

special type of program 'Drivers' will be written which can be used to connect any type of software radio to the GNU Radio toolkit. Then users can just write simple programs that connect the various software modules making up GNU Radio together, to make their own software radios.

At the moment these programs for the GNU radio project must be written in a programming language called C++, which isn't very easy for new programmers to learn. However it will soon be possible to write programs in a new easy-to-use programming language called Python.

Built Their Own

Some of the GNU Radio users have built their own software radios using old cable TV tuner circuits and connecting them to analogue to digital converter cards (normally sold for scientific experiments) that plug into their PCs. Using this system it is possible to digitise any 5.5MHz section of the radio spectrum and then to do anything with it inside the computer. Already one GNU Radio programmer in the USA has written a module that allows GNU Radio users to view digital High Definition TV (HDTV) pictures on their monitor screen. However many other things are possible. For instance every f.m. transmission in any 5.5MHz section of the radio spectrum could be monitored at the same time.

Or when the GNU Radio POCSAG pager decoding module is ready (someone is writing it now) it would be possible to program the tuner to 153MHz then decode every pager message transmitted in that frequency band simultaneously! But before you get excited the analogue-to-

digital converter card required for this project, presently costs over £1000. However, some of the GNU Radio project group are designing their own analogue to digital circuit that will be cheaper. This will connect to the latest PC's USB 2.0 connector and will allow possibly up to 30MHz sections of the radio spectrum to be processed by the PC. The other good news is that the GNU Radio toolkit can be downloaded for free and doesn't cost a penny to use. It isn't for everyone as you have to know something about programming to use it and it doesn't work with the Microsoft Windows operating systems. Instead it requires either Linux and possibly soon the latest Apple operating system OSX.

As you can see we have yet to see any of the major scanner manufacturers starting producing software radios. Perhaps this is because the technology required to produce such a receiver is very different from that in the traditional radio receivers they have produced in the past. So it will be interesting to see if they move into this field or if in the future it is dominated by some new companies.

You will all have probably guessed that I am pretty excited by the prospect of software radio and what it will do for the monitoring hobby. However, it isn't all good news and the hobby still faces problems. For instance, instead of just needing to buy a radio which you just pay for once, with software radio you will need programs and they may well cost extra.

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New Modes & Methods

Thanks to radio users using software radio new modes and methods of broadcasting will appear at a much faster rate than they ever have before. If you want to monitor these new modes then you will need new programs for your software radio and who knows what that will cost. Of course, this isn't certain to happen and if the GNU Radio project becomes popular then the new programs required for the new modes will be free.

The other problem monitoring hobbyists are increasingly having to face is that of radio users encrypting their transmissions and software radio won't help with that. For instance only a software radio can demodulate the complex $\pi/4$ d.q.s.p.k. modulation system used by the new Airwave Tetra system that is to be used by all of the UK's emergency services. Although it can extract the raw data transmitted, there is no way it can decrypt it so, even a software radio won't enable you to monitor your local Police again.

So, while software radio won't cure all of our problems it

does offer some exciting prospects. For the first time a hobbyist in his shack or spare bedroom is going to be able to work on demodulating new modes or making better filters without having to design and build electronic circuits or even buy electronic components. While software radio will require all those involved to learn new skills to use it, surely this is no different from when we moved over from valves to transistors and integrated circuits.

So there you have a quick explanation of a software defined radio, I hope it was of great interest to you. And I believe that in 10 years time radio monitoring hobbyists won't know how they coped in the past without software radio.

Do you want to know more about software radio? As software radio is a complicated subject, I have only been able to give you a brief introduction to it here. If you want to learn more, then I can recommend that you take a look at the ARRL's web page on software radio.

SWM

For general information about software defined radio see www.arrl.org/tis/info/sdr.html

For more information on the WiNRADiO WR-G303i see www.winradio.co.uk/home/g303i.htm

For information on the RFSpace SDR-14 look at www.rfspace.com/

For information on the GNU Radio project then see www.gnu.org/software/gnuradio/

Analogue-to-Digital Converters

If you're not familiar with the term, let's take at an example. A quick look into any electronic component catalogue reveals that there are hundreds of different types of analogue-to-digital converter integrated circuits (i.c.s) for sale. However, software radio usually requires very fast versions, that can sample the analogue input (in this case a radio waveform) very frequently. The frequency of sampling is defined by Nyquist's sampling theory, which says that you need to sample at least twice as fast as the highest frequency you intend measuring. This means in practice that if you wish to convert a 20MHz wide radio signal into digital information, then you need an analogue-to-digital converter i.c. that can sample at a rate of at least 40 million samples a second or faster.

Until quite recently, high speed analogue to digital converters were very expensive, but in the last few years prices have really started falling. Now converters that can sample at 80 million samples a second (so could digitise a 40MHz wide signal) are on sale for less than £20. So, Software Radio shouldn't be long coming to an outlet near you. We'll keep you up-to-date here in SWM.

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- Illuminated LCD and Keypad
- Optional slot cards for extended capabilities
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UPITERU MVT-3300EU



- VHF airband plus lots more inc. emergency
- 66-88/108-170/300-470/806-1000MHz
- 200 Memories
- 5 Tuning steps
- Fast scan speed
- Very sensitive
- Requires 4xAA cells (not supplied)
 Includes flexible antenna, earpiece and carry
- strap

YUPITERU MVT-7100

530kHz 1650MHz

- LSB, USB, AM, WBFM, NBFM
- 1000 Memory channels
- High Sensitivity
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- High Speed search & scan functions Battery save function
- Individual power/volume and squelch controls Free NiCad batts & charger, belt clip, earpied and telescopic antenna

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66 512MHz with gaps

5/12.5kHz channel steps

Data skip (lockout channels)

NFM, AM (Airband)

· 4.8V DC Int. battery BNC Flexible Antenna

100 memories



- **PSR-282**
- 66-88/118-137/137-174/380-512MHz Modes AM, FM
- Memories 200 (10x20)
- Search speed 50 steps/sec
- Scan speed 25Ch/sec
- 4xOne-touch search banks
- 8.33kHz steps in airband
- Audio 180mW into 8 Ohms int, spki





- · NFM, WFM, AM (Airband) 400 memories

• 530kHz - 2039MHz

1000 memories

25 tuning steps

500 Pass channels

- 10 Priority channels
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- 6V 600mAh Ni-Cd pack + AC charger
- **BNC Flexible Antenna** Leatherette case

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UNIDEN-BEARCAT UBC-280X

25 - 956MHz with gaps NFM, AM (Airband) 200 memories

Earphone

- 5/12.5kHz channel steps
- 4.8V 800mAh Ni-Cd power pack
- AC Charger
- BNC Flexible Antenna
- Earphone



UNIDEN-BEARCAT



· NFM, AM (Airband)

- · 200 memories 10 band coverage
- 100 Ch/sec scan speed · Priority channel
- 4.8V 600mAh Ni-Cd int

AC Charger
 BNC Flexible Antenna

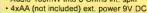














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UNIDEN-BEARCAT UBC-60XLT-2



66 512MHz with gaps

- NFM
- 80 memories
- 1 Priority channel
- 5/12.5kHz channel steps
- · Data skip (lockout channels)
- 4x AA cells (not provided) · BNC Flexible Antenna

Earphone



"BUDGET

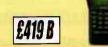
VALUE"

ALINCO DJ-X2000 "FABULOUS FE



- AM, NFM, SSB, CW 2000 memories
- 23 tuning steps
- Channel scope
- Fully programmable4.8V Ni-Cd battery pack
- 8-15V DC ext.
- Telescopic Antenna





UNIDEN BEARCAT **UBC-780XLT**



- 25-1300MHz with gaps · NFM, WFM, AM
- 500 memories
- · Analogue Trunk Tracking
- · Alphanumeric display
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 13,8V DC 700mA

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The new AR5000A now offers a frequency coverage of the entire radio spectrum that is practical to cover. The +3 version offers even more with synchronous AM (USB/LSB/DSB) AFC & Noise Blanker. *10kHz-3GHz *AM, FM, USB, LSB, CW *2000 memories *45 CH p/s scan speed *Audio 1.7W (8 Ohms) *Supply: 12V DC @ 1A



AR5000A AR5000A £1599 C £1799 C

YAESU VR 5000

*217x100x260mm *3.5kg

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100kHz = 2599MHz

DSP Noise & notch filters (Opt) Super HF performance Automatic Tape recorder option

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- Smart search feature
- · 8 char. alphanumeric display
- · Band scope
- PC programmable



YAESU VR-120D



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- Alphanumeric tags
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The Scout frequency recorder automatically stores frequencies as it locks onto them *10MHz-1.4GHz *Input: 50 Ohm *Sens:<3mV @ 150MHz *Measurement: 10mS *Records: 400 freqs *Display: LCD *Bargraph: 16 segments *Supply: Int Ni-Cads *Battery life: 8hrs *AC adaptor AC90 *Size: 94x70x30.5mm *Weight: 240g

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featured neal left receiver that displays nearfield analogue signals in spectrum format.

*30MHz-3GHz *FM Analogue *64x128 graphical display with white LED backlight *20 memory banks, 100 fregs in each *Sens: 100UV @ 100 MHz *Pwr: 8xAA alkaline or AC adaptor (optional) 12V DC 350mA

*Size: 203x108x2z.5mm

X-SWEEPER with GPS: £1699.95



ICOM IC-R5



- 150kHz-1310MHz
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- 1250 Memories Name Tagging
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- · Civil & Military

- **Emergency Services**

2xAA cells (extra) **ICOM IC-R3**

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Option only) "Antenna:
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PLT - When Technologies Collide

Lawrie Hallett G8VJH examines what could potentially amount to a very nasty source of r.f. interference for our hobby in the future. The use of the National Grid to supply Internet connectivity to the UK's homes.

fter many years as something of a technological backwater, radio frequencies below 30MHz are suddenly back in fashion. Digital broadcasting technologies such as Digital Radio Mondiale (DRM), and the increasing popularity of Amateur Radio may both be very welcome, but other developments could turn out to be very unwelcome indeed, threatening broadcasters (both analogue and digital) and amateurs alike. At the moment, Power Line Transmission (PLT) sometimes also known as Power Line Communications (PLC), the subject of this article, is the obvious example.

New technologies don't usually replace their established rivals immediately. If the upstart idea is successful (and that's a big if, as only about 1% of new products make the grade), then there is typically a period of transition during which the new supplements the old, thereafter, sometimes, but only sometimes, replacing it. A good example of an old technology is a.m. broadcasting, which was supposedly superseded, but in fact refused to disappear!

Within any industry therefore, the march of progress may not be entirely linear. However, things get much more complex when previously separate technologies collide. If the pressure for change is strong enough, this then becomes inevitable, but the process of change, once set in train, inevitably creates both winners and losers as priorities and established practices are revised and altered to accommodate the upstart technology. Of course the worst situation of all occurs when new and old technologies are simply incompatible with each other, compromise under such circumstances is next to impossible.

Rival Camps

Radiocommunications and telecommunications are two industries which, although historically related, are now increasingly being merged together in an increasing number of ever more complex relationships. Some of these interactions may be beneficial to both sectors, but others will inevitably cause bitter disagreements between the rival camps involved. PLT is one such technology, offensive to the established interests of the radiocommunications industry because it potentially threatens their core resource - the radio frequency spectrum. Quarrels between relatives are often of the worst kind and this one is shaping up to be pretty major!

Many readers will doubtless have a pretty good idea of what PLT technologies are, and of the potential threat which they pose to amateurs, broadcasters and the various other established users of the h.f. spectrum, but just in case, here is a quick overview before exploring the issue in more detail.

The idea behind PLT technologies is to earn extra revenue for



• Some claim that radio-noise levels are already so high that the effect of new sources is insignificant. The BBC has made various measurements to refute this argument. This photo shows BBC engineers measuring radio noise in the short wave bands in a typical suburban garden at a quiet remote site for reference.

power companies by making additional use of existing power grid networks to provide bi-directional, broadband, data links between households, businesses and the Internet. The technology is intended to provide an alternative 'last-mile' link to premises by installing Internet interface and PLT equipment in electricity sub-stations along with individual Internet connections for customers in the various premises which receive their mains supply from them. In addition to offering network access, PLT technology can also be used for home networking within a specific domestic building or business site.

At present there are two basic types of PLT system undergoing various trials. The first such system makes use of discrete blocks of frequencies, whilst the second takes a spread-spectrum approach. Both the RSGB and the BBC were given the opportunity to examine examples of both approaches, courtesy of Scottish and Southern Electricity which has been conducting field trials of both systems in the village of Crieff to the west of Perth in Scotland.

The example discrete frequency system installed at Crieff is manufactured by Ascom. This uses three blocks of frequencies for connections between the sub-station and individual properties, these being 2.4, 4.8 and 8.4MHz. Once signals have arrived at the premises transponder or 'Access Point' (typically located adjacently to the electricity meter), subsequent in-building distribution takes

place on a second group of three frequencies, these being centred on 19.8, 22.6 and 25.2MHz. The band-width used at each of these frequencies is thought to be in the region of 500kHz to 1MHz, but neither the roll-off characteristics of the modulation scheme, or the amount of filtering employed are apparent from the information available.

Documentation on the Ascom website claims great potential for their PLT system, known as 'Powerline Communications', stating that it "out-performs traditional broadband access such as cable and ADSL. The maximum bandwidth is increased to 4.5Mbps with the first systems available on the market. Prototypes are already available that deliver a bandwidth of between 20 and 40Mbps". (Ascom website document: Empowering Access Networking Business).

Ascom also claim that their system "is optimised for the data transmission over existing power distribution networks, providing maximum throughput at a minimal power level. The modulation design and the frequency assignments avoid interference from and to amateur radio and broadcast services". (Ascom website document: Welcome To The Second Invention Of Power).

The spread spectrum system under test at Crieff is manufactured by Mainnet and has been described as a 'direct sequence spread spectrum system'. A search on the Mainnet website didn't reveal very much technical detail about their 'Plus' system, indeed by comparison with the information provided by Ascom the site is pretty sparse. However, what is clear from the website is that the system uses the same frequencies for both sub-station to premises connections, and for internal networking within a particular building. As a result, there is no 'gateway' at each property which would otherwise be needed for frequency transposition. The Mainnet system does however use repeaters to boost signal levels over longer paths. The Mainnet Plus approach is described as "completely different from the traditional one of sending the strongest possible transmission signal in order to reach the end user... each unit sends the lowest possible signal required to reach the next point. The system employs smart-repetition and uses the attenuation of the electricity lines in order to create 'cells' similar to those used in cellular systems, enabling the different units to efficiently use the same frequencies while preventing collisions".

There may of course be other approaches to PLT in addition to the two briefly described here. However, the fundamental problem with the underlying approach of all PLT systems using mains wiring as the bearer (and regardless of the modulation scheme used) is one of physics! Cable infrastructure designed to carry a.c. mains voltages at 50 to 60Hz is simply not suitable for carrying signals at the higher (radio) frequencies involved. In fact, at radio frequencies such wiring behaves very unpredictably, typically acting as an unplanned, random antenna with all the unfortunate consequences that entails in terms of the potential for interference and the resultant degradation caused to broadcast, amateur and other radio signals.

It is perhaps worth mentioning at this stage that there exists also other similar technologies to PLT, such as xDSL systems, which use telephone cabling instead of mains wiring to make the link into individual properties. One such example is ADSL systems with carrying capacities of around 0.5 to 1Mbps and working at frequencies below 2MHz. These are being successfully rolled-out in the UK and elsewhere with little apparent interference occurring to radio based services as a result.

Fundamental

There are however some fundamental differences between telecomms lines and mains wiring, which make xDSL services inherently somewhat easier to control. Telecomms infrastructure typically employs fairly straightforward end-to-end wiring (no rings and spurs) which can easily be isolated at both ends of the path concerned, plus there is the consideration that they do not carry high voltage, high current electricity at the same time as voice and data traffic! Filtering at both ends of the path can typically be

implemented fairly easily, and because of this separation, power levels set on a per circuit basis, thus further reducing the resultant interference potential. Compare this to data carried over mains wiring, where filters would need to be able to cope with full household current loads, whilst suppressing both differential and common mode PLT signals! Not cheap or easy to produce and there's still the issue of radiated interference to deal with!

In the UK, the Radiocommunications Agency (now part of Ofcom) very quickly implemented regulations (in the form of the MPT1570 standard applying to frequencies below 1.6MHz) which seem to have proved very successful since their introduction in January of last year. Of course in future, other technologies may emerge which could also have adverse impacts on the radio spectrum. More immediately, it may well be that emerging xDSL specifications, which use higher bearer frequencies, such as the various VDSL high capacity systems currently being developed, may become more problematical, but at the moment it is certainly PLT systems which appear to pose the greatest threat.

As far as operating frequencies are concerned, it is the spectrum between approximately 2 and 12MHz that presently seems most at risk. Because long wave and medium wave frequencies are relatively low and thus liable to interference - particularly in the form of impulse noise from appliances, etc. For PLT systems there can also be problems with the ingress of strong broadcast into electrical cabling (if cable systems leak out, they can also let other signals in!). As a result, such frequencies have tended to be avoided by systems tested in the UK to date. Frequencies that are too high also present problems because the attenuation of mains networks increases with frequency. This is why for example, the Ascom system uses frequencies below 9MHz for wide area signal distribution and frequencies above 19MHz for shorter range inhouse signals. Of course, because network attenuation is much less of a problem over very short distances, developments in PLT like technologies may even use higher frequencies, above 30MHz in future.

All About Protection

In the end, it all comes down to protection ratios. For any broadcast signal to be successfully received and demodulated it needs to be sufficiently stronger than the background signal levels on the frequency concerned at the particular location involved. Unwanted energy on a particular frequency equates to increased 'background' signal levels. Should the level of unwanted energy become too high then the difference between the wanted and unwanted signals (the protection ratio) will become too small and the wanted signal will degrade and eventually cease to be receivable.

The audible results of the presence of PLT interference on a broadcast signal are dependent upon both the scale of the interference and the nature of the broadcast signal involved. In the case of traditional a.m. signals, the interference will degrade the quality of the broadcast audio signal proportionally. The greater the level of interference, the more damage to the audio that results. At low levels of interference minor distortion and increased background noise are the result, but beyond a certain level, the broadcast audio is simply swamped by the interference and becomes totally unlistenable as a result. In the case of digital signals, such as DRM, error correction will prevent the interference becoming a problem up until the point at which it becomes too strong and the error correction is no longer adequate. After this point the result is simply silence! The receiver can't resolve the digital data stream and simply gives up and mutes, until the interference reduces or the broadcast signal gets stronger.

The behaviour of digital radio systems under interference conditions could prove to undermine its wide scale introduction should PLT systems be rolled out. Listeners purchasing such equipment and then going home to find silence emanating from their loudspeakers are unlikely to blame interference from a technology they've probably never heard of and don't understand. Far more likely, they will simply take the equipment back to the

continued on page 36

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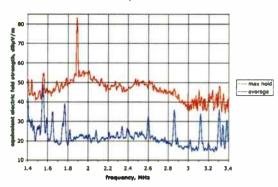
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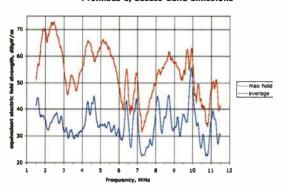
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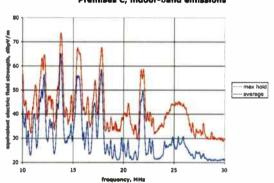
Premises C, access-band emissions



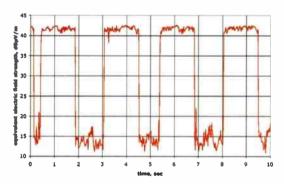
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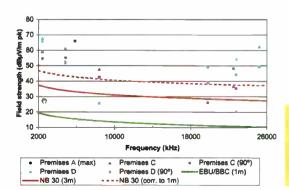
Premises C, indoor-band emissions



Premises C, cyclic emissions at 4.8MHz



Emissions compared with limits



- Fig. 1: A broad spectrum, apparently centred just above 2.4MHz can be seen. The reason for the second peak at about 2MHz is not obvious, unless perhaps resonances in the mains wiring happen to have placed a partial notch in the vicinity of 2.3MHz, this giving the appearance of two.
- Fig. 2: The confirmation of the existence of bands in roughly the expected places, with some minor dips and peaks - perhaps the dips are resonance effects in the wiring as suggested in Fig. 1. Some odd peaks are unexplained, as they do not appear to correspond to expected PLT operation or to broadcast frequencies.
- Fig. 3: Here you can see that many broadcast signals were present during the testing in the 12, 13, 15, 17 & 21MHz broadcast bands. The wider 'humps' corresponding to the indoor-band' PLT emissions at 19.8, 22.8 and 25.2MHz are visible, the last being the most prominent.
- Fig. 4: A consumer receiver tuned to the centre of the 2.4MHz 'access' band. Here the measurements were made whilst deliberately tuned in to the PLT signal to obtain an aural signature. This takes the form of regular rhythmic bursts with a slight 'chirrup' separated by silence, with a period of roughly 2.5s. This was checked by tuning the spectrum analyser to the 'access' bands while set to 'zero span' and 1kHz resolution bandwidth, so that it functioned similarly to a tuned receiver connected to an oscilloscope. The plot clearly confirms the periodic behaviour noted 'by ear'.
- Fig. 5: The various spot frequency indoor emissions measurements made during the compilation of the BBC R&D white paper WHP067 using the receiver's peak detector with various limit curves superimposed.

shop it was purchased from, complaining that the newfangled technology doesn't work! Take what happened with digital terrestrial television (DTTV) as an example. For a variety of reasons the effects of impulsive interference were greater than expected and uptake of the system suffered as a result. Most people who encountered problems simply thought their equipment was faulty!

In an ideal world, the solution would be simple, to compensate by boosting the level of wanted signal. However, in reality this is rarely a practical solution. For broadcasters using high-power transmitters there are strict internationally agreed power limits to ensure that signals from different broadcasters do not cause interference to each other. Of course, there is also the not insignificant issue of operational costs for such broadcasters - even a relatively small 3dB increase in radiated power is not cheap at the multi-kilowatt level! In fact the gulf may typically be well in excess of 10dB! It follows therefore, that, if allowed, such increases in power usage would not only be ridiculously expensive in monetary terms, in addition they would also have a noticeable impact on the world's power consumption totals!

For the radio amateur, sometimes part of the challenge is to use as little power as possible, and, as with broadcasters, strict power limits exist. Essentially, it is logical to argue that for a variety of reasons (with regard to efficiency, environmental impacts and, not least, simple practicality) minimising radiated energy from interfering sources is a more sensible approach than simply entering into some kind of 'power race' to overcome increases in interference.

It is in the nature of PLT systems that they need to be reasonably powerful in order to work properly, not least because they need to overcome the inevitably 'lossy' nature of the cable bearer over which they operate. A modem fitted at a particular sub-station sends and receives signals which flow over the same routes as the electricity supply which the sub-station was originally constructed to supply. This means that the modem is

inevitably connected to all 'down-stream' properties and that power levels employed need to be set so as to ensure that sufficient signal levels reach each of the properties requiring a connection. One inevitable side effect is that all properties supplied by the sub-station in question will receive a signal whether the customer intends to use the signal or not!

From a radio perspective one rather strange aspect of the whole PLT debate is why it ever began in the first place!
Governments around the world are paid up members of the International
Telecommunications Union (ITU). The

Radio Regulations of this body take the form of a binding international treaty, which, amongst other things, calls upon all signatory administrations to prevent unnecessary interference being caused to radio signals. A key passage within the regulations is Article 15, Section II which states that administrations "shall take all practical and necessary steps to ensure that the operation of electrical apparatus or installations of any

Between 12 and 13 November 2002, BBC Research and Development were offered the opportunity by Scottish & Sourthern Electricity (S&SE) to visit PLT equipped premises in Crieff and perform some limited testing and mearurments. Here are some of the plots produced.

kind, including power and telecommunications distribution networks,...does not cause harmful interference to a radiocommunications service".

Numerous pieces of national and international legislation are also intended to prevent unnecessary electromagnetic radiation. The previously mentioned *MPT1570* is just one of many relevant documents here in the UK, and at a European level there is also the EMC (Electro-Magnetic Compatibility) Directive (89/336/EEC).

What Is Interference?

Despite such legislation, this is where things get messy... What exactly is meant by 'interference'? If preventing its occurrence was to be seen as the number one priority, we certainly wouldn't be able to use fluorescent lighting in our homes and offices! Inevitably, it comes down to a matter of degree. Processes using electricity have the capacity to cause interference even when working properly, and so, a draconian approach to interference prevention would place severe constraints on the development of new technologies, products and services, something which would be both politically and economically unacceptable. Thus, limits have to be set which balance the various priorities such that in effect there is an acceptable level of interference allowed associated with technologies such as PLT and xDSL. Limits have to be defined so that equipment and installations can then be measured against them to ensure that systems are working within acceptable parameters.

Not surprisingly therefore, there is a great deal of ongoing discussion about to what degree PLT systems should be permitted to radiate energy on radio frequencies. Proponents of the system are understandably interested in securing limits which maximise the usability of their systems with the minimum of cost implications. Existing spectrum users (including amateurs, broadcasters and the military) are, just as understandably, not concerned with such issues but rather in ensuring that the absolute minimum of detrimental impacts are caused to their various existing operations.

At present, the sorts of levels being debated by the various forums concerned all seem to favour the introduction of PLT technology at the expense of current h.f. spectrum users.

As a result of such divergent interests, agreement on radiation limits are, not surprisingly, hard to come by. At the European level, a CENELEC/ETSI joint working group established in October 2001 published a status report in June 2002 which considered, "the question of the radiated limits for which various proposals have been submitted with a relatively large dispersion", to be the main sticking point preventing agreement. More recently, and closer to home here in the UK, a British Standards Institute (BSI) working group has also been established (Sub-committee GEL/210/11/2) to consider the issue. As a result, in November 2003, the Institution of Electrical Engineers (IEE) wrote to BSI setting out its position, stating "The IEE suggests that pending further scientific research about the impact of PLT on other radio services, and despite the pressures, it is premature to try and define either field strength or conduction standards to regulate PLT".

Assuming it can in fact be done, defining such limits for the operation of PLT systems is just one of the difficulties! Even if such limits can be agreed between system proponents and established spectrum users, there is then the by no means small matter of how such limits are to be measured. As but one example, how far from a radiating element should signal levels be measured? In the case of the UK's MP1570, the distance chosen is one metre, making it perfectly possible to take readings within a domestic dwelling. An alternative suggestion is to use a distance of three metres, in which case finding a measuring point in domestic locations could prove a great deal more tricky with electrical cables possibly in the floor and ceiling, as well as the walls!

The Future

Given the inherent technical problems associated with PLT infrastructure, it is of course possible that a major roll-out of such systems may never occur. Other technologies may emerge which

offer greater capacities and flexibility without so much in the way of unwanted negative side effects. However, for existing radio users, protection of the spectrum should not simply be a matter of hoping that such a 'market decision' emerges as the saviour of the airwaves. Lobbying and campaigning is typically a time consuming and thankless task, but one which is often essential. Organisations such as the RSGB and the BBC need to be supported in their efforts to protect the spectrum, not just from PLT but from other, yet to be invented, systems which could seriously damage a unique resource in future.

Since the end of last year (2003) UK regulation of the radio spectrum has been the responsibility of Ofcom, the new 'joined up' super-regulator, which has taken over the role of the Radiocommunications Agency, as well as the Radio Authority, the ITC and Oftel. In tackling the issue of PLT, Ofcom will have to balance the interests of both sides of the argument, spectrum users and telecommunications companies alike. If, as seems likely, power companies continue to push for the widespread introduction of PLT technologies, there will inevitably be both winners and losers as the result of new regulation.

Further Reading

BBC Research and Development background paper covering the potential impact of both PLT and xDSL systems.

www.bbc.co.uk/rd/pubs/pdffiles/hf2000jhs.pdf

Report of BBC R&D site visit to Scottish and Southern Electricity PLT test installations at Crieff (links here also to sample audio recordings). www.bbc.co.uk/rd/pubs/whp/whp067.html

RSGB website PLT Index Page. www.rsgb.org.uk/emc/pltnew.htm

Report of RSGB site visit to Scottish and Southern Electricity PLT test installations at Crieff.

 $www.qsl.net/rsgb_emc/CRIEFF\%20Notes\%20Version_1.html$

Letter to European Commission from German DX Club - Assoziation deutschsprachiger Kurzwellenhörer (in English).

www.addx.de/plc/EU-04-01-14.pdf

Powerline-PLC Info - Austrian amateur site focusing on PLT issues and including various videos (site in English).

www.powerline-plc.info/index_en.html

Ofcom - MPT1570 - Radiation Limits and Measurement Specification. Electromagnetic radiation in the range 9kHz to 1.6MHz from material substances forming part of a telecommunication system (January 2003).

www.ofcom.org.uk/codes_guidelines/radio_comms/interference_cg/?a=87101

Ofcom UK Technical Working Group (TWG) on Compatibility Between Radio Services and VDSL + PLT Systems Operating between 1.6 and 30MHz.

www.ofcom.org.uk/static/archive/ra/topics/interference/ documents/dslplt.htm

Main.net Communications website.

www.mainnet-plc.com

Ascom Powerline website (Select 'Powerline Communications' from the drop-down box marked 'Ascom world-wide').

www.ascom.com

PLC Forum - Representing the interests of manufacturers, energy utilities, etc. with regard to PLT/PLC systems.

www.plcforum.org

For a 'clickable' version of these links, visit www.pwpublishing.ltd.uk/swm/PLT/

SWM

Upgrading the Acorn1 Short Wave Receiver

The Acorn 1 first appeared in SWM January 1994 and we recently had some enthusiastic calls from readers who were still eagerly awaing the expansion details promised some ten years earlier. Robert A. Wilson FRSA takes up the thread.

t is some years now since my article on the Acorn 1 single valve short wave receiver appeared in *Short Wave Magazine*. Several weeks ago, I found it at the back of the garden shed whilst having a clear-out. I found that, despite a coating of rust on the tuning capacitor, it still worked. So, I decided to upgrade it, first adding an r.f. amplifier and then an audio output stage.

I prepared for this upgrade during the building of the prototype by leaving two large spaces in the receiver to accommodate the two additional valves.

Fig 1. shows the completed upgrade with the three stages separated by dotted lines. The component numbers of the original detector stage have been left unchanged and the numbers for the two extra stages carried on from there. Hence the reason for the valve line-up following the unusual form of V2, V1 and V3. This was done for the sake of continuity.

RF Amplifier

The first upgrade is that of the radio frequency (r.f.) amplifier which comes before the original detector stage. I chose a 954 acorn pentode for this function. This valve only differs in looks from the 955 by the addition of top and bottom connections which are anode and control grid respectively. Physical and theoretical details of this valve are shown in **Fig. 2**.

Ideally, r.f. tuning would be via a second, and identical,

gang to the original tuning capacitor, C2. Replacing C2 with a twin-gang capacitor would involve much more rearranging, as well as added expense. Another choice would be to use a single gang capacitor identical to C2 and tune both stages independently. I discarded this idea for a cheaper option. Stepped r.f. tuning is now performed by S1, a single pole, 12-way rotary switch with twelve capacitors of ascending value wired around its contacts. This has proved very effective and both switch and components are readily available at modest cost.

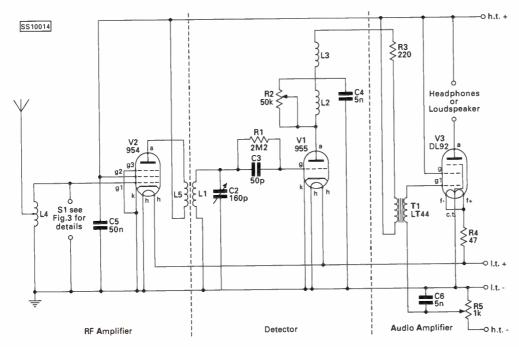
The wiring of the back of the switch is shown in Fig. 3. The capacitors are all of the small disc ceramic type. Solder one lead of each capacitor around the switch contacts from 1 to 12 in ascending order as shown. I used a Maplin rotary switch, the contacts of which are conveniently labelled from 1 to 12. You need to form a wire ring of fairly heavy gauge wire with a circumference slightly larger than the ring of capacitors. Solder the remaining lead of each capacitor to this ring. This switch forms a simple stepped variable capacitor ranging from 8.2pF up to 180pF. The connecting points 'X' and 'Y' are left unconnected for the moment.

The diameter of the wire ring has no significance at all. It is simply used to join up the outer capacitor leads and its size is determined by the size of the switch and the capacitors.

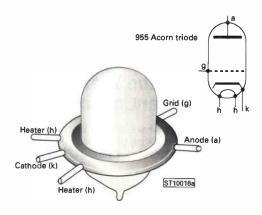
Remove the antenna trimmer C1 together with all its wiring from the original receiver. This is now redundant and

C1 ceases to exist in the upgraded receiver. Fit S1 into the hole vacated by C1 antenna trimmer.

An r.f. tuning coil, L4, must now be wound for the r.f. stage. It is wound on an identical sized former to that of the grid coil L1 in the detector stage. Constructional details are shown in Fig. 4. It has the same number of turns, but is centre-tapped using the method shown. It is placed just behind the rear terminal panel behind the antenna and earth terminals. Although it may be glued down, mine is simply supported by its wiring. The lower connection is taken to the nearest convenient earth point on the chassis. In the case of the prototype, this is a solder tag directly beneath the earth terminal on the original receiver. The centre-tap is taken directly to the antenna connection on the terminal panel, from which the original C1 antenna trimmer



• Fig. 1: The complete circuit diagram.



954 Acorn Pentode

93

91

Supressor
grid (g3)

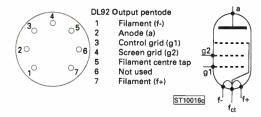
Screen
grid (g2)

Cathode (k)

Control grid (g1)

Anode (a)

• Fig. 2: The valve details.



wiring has been removed. The positioning of L4 is shown in Fig. 5. S1 may now be wired in. Take the wire ring connection, 'Y', down to the nearest chassis solder tag. Take the central connection, 'X', across to the top connection of L4. The remainder of the r.f. stage is not at all invasive of the original design.

Before work is started on the r.f. amplifier itself, a coupling coil, L5 must be wound around L1. It is not nessecary to remove L1 to do this. Drill two small holes close together in the end of the former. These holes can be seen clearly in Fig. 6. Thread a length of thin insulated wire in and then back out of these holes. Leave a length of about 75mm protruding. This will later be connected to V2. Thread the wire around L1, allowing it to lie between the turns of L1. I used white wire for this and it can be clearly seen in Fig. 6 (bottom left). When you come to the end, put a spot of adhesive on it to stop it springing off and solder the tail of the new coil to the h.t. positive terminal.

The actual r.f. amplifier is very simple. Apart from the two new coils, L4 and L5, it consists only of the 954 acorn valve and one capacitor, C5.

The amplifier is fitted to a wood base measuring 63 by 50mm and about 18mm thick. This thickness of the board is necessary to accommodate the bottom valve connection. Fig. 7 shows the amplifier board. The ceramic valve holder is identical to the one used for the 955 detector valve. It is screwed to the board with the three connections at the bottom and a solder tag is placed beneath each of the two fixing screws. A hole must be drilled in the centre of the valve holder to accommodate the lower valve connection. This must not touch the chassis. A thin wire is carefully soldered to the base pin of the 954 valve. This is the connection to the control grid. The valve is placed in the holder and the wire from the lower pin cut to length and soldered to the rim of the solder tag on the right of the board. Another thin wire is soldered to the top pin of the valve which is the anode. This is soldered to the tag on the second fixing screw on the left side of the valve holder.

The connections are coded as follows: h = heaters, k = cathode, g1 = control grid, g2 = screen grid, g3 = suppresser grid, a = anode. Three small holes are drilled in the corners of the board in positions X, h.t.+ and CH. Three small p.c.b. pins are inserted into these holes to act as anchoring points

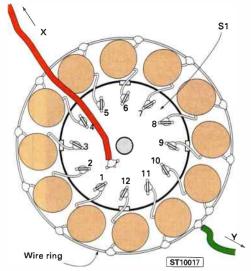
for the wiring. h.t.+ and X are joined together by a single wire and X is also connected to g2. h, k and g3 are also connected together and on to CH corner pin. A 50nF capacitor is wired between g2 and g3. I used 50nF simply because I had one handy, but see from various electronics catalogues that this no longer seems to be a popular value. If you are unable to find one, a 47nF capacitor will work just as well.

The board may then be placed in the space left behind

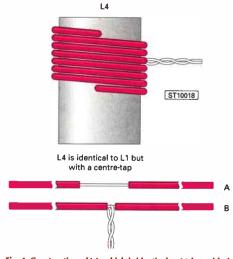
the variable capacitor as shown in Fig. 6. It could be glued down, but I left it supported by the wiring which is more than adequate. The 50nF capacitor goes next to the tuning capacitor. The points X and h.t.+ are to the right of Fig. 6 and CH to the left. In this way, the wiring in of the board is very simple. Connect the free end of the newly wound coupling coil L5 (white wire) to anode connection 'a'. The control grid (g1) connection opposite goes across the receiver to the top of L4. h.t.+ is taken direct to the solder tag on the terminal panel to which the h.t.+ lead to the battery is connected. CH takes the ioined up heater and cathode connections down to the most convenient chassis solder tag. The remaining heater connection (h) on the valve holder is taken direct to the l.t.+ solder tag on the terminal panel.

The point 'X' is left unconnected at the moment. It will be used later as a convenient h.t. pick up point for the audio (a.f.) amplifier.

The set is now ready for testing. Connect antenna and earth, plug in the headphones and connect up the l.t. battery. Both valves should light up. If only one, or neither of them light,



• Fig. 3: Wiring of S1, r.f. tuning switch (viewed from back).



• Fig. 4: Construction of L4, which is identical to L1 but with the addition of a centre tap.

continued on page 42



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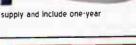
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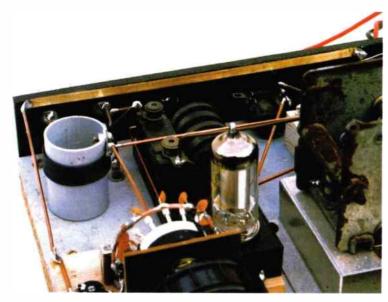




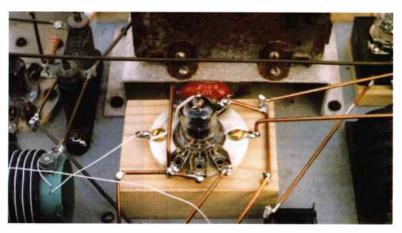
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• Fig. 5: Positioning of L4 and the extended h.t.- line.



• Fig. 6: The r.f. amplifier and the coupling coil L5 (white winding).

check the heater wiring before continuing. If they do both light, connect up the h.t. battery.

Place S1 somewhere near its central point. Tune a station in with the main tuning, adjust the reaction control and finally peak up the volume with S1 coarse r.f. tune control.

The addition of the r.f. amplifier does increase the gain (volume) of the receiver, but not by any great amount. It does, however, improve the smoothness of the reaction control and makes the receiver more sensitive to fainter signals.

Once the receiver is functioning with two valves, work may begin on the audio (a.f.) amplifier. This will dramatically increase the output volume of the receiver.

AF Amplifier

When the time came to decide on what a.f. amplifier valve to use, I chose a DL92 battery output pentode. This type of small valve was popular in the 1950s and 1960s as an output valve for a number of the small suitcase-style battery portable designs. It has a directly heated filament which only requires 1.4V and takes a current of 100mA. As a 6V battery is used for the heaters of the 955 and 954 acorn valves, a dropping resistor must be included in the filament line to reduce the 6V to 1.4V.

This type of valve fits a B7G seven-pin chassis-mounting valve holder. I took a small plastic box 28mm square and about 15mm deep. This was cut from the bottom of a plastics container, which held cocktail sticks. The lower part of the

box, from which the valve mount was cut, is a dark maroon colour, whilst the top is clear. A hole was cut in the end of the box to fit the B7G valve holder and five small holes were drilled in the lower sides of the box. The wiring of the mounting unit is shown in Fig. 8a and Fig 8b. The diagram Fig. 8a shows the box viewed from the underneath with the valve holder in position. The position of the five small holes is indicated by g1, h-, h+, g2 and a. Although there are seven pins on the valve, number six is not used. Join pins 1 and 7 together. Solder the dropping resistor, R4, to pin seven and thread the other end out through the h+ hole. This resistor has a value of 47Ω and should be at least 0.5W. In dropping the surplus 4.6V across itself, it dissipates 0.47W when passing a current of 100mA. The remainder of the wiring is straightforward as in Fig 8a. The mounting unit viewed from the top is shown in Fig. 8b as it will look when fitted into the receiver and seen from the front.

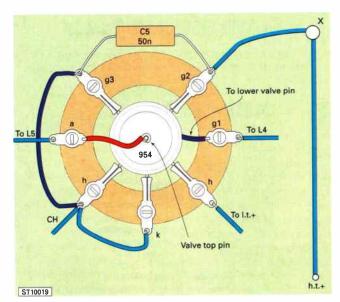
All the components for the a.f. amplifier are mounted on a small wooden baseboard 63 by 38mm and 8mm thick. This is shown in Fig. 9. Glue the valve mounting unit to the right of this board with the output leads as shown. Twelve small holes are drilled into this board and fitted with small p.c.b. pins. These act as both anchoring points and connecting points to the body of the receiver. I have only indicated two of them in Fig. 9. for the sake of clarity. They are represented by the black spots. The small transformer, T1, has two small metal mounting tabs on the bottom. These are inserted into two more small holes. One side of the transformer has three wires leading out, whilst the other side has only two. The side with three must point away from you. The centre wire is not used and is shown cut off short in Fig. 9.

The small preset potentiometer R5, has three mounting tabs which would normally be soldered into a printed circuit board. In this case, they are glued into three holes in the a.f. board, and the soldered connections made to the upper parts which are above the board surface. Only two other components are on this board, R3 and C6. Both are soldered to two p.c.b. pins. The wiring is straightforward. I have shown the wire linking g2 to T1 outside the board for clarity. It actually tucks neatly under the outside edge of R3 and can be seen in Fig. 11.

You may have noticed that there are two leads labelled CH (Chassis) on the board. There is no reason why these could not have been joined together on the board and just one taken down to a chassis solder tag. The simple explanation is that I did not notice it when the circuit was evolving!

Before the board can be wired into the receiver, there are three small alterations to make to the set itself. The DL92 mounting unit requires a filament supply of 6V positive (the dropping resistor inside the unit reduces this to 1.4V). The nearest and most convenient point is the positive heater pin on V1 which is on the other side of the set. I took a piece of 13mm square section wood, 138mm long and glued it to the base of the receiver in front of the main tuning capacitor C2. On top of this, I then glued a strip of flat brass. A wire was taken from the positive pin of V1 to the right hand end of the brass strip. This forms a solid l.t.+ line across to the vicinity of V3. Make sure that the brass strip is clear of the tuning capacitor's aluminium mount which must not be allowed to short-circuit it to the chassis. This l.t.+ line is clearly shown in Fig. 10.

The h.t.- line must also be altered. Where it is taken through the terminal panel and connected to the chassis by a solder tag in the original receiver, it must be disconnected. Glue a flat strip of brass along the inside of the top of the terminal panel and extending across the back of the receiver to the end of the panel. Solder the disconnected h.t.- lead to the right hand side of this strip. This strip carries the h.t.- line



• Fig. 7: Physical wiring for the r.f. amplifier.

across to the other side of the receiver for convenient connection to the a.f. amplifier.

Finally, disconnect the wire between the end of L3 and the headphone jack.

The a.f. board may then be placed in position on the left hand side of the main tuning capacitor C2 ready for wiring. I did not glue it to the chassis as the wires are more than strong enough to hold it firmly in position.

If the switch S1 makes things awkward, remove it temporarily as it only has two connections. Both the CH points are taken down to the nearest convenient chassis solder tag. h+ on the a.f. board is taken to the end of the extended l.t.+ line. The lead from R5 is taken to the extended h.t.- line on the terminal panel. The open end of R3 is taken

to the free end of L3 which has just been disconnected. The 'A' connection is taken to the vacant connection on the jack socket which you have just disconnected from L3 and the G2 connection is taken across to point 'X' on the r.f. amplifier board. Replace S1 (if you took it out). The positioning and wiring of the a.f. amplifier board is clarified by Fig. 11. The set is now complete and ready for testing.

As the DL92 valve is directly heated and has no separate cathode, it is no longer possible to use a 6V transformer for the heater/filament supply (l.t.). If you were to use one, it would not damage the DL92, but you would be overwhelmed by a very loud 50Hz mains hum! I used a 6V rechargeable lead acid battery. You will probably not be able to observe the DL92 light up as it emits only the faintest of glows when viewed from the correct angle in total darkness.

Plug in headphones and connect antenna and earth. I found that although the set works with 27V of h.t. it is not very loud. In order to get the most out of it, about 54V is required for h.t. This means that six small 9V batteries

must be connected in series. This is not necessarily an expensive exercise. I recently purchased six of these batteries from a 'cheap' shop for £2. They came in packs of three for £1 per pack!

I found that the set picked up a number of stations at loudspeaker strength and it was necessary to reduce headphone volume by either turning down the reaction control, or moving S1 off its optimum position.

After the initial testing, it is necessary to set the grid bias on the DL92 output valve. The DL92 requires -7V on its control grid. This can be adjusted by R5. The anode current through V3 has to flow through R5 and this produces a voltage drop across it. The slider of R5 is used to take off the required -7V which are applied to the control grid through the secondary winding of T1. If you have a high impedance electronic multimeter, connect the positive probe to the chassis, and place the negative probe on the g1 pin on the DL92 mounting unit. Adjust R5 until you get the required 7V

reading. If you have an older multimeter with a low input resistance, this method will not be as accurate as the resistance of the meter itself will upset the adjustment.

If this is the case, connect the meter in

g1

(a)

Grant DL92 mounting

g2

a

g1

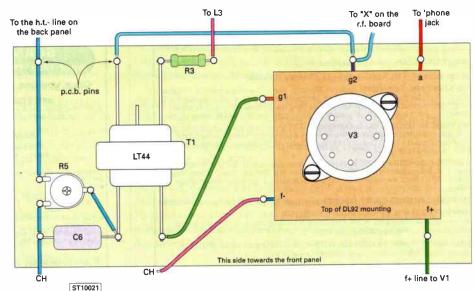
Top of DL92 mounting

This side towards the front panel

 Fig. 8: The mounting of the DL92 audio amplifier valve.

the h.t. positive lead to the battery whilst set amplifier valve. on a low mA range. Adjust the h.t. battery drain to about 8mA. If you do not adjust the grid bias, the set will still work, but if you do not have sufficient bias on the DL92 grid, you will not only run the h.t. battery down a lot quicker, you will also, eventually damage the valve!

At different times of day and night, I have picked up a



• Fig. 9: Wiring diagram for the a.f. amplifier section.

number of Spanish stations, several from the USA, one from South America, another from South Africa and last, but not least, one from as far away as Hanoi.

You must not expect amazing results from this receiver as it is very basic, but it certainly gave me a lot of satisfaction developing the circuit by a mixture of theory and trial and error. If it is not selective enough for you, this can (in theory)

continued on page 45

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• Fig. 10: Constructional details.



• Fig. 11: The switched capacitor r.f. tuning assembly.

be improved by having less number of turns on L5 and having the centre tap on L4 lower down the coil. The downside of this is that you will lose volume.

If you wish to use a loudspeaker, it must have its matching transformer with it. (This is often bolted to the speaker frame itself). Even now in 2004, it is fairly easy to pick up an old valve radio set on car boot sales for a few pounds. They are a splendid source of loudspeakers, tuning capacitors and other components. Especially the small suitcase-style battery sets previously mentioned.

Components & Valves

Apart from stripping old radio sets, the components and valves of the 'Acorn 3' are still commercially available. The three valves and valveholders may be obtained from Valve & Tube Supplies, Unit 2A, Industrial Estate, Rink Road, Ryde, Isle of Wight PO33 2LT. Tel: (01983) 811386. If you have access to the Internet, plenty of other valve and vintage component suppliers can be found via the search engines. The remainder of the components may be obtained from the well-known Maplin Electronics mail order firm who also have branches in many major towns and cities. In the circuit, I have used two capacitors with values of 50nF and 5nF respectively for C5 and C6. These do not seem very popular values nowadays, but preferred values such as 47nF and 4.7nF will work just as well.

Although the set now has a much higher h.t. voltage, it is still well within safe limits and the worst shock that you could get from it would only be a slight 'tingle' in the finger tips, if that.

The front panel of the receiver was removed during the upgrage. Before replacing it, the 'Antenna Trimmer' control should be re-named 'RF Tune'.

Historical Note

Acorn valves were developed in the mid to late 1930s for v.h.f. use before the advent of transistors. They were highly effective and could cope with frequencies as high as 400MHz, but being physically small, there were problems in their manufacture.

There are still a surprising number of them around, and not long ago, my wife came home from the market with a jam jar full of them at a cost of a couple of pounds. The 954 used in the circuit described was purchased "New and boxed", from Valve & Tube Supplies. The listing on the surprisingly new-looking box was US - Army, US Navy, Tung Sol Lamp Works Inc, Acceptance Date December 1943.

The DL92 type output valve was very common in the 1950s and 60s in the small battery portables previously mentioned. I still see them from time to time on car boot sales. When closed up, they are not immediately recognisable as radio sets at all. Typical measurements are nine by nine by four inches. They were completely self-contained with internal l.t. and h.t. batteries and a frame aerial in the lid. They make a good source for battery valves, variable capacitors, loudspeakers and other useful components. I never pay more than £5 for these radios and still find them a delight to behold.

You Will Need:

RF Amplifier

Qty I	Com	ponent	
-------	-----	--------	--

Acorn pentode valve Nr. 954

1 Valveholder for 954 valve

Capacitor 50nF (C5)

Single pole, 12-way rotary switch (S1)

Coil former for L4

12 Ceramic capacitors (See Fig.3 for values)

Suggested Source

Valve & Tube Supplies (See text)

Valve & Tube Supplies (See xext)

See text

Maplin Electronics

See text

Maplin Electronics

AF Amplifier

Qty Component

1 Output pentode valve Nr. DL92 (V3)

B7G valveholder for above

1 Audio transformer LT44 (T1)

1 Capacitor 5nF (C6)

1kΩ Submin preset potentiometer (R5)

1 47Ωresistor 0.6W (R4)

220Ω resistor 0.6W (R3)

Suggested Source

Valve & Tube Supplies (See text) Valve & Tube Supplies (See text)

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OfftheRecord

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et me begin by saying thanks to Tommy Rivers who wrote from County Limerick in Ireland to say that he enjoys reading this column. He mentions that he has fond memories of visiting some of the offshore radio stations and also that during the past two years he has been presenting programmes on a free radio station called Estuary Radio 107.8 f.m. Unfortunately, the station has had a visit from the Irish authorities and much of its equipment has been confiscated.

I am not sure of the exact date on which this occurred, but Tommy has also sent me some press cuttings which indicate that the general listening public have been very displeased at the removal from the air of several stations, which were obviously very popular and serving a useful purpose. Local government officials have been deluged with complaints about the closures and a support group has been formed by listeners to campaign for the stations to be able to return and continue broadcasting.

Ireland is often considered to be a place that is less hostile than most to free radio stations, but from time-to-time bad news emerges from over there as the raiding authorities (known as 'ComReg' these days I believe) have a blitz and visit a number of stations in a short space of time. When this does happen, any stations not raided also tend to close down anyway as a precaution.

Recent History

Looking back several years the legal position in Ireland was unclear, and this gave rise to many free radio stations including the so-called super-pirates like Nova and Sunshine. These stations proved immensely popular and successful, but were forced to close as new legislation was introduced and new licensed stations were launched.

In spite of this, some free radio stations continued and other new ones emerged and in an environment where they were left undisturbed for long periods they have been able to establish a substantial infrastructure, often with 24 hour seven day operation. Although not on the same scale as the huge stations of years gone by, they have built up a large and loyal following of listeners. I hope that a way can be found for such stations to continue.

Soapbox

It is interesting to see how broadcast radio has developed in different countries over the years. I have observed a few common threads. Governments have an instinctive fear of it and their attempts to legislate and regulate often fall short and fail to deliver. While this remains the case, free radio continues to be relevant and necessary to provide the service that listeners want, and as a beacon of protest and voice of opposition against the establishment legislators and regulators who seek to manipulate things and silence anyone other than their carefully-selected yes-men.

Free radio people have a passion and an enthusiasm for radio as a service to the listeners - that is their key motivation for becoming involved. In many cases they prove that they have a good understanding of the medium and therefore do it well.

In fact, I am not an advocate of anarchy on the airwaves. I do believe that there is a need for some planning and regulation, but there needs to be more dialogue and cooperation between the governmental regulatory bodies and the people who are genuinely interested in producing good broadcast radio services for the listening audience.

AM Bands Activity

I love the springtime. The flowers are beautiful, the temperatures are rising and the foliage returning to the trees provides better cover for the land-based pirates who like to skulk about in the woods with their portable transmitters and car batteries.

The Christmas holiday period saw some significant m.w. activity with some interesting and entertaining programmes. Swinging Radio England did a marathon broadcast over several days on 819kHz and it was reported that the station was experimenting with a half-wave dipole antenna.

Enigma TKR was active on 846kHz at the beginning of the year as well and there was talk of both these stations planning further broadcasts during the course of the year. There have been a few weeks of inactivity on m.w. since January, but hopefully by now it is worth having a tune around again to see what is out there.

On short wave, stations have been affected by the strange and often disappointing propagation conditions which were widely reported through the

winter months. The 75/76m band has been closing completely for short skip on most nights. Radio Amateurs who like to use the nearby 80m band have apparently been complaining of the same problem. I have never known these frequencies behave like that in past years.

With the lengthening days in spring, 48m remains open until later in the evening with each passing week. Radio Underground was forced to change its plans from evening transmissions on 76m to afternoons on 48m. The station is recommended listening for 'anoraks' as it is always a good source of radio news and information.

The roll-call of other British regulars on 48m has remained pretty much the same, with the likes of Radio Pandora, WNKR and Valley Wave. Stations noted occasionally in recent weeks include Radio Argus and XTC. A station identifying as Juke Box Memories (perhaps that was the programme name) was heard on 6.290MHz. The presenter gave his name as Pete Edwards and sounded English, though the contact address was in Dublin.

Looking to Ireland, Jolly Roger Radio is still on air most Sundays including relays of Britain Radio International, but Ozone has announced that it will cut back to once a month on the first Sunday.

Mentioning a few stations from elsewhere, Radio Piranha has been heard in the UK on 6.291MHz with Latin American music. Radio Space Shuttle International (featuring the programmes of DJ Space Walker) will be testing on frequencies around 17.4MHz in the 16m band. The station broadcasts in a.m. or I.s.b. mode from outside the UK (though probably their claims of being somewhere in orbit are an attempt to throw certain people off the scent).

Various other bands have been tried in the past and I recall having heard the station a couple of times on frequencies around 15.8MHz with good signals. A considerable number of Dutch stations often occupy the bands as well. Alfa Lima will sometimes run parallel transmissions on 15.070 and 21.900MHz alongside their 48m outlet.

Radio Korak can often be found on 3.927MHz on Saturday evenings. In the 1.6MHz band, stations like Radio Baroness and Radio Utopia give good signals and speak English as well as Dutch.

The Big Four Oh!

This year is the 40th anniversary of the launch of Radio Caroline. There has been much speculation about all sorts of events that might be taking place as tributes and celebrations, so knob twiddling at every opportunity is recommended. Rumours of new offshore stations are still floating about if you will pardon the pun, but listening to your radio receiver is the best way of knowing for sure if something is broadcasting.

Decode

- Mike Richards G4WNC, 49 Cloughs Road, Ringwood, Hants BH24 1UU
- E-mail decode@pwpublishing.ltd.uk Web site www.mikespage.btinternet.co.uk

PACTOR Low Down

With PACTOR gaining a progressively greater commercial following on the h.f. bands, it's about time I gave you an insight into this successful mode. PACTOR originated as a compromise between Packet Radio (AX25) and AMTOR. The system was developed by German radio amateur Ulrich Strate DF4KV as an h.f. optimised data system. The subsequent success suggests Ulrich was on exactly the right track with his development ideas. As you know, the early days of h.f. data saw RTTY as the most popular system, mainly because of the availability of surplus teleprinters. The advent of computers in the shack suddenly opened-up a whole new world of data communications and spawned all manner of new developments.

Probably the most successful of the early systems was AMTOR. This was designed to handle typed-in QSOs in a more reliable way and was very effective. I used this extensively with my old BBC B computer many years ago. It was an excellent system for low power communications and I used to make regular 'skeds' into South America with just a few watts into a long wire antenna on 14 and 21MHz. Whilst excellent for typed contacts, AMTOR made really hard work of long text or data strings and the packaging into blocks of three characters was overkill. AMTOR was also limited by a fixed data speed of around 50baud end-to-end which was far too slow for data transmission.

It wasn't long afterwards that Packet radio was introduced on the v.h.f. bands. Although at its best with clean v.h.f. signal paths, Packet soon found its way onto the h.f. bands. Packet was really not well suited to h.f. mainly because the data blocks were too long. This increased the chance of errors within the blocks with the subsequent requirement for more repeated blocks. As a result, Packet was only good quality h.f. links. Ulrich soon recognised

the potential for a halfway-house that would combine the benefits of AMTOR and Packet plus take advantage of the processing power available in the shack to add a few extra features.

PACTOR Essentials

Let's take a look at some of the essential features of PACTOR that make it such an attractive mode for h.f. use. To start with the data format uses a fixed time frame as does AMTOR, but adds increased error protection as found in Packet. Whereas AMTOR error correction relies on each character matching a preset bit pattern, PACTOR uses a 16-bit cyclic redundancy check (CRC) to ensure

block is error free. This is a very powerful system that has been standard practice in the computing industry for many years.

Additional versatility is provided through an automated speed change feature that's built into the protocol. This causes the link to speed-up or slow-down according to the quality of the radio link and so ensures the best possible data speed. A really special feature that had not been seen before was the inclusion of what's been called memory ARQ. If you look at most radio data systems that include error correction, you will find that they generally discard any receive errors. If we take AMTOR as an example, if a



The SCS PTC-lipro multi-mode PACTOR Controller.

much more accurate error identification.

The CRC form of error management uses a mathematical formula to produce a 16-bit numerical representation of the bit pattern in

group of three received characters fails to pass the error check they are all discarded and a request sent to the originator to repeat the group. On a poor link this can happen

repeatedly until a clean block finally gets through.

PACTOR uses a very different approach and includes a recording mechanism that keeps a record of every data block. If a received block contains an error it keeps the faulty block and asks for a repeat. If the second block is still faulty is compares it with the first faulty block and tries to make a good block. This process repeats until a good block is reconstructed. Rather than record the digital elements of the block, the PACTOR recording system uses an analogue to digital (A-D) converter to record the signal straight from the demodulator. By using this system noise reduction techniques can be applied to clean-

up the signal before the comparison process and so increase the chance of success.

The PACTOR alphabet is the full ASCII



really practical over really The SCS PTC-IIe Sophisticated PACTOR Controller.

the associated data block. This calculation can then be repeated at the receiver and the two numbers compared to make sure the

SWM, April 2004 47

character set to provide maximum flexibility. The listener has also been remembered with a special Listen mode built into the protocol so you can monitor stations that are already synchronised.

One final point to note about PACTOR I is that it is based around the use of a separate external processor and demodulator. The sophisticated nature of the mode combined with the limited capabilities of the shack computers at that time made software implementation impractical.

However, with high-speed Pentium PCs and sophisticated soundcards the norm, it's no surprise to find that PACTOR I can now be implemented entirely in software.

PACTOR I

Now for a bit more detail. We'll take a closer look at a basic PACTOR signal so you can start to understand the sophistication of this mode. When a transmission starts the originating station sends synchronisation packets with both 100baud and 200baud sections. As you might expect the 100baud section is used to set-up the link but the 200baud element is used to assess the quality of the radio

link. There are four special control signals associated with PACTOR known as **CS1**, **CS2**, **CS3** and **CS4**. The CS1 and CS3 signals are used to acknowledge receipt of data whereas a CS2 is sent in response to an error to request a repeat. The CS4 character is used to manage the link speed and effectively acts as a toggle. In the synchronisation process if the receive station is happy with the 200baud sync packets it will send a CS4 acknowledgement which will cause the link to start at 200baud.

If at any time the quality of the link starts to deteriorate, the station experiencing problems will send a CS4 to knock the speed back down to 100baud. This is a really powerful addition to the mode and helps to ensure maximum data transfer regardless of the prevailing conditions. A couple of other important extras built into the system are the ability to break-in or force a reversal in the transmission. This has been carried forward from AMTOR and can be very useful.

The other nicety is what's known as positive QRT (shut-down). AMTOR was famous for its lack of shut down. If the remote station went out of range or just closed down the other station would just keep trying to keep the link open. PACTOR includes a

simple protocol which sends the receive address in reverse order to indicate that the link is closing. As if all this wasn't enough the throughput of data is further enhanced by the inclusion of a data compression scheme.

The chosen compression method is the well established Huffman encoding developed by **Professor David Huffman**. This compression model is particularly attractive because it is very simple to implement and provides a 100% speed increase, which is



SCS website - a start-point for lots of useful information.

well worth while! The system is completed with a Forward Error Correction (FEC) mode that can be used for broadcast, but is more commonly used to start a contact (CQ call). The FEC mode operates by sending normal blocks of data complete with the CRC but with one or more repetitions.

PACTOR II

The original PACTOR system was great for Amateur Radio use and its commercial potential was soon recognised with the development of PACTOR II. The system maintains backward compatibility and all contacts start with f.s.k. and 100/200baud packets. Once connection has been established the systems makes use of its six Control Signals to implement a host of advanced features. The modulation system is dual phase shift keying as opposed to the simple f.s.k. used for PACTOR I. However, the modulation changes according to conditions and steps up through d.q.p.s.k., 8-d.p.s.k. and 16-d.p.s.k. for the fastest data rates.

Work has also been done to improve the on-line data compression and the encoding algorithm checks each packet to see if it would be faster to send it using Huffman,

PMC or just straight ASCII. PMC is a new system developed by PACTOR developers SCS Communications and can provide a 30% speed increase over straight Huffman encoding. Another neat extra is PACTOR II's ability to change the packet length to suit the data being presented. If there is a constant stream of data applied, as opposed to a slow hand-type input, PACTOR II will step-up the packet length to increase the data throughput.

To further improve the resilience of the link

PACTOR II uses convolutional coding to drive the modulation, paired with Viterbi decoding in the receiver. This is similar to the system used in PSK31 and has proven to be very effective for recovering errors from noisy channels. All these enhancements have created a system with huge flexibility that automatically adapts to suit the prevailing conditions and can achieve reliable h.f. data rates of 1200 bits per second.

PACTOR III

This is the very latest incarnation and represents yet another significant step forward. As with the rest of the family, PACTOR III continues with backward compatibility and starts each contact in PACTOR I mode. The main difference with PACTOR III is its dramatically improved data rate

that can be as high as 5200 bits per second under ideal conditions. As with previous systems PACTOR III works automatically to get the very best from the link so there's no need for operator intervention. Achieving a throughput of 5200 bits per second cannot be done in the 500Hz bandwidth used by PACTOR I and the latest variant requires a full 400Hz to 2.6kHz speech channel to hit 'top speed'.

Summary

At the time of writing, PACTOR II remains the most common h.f. PACTOR system and is used extensively for h.f. E-mail systems worldwide. Both PACTOR II and III require hardware decoding so demand some investment before you can listen. If you have one of the top-end Hoka or Wavecom decoders you will find PACTOR II already included. If you're starting from scratch you will need a PACTOR II or III modem. The main suppliers for these decoders are SCS, and they're not cheap. The new PTC-II modem costs around £420 or £520 if you want PACTOR III as well. To learn more, the SCS website is a good place to start so, here's the link: www.scs-ptc.com/

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This is what the experts say. John Wilson: Nov 2000 SWM:

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Half A Century Ago

A bit of nostalgia for valve fans first this month, take a look at the photo of a 1953 amateur shack supplied by Frank Walker of Poole. As can be clearly seen, the equipment is pretty large and yet for all its size, only operates on a few of the lower frequency amateur bands.





The station consists of an R107 receiver (on the left) plus the separate receiver and transmitter of the Canadian 52 set. Transmitting using a.m. on the 3.5MHz band into a 150m long wire antenna, the input to the p.a. was 35W.

Above the R107 receiver is a wire recorder, a very unreliable fore-runner of the tape recorder. Ex-military equipment was widely used in amateur shacks for many years after WWII and this fairly typical set up belonged to DL2PA, the club station of the 1st Air Support Signal Unit, British Army of the Rhine, in Lemgo, Germany.

DXpedition News

Four Brits, Steve G4NG, Mark G4AXX, Dick GU4CHY and Rich M5RIC will be operating from the south east African country of Malawi formerly known as Nyasaland - from 18 April to 1 May. The country's call prefix is 7Q, but the exact callsign for the operation is unknown at the time of writing. Activity is expected across the h.f. bands using s.s.b, c.w., RTTY and PSK31. There will be three stations in operation using linears and beams, so signals should be strong! The website to look at for more information is www.malawi.digital-crocus.com which includes details of the Malawian aid charity that the DXpedition will support.

The Gambia will see activity from Netherlander Jan using the call C54JJ from 29 March until 5 April. As well as s.s.b. he'll also

try some data modes, RTTY and PSK31, all on the h.f. bands. If his attempts to work the 1.8MHz and other lower bands fail then he'll be found on the WARC bands, 10, 18 & 24MHz.

Operating closer to his home will be Frenchman Jean-Marc F5SGI. For a week from 11 April he hopes to be using the call TM61LE from Groix Island, just off the southern coast of Brittany. This will be a c.w. only station on the h.f. bands.

A major DXpedition, taking place for two weeks from 4 April, will be on the equatorial pacific island of Banaba. Previously known as Ocean Island, it was claimed by Britain just over a century ago when it was discovered that the island was rich in phosphate. Mined to destruction, it has been part of the Republic of Kiribati since the mining became uneconomical and it and the other Gilbert Islands were granted independence.

The DXpedition will consist of seven separate stations operating 24 hours-a-day on all bands. Funds are still being sought, although the equipment had been shipped by January so everything's set up to go. Take a look at www.dx-pedition.de/banaba2004/ for the latest information on the event, which will use the callsign T33C.

Power Measurement

The best way to find out the output power of a transmitter is to measure the voltage of the r.f. output across a suitable load. As the output impedance of all today's amateur transmitters is 50Ω then that's the resistance of the dummy load that you connect to the transmitter's antenna socket. For the purists I'd like to say that I know it's not a dummy, but a real load. My guess is that it started life as a dummy antenna load and the antenna bit got lost over time. Enough of semantics.

The task in hand is to measure the voltage across the load and the simplest way is to rectify the r.f. voltage with a diode and measure the resultant d.c. voltage with a 'common or garden' voltmeter. See Fig. 1 for the circuit diagram.

Of course, the hard part if you're using a typical coaxial dummy load is getting the diode attached to the inner connection of the load. So, here's my suggestion for a bit of hardware that's easy to 'knock-up' and which makes that job a lot simpler. All it consists of is a couple of SO-239 chassis sockets bolted together back-to-back so that the inner coaxial line is exposed for the diode to be attached. It's the circuit inside the dotted lines in Fig. 1.

Construction only requires a minimum of

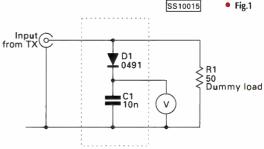
soldering and no metal working. All the bits can be obtained from Maplin Electronics and the total cost is less than £10 with M3 nuts and bolts used throughout. As well as the sockets, three bolts, ten nuts, three 8mm nylon spacers and two solder tags make up the hardware. The photo shown at the bottom of this page should provide a fair idea of the layout. Solder the two inner connections of the SO-239s together.

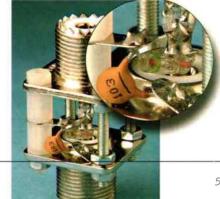
Connect the 'line' end (or cathode) of the diode to the tag between the nylon spacers, and the other end to the SO-239 inners. Fit a 10nF capacitor between the two tags. The only bit of fettling required is to cut down one nylon spacer.

Once built, to measure the rig's r.f. output connect a patch lead from the antenna socket to one side and a dummy load to the other. With its range set to d.c. volts connect a multi-meter to the two tags - the positive lead to the one between the plastic spacers - transmit, and read off the voltage. For s.s.b. you'll need to whistle into the microphone to generate some r.f. voltage. If you want to work out what voltage equates to what power then the formula is:

Watts	Volts
0.25	3.54
0.5	5.00
1	7.07
2	10.00
3	12.25
5	15.81
10	22.36
20	31.62

If you don't want to do the maths then Table 1 has the voltages for a few different output levels. Technically the output will be slightly higher than the meter reading indicates due to the voltage loss across the diode, but it's not worth getting worried about! It shouldn't take long to construct the device and it is a piece of kit that those who need to check the output of their transmitters, such as entrants in the PW low power contest in June, should find very useful.





Propagation Forecasts

- Jacques D'Avignon VE3V9A
- E-mail: Jacques@pwpublishing.ltd.uk

How to use the Propagation Charts

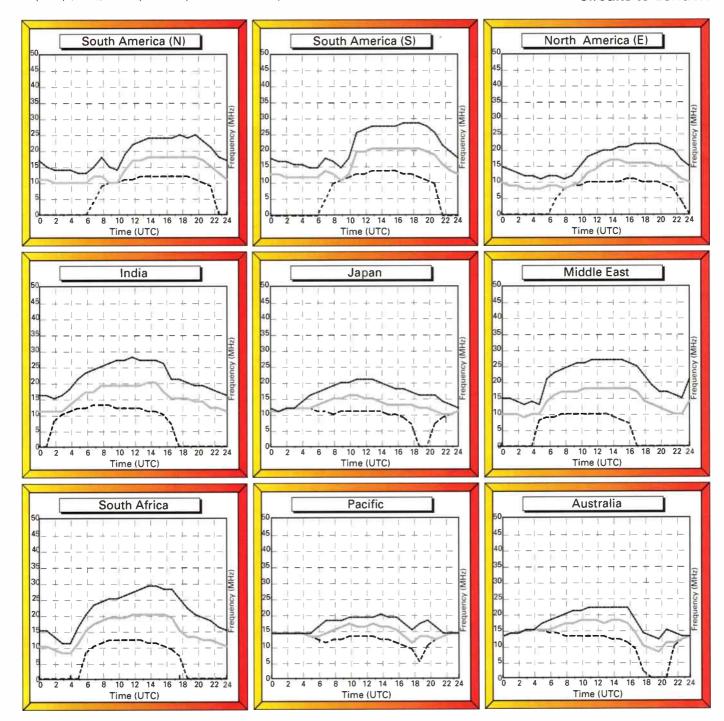
The charts contain three plots. The lower dashed line represents the lowest usable frequency (LUF), or ALF (Absorption Limiting Frequency). The chances of success below this frequency are very slim.

The middle line indicates the optimum working frequency (OWF) with a 90% probability of success for the particular path and time. Lastly, the upper dashed line represents the maximum usable frequency (MUF), a 50% probability of success for the path and time.

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

Good luck and happy listening.

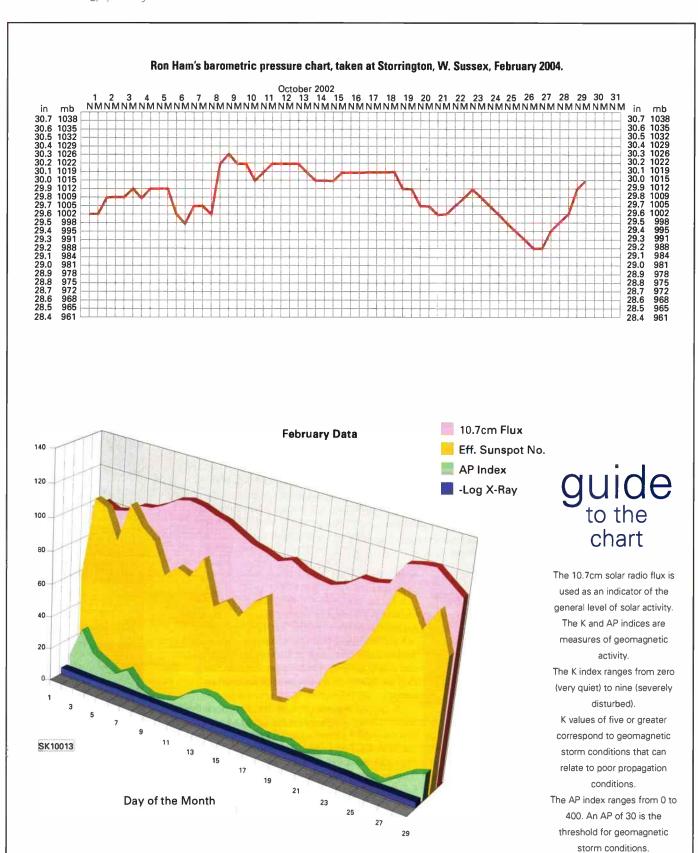
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Satellite

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

he recently positioned Hellas-Sat-2 satellite is located way out at 39°E and intended to carry sports output from the upcoming Olympic Games. Now that it's there, with much spare bandwidth capacity, the Greek media use it for news and programme feeds. I returned home late on the afternoon of 7 February, my 'phone answering machine contained an excited call from Roy Carman (Dorking) reporting 'unusual things' being carried over this sat. A schooner being boarded, army and police involvement, INFLATABLES, a casualty at the local rail station. A quick scan over Hellas-Sat revealed a clutch of 'BT5' feeds between 11.00 - 11.027GHz-V which later revealed to be premier football running MPEG 4:2:2. But, it was another three feeds that created most interest...11.173GHz-V signing as 'HELLASAT' on colour bars; 11,182GHz-V - 'POLICE FOKEA'; and at 11.191GHz-v (all were SR6070 FEC 3/4) 'POLICE PIRAEUS 1 WRONG LINE STANDARD' caption The 'Hutton Reports' arrive at the back on colour bars. It was the 'POLICE FOKEA' or of the Royal Courts of Justice. channel that carried picture activity, the others were on test card.

Hellas-Sat-2 carries an interesting programme bouquet at 12.525GHz-V (27500+3/4) with content from the Eastern Mediterranean. You'll find Alpha TV; Antenna Pacif Ser; OET Promo; RTS SAT; MKTV SAT; CYPRUS SAT and ERT SAT. The OET offering however is in English and offers

travelogues and local documentaries on Greece, worth watching if you're intending to take a holiday in the area.

Earlier on 7 February, Europe*Star-1 @ 45°E carried news material found during a scan, but on checking the memory cache, the downlink had switched off. 'IRAQ MEDIA' had been downlinking at 11.748GHz-V

(27500+3/4). Output from

Iraq has dropped considerably in recent times, though a fairly regular offering is the 'ABC SCOPUS' feeder on Intelsat 707 @ 1°W. This usually runs in NTSC 525-line at 11.659GHz-V (5632+3/4) for a direct link into ABC NY, though I've seen 625-line PAL being used, as befits the broadcaster client. Rather more dramatic unedited Iraqi footage was seen late afternoon of 1 February.

The Middle East is still far from peaceful and strife has continued for years between Israeli and the Palestinians. Our old friend Alan Richards noted a W2, 16°E feed late afternoon on 29 January, 11.146GHz-V (3255+3/4) service ident 'Broadcast 1' from Tel Aviv. A service was being held for three Israeli soldiers killed in year 2000 and with the return of their bodies so Hezbollah prisoners were exchanged.

Just a little higher in frequency, on *W2*, Alan found 'SSNTES-34 2 AUDIO' downlinking for Sky Sports (11.174GHz-H (5632+3/4) at a rather dark and very cold Elland Road, Leeds United football ground. They have financial problems, large debts and a possible winding-up order, the male sports reporter himself chilled to the bone and teeth chattering presented the

latest developments to camera. Alan Richards previously resided near Nottingham but during January moved to a new home near to Horncastle, Lincolnshire and within days was welcomed with over 600mm of snow.

Unfortunately, his 1.5m dish remained at Nottingham and he is currently using an 800mm dish. It's obviously working well as he found a 39°E Hellas-Sat-2 'INA NEWS' feed at 12.630GHz-V (6111+3/4). Curiously, on tracking his dish back to the heavily inclined** Telecom 2A @ 3°E he found another outside broadcast feed using the same frequency and parameters - this was a service in a large hall/auditorium uplinked by 'UKI-801' for 'MKTV-SAT, Macedonia.

Driving across the Sahara Desert in our mid-winter sounds attractive and early through to mid-January sees the annual Paris-Dakar rally. Unfortunately most of the live coverage feeds were arriving during the daytime when us lesser mortals are in the sweatshop earning the

daily bread, however Roy Carman (Dorking) received a couple of parallel feeds from the desert wastes.

PanAmSat's PAS-1R @ 45°W provided two parallel feed frequencies, 'GCR/FLY' at 11.575GHz-H and 'GCR-DAKAR-FT' at 11.585GHz-H (both SR6111+3/4), which were used during the rally period. One day the up-link

base was sited at 'Bobo-Dioulasso' en route to Dakar. Interesting to note that the 11.585GHz slot is a shared sport slot, following Dakar output on one day the PanAmSat test card appeared followed with a South American football match with new parameters - SR6620+2/3. The PanamSat near neighbour - PAS-3R @ 43°E - has up-linked from the Australian jungle the German version of I'm a Celebrity, get me out of here the survivor genre programme feeding into German national TV. Ich3/4Bin3/4Ein3/4Star has similar programme content in a jungle environment including well endowed females

wallowing in mud! The 43°W bird was carrying the main encrypted programme feed service identified as 'Ich Bin Ein Hauptrager' ('Hauptrager' stands for the 'main' feed) and ran at 12.696GHz-V (13200+3/4). Meanwhile over on *Eutelsat W2*, 16°E appeared 'Ich3/4Bin3/4Ein3/4Backup' and this was the reserve feed ex Australian jungle at 12.547GHz-H (5632+3/4) - and was in the clear. I noticed on an Italian bouquet that they too have their own version of 'Carry on up the Jungle'.

At the end of January the 'Hutton Report' hit the TV waves. Unfortunately, taking out Greg Dyke in the process. *NSS-7* carried a special Parliamentary report via 'SERVICE 1' @ 11.562GHz-H (6111+3/4) with Tony Blair addressing the main House on aspects of the 'Hutton Report'. Meanwhile, *W2*, 16°E has 'UKI 784 C2' round at the back door of the Royal Courts of Justice to witness the delivery of 'Hutton Report' copies for general public reading matter - downlinking @ 12.554GHz-H (5632+3/4).

** latest Lyngsat info advises *Telecom 2A* has a 2.3° drift.



A support truck in the Paris-Dakar rally makes heavy going in the Saharan sand.





Keith Hamer & Garry Smith TeleVISION

17 Collingham Gardens, Derby DE22 47S

bysmal would be the best word to describe DX conditions during January, although most of us could think of alternative descriptions! Things did improve by the end of the month when a short Sporadic-E opening to the Iberian Peninsula occurred shortly after 1800 on the 30th. Reports concluded that the Quadrantids meteor-shower event on 3rd and 4th was a disappointment. Our thanks to Simon Hockenhull, Stephen Michie and Peter Barber for their extreme patience and perseverance whilst monitoring during the bleak period.

Interference Problems

Few DXers escape the wrath of interference problems and these days even once innocent gadgets are now causing problems. Martin Dale (Stockport) has realised that his domestic central-heating boiler is spewing out interference affecting frequencies between 3 and 30MHz. Martin aptly describes the sound effect as a chain-saw revving up!

In Coventry, Peter Barber is experiencing further interference problems in Band I. In addition to harmonics from his neighbour's new cordless 'phone affecting channel E4 (62.25MHz), a new source of interference is plaguing him which seems to peak to the south south-west. This takes the form of a varying fundamental of around 6.9MHz and creates strong harmonics throughout the h.f. bands and into Band I.

Roger Bunney (Romsey) suspects interference from broadband transmission of data using power lines (PLT) in his area with interference ranging from below medium wave through to mid-h.f.

Antenna Encounters

Martin Dale has drawn our attention to an interesting website at www.wrightsaerials.tv which has a photo gallery of archive and modern UK antenna installations, some of which are rather dodgy. There are also some amusing stories about installation encounters and various links to other websites, including the Early Television Foundation which provides a fascinating insight into the development of TV in the USA. There is an antenna gallery of early USA designs, including a complex stacked dipole array known as the Finco 'Bedspring'. It also mentions the use of pre-war 343-line and 441-line systems and even refers to a Channel 1 (which operated below 50MHz) but no frequencies are given. Does anyone have any details of this channel, when it was used until,

which transmitters used it and why and when it was abandoned.

UK RSL Update

In the UK, RSL TV stations may be losing popularity, as in some areas there has been a lack of participants for licence renewal. Areas where RSL channels have disappeared include Edinburgh, Bristol, Perth and Taunton.

Roger Bunney advises that the proposed RSL station for Romsey will use Channel E48 with 1kW e.r.p. and will cover a 16km radius of Romsey, part of Southampton, Totton, Waterside and east of the New Forest. There is also the possibility of a relay being built at Lymington.

A new transmitter has been installed at Rowridge for 'Solent TV' providing a full 2kW e.r.p. (the old TV-12 transmitter didn't) on Channel E54 (horizontal). Technical quality is high and the station delivers NICAM stereo. The station can also be accessed at www.solent.tv on the Internet. On the mainland, 'Southampton TV' broadcasts on Channéls E29 (H) and E54 (V) and carries lots of local advertising. Further north, 'York TV' is now on-air on Channel E54 serving around 250,000 people.

ITV Changes

Carlton and Granada have merged to form a single company called 'ITV plc' throughout England and Wales. A common graphics theme and cloned studio set was introduced for all ITV regional news programmes on 2 February. Graphics feature the ITV's three blue blocks followed by one in yellow. In addition, News At Ten has been scrapped and replaced by ITV News, now shown weekdays at 2230.

Stephen Michie (Bristol) advises that local programme opt-outs have been introduced depicting local scenes including Glastonbury Tor scribed with 'ITV West of England'. Other examples are 'ITV for the East Midlands' and 'ITV Yorkshire'.

Black & White Solution

Trevor Burton (Hereford) asks why our photographs of DX reception are generally reproduced in black-and-white. There are several reasons, the main one being deliberate i.f. bandwidth reduction within the receiving equipment. As we pointed out in the January 2004 DXTV epic, a narrowed i.f. bandwidth lifts the reception threshold, thus enhancing weak signals but at the expense of bandwidth. Unfortunately, restriction means that the chroma (colour) signal cannot pass resulting in a monochrome display.

Even where colour reception was possible, many of the older pictures were home processed in black-and-white simply because it was the simplest and cheapest option.

Service Information

Stephen Michie has been observing the following changes to various European services receivable in Band I:-



Fig. 1: The revised TTV News logo.



 Fig. 2: The new regional STV News identity, introduced on February 2.



Jig. 3: The '£1' box-type logo radiated in £ithuania.

Sweden: The close down sequence currently consists of programme schedules followed by the clock and a blank raster. The news service SVT-24 has been renamed '24' following the merger of 'SVT-24' and 'SVT Extra'.

Lithuania: The LRT logo has been replaced by 'L1' which forms a box in the top-right of the screen.

Croatia: The HRT-1 clock is only shown before the midday news.

Belgium: From Rotterdam, **Gösta van der Linden** advises that a third Belgian TV network is now on-air with broadcasts in French.

Luxembourg: Two new terrestrial channels, RTL+ and RTL-3, are to be launched, according to **Lionel Michelland** (France).

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 offair pictures stored as 'JPG' files on PC discs and good-quality video recordings.

Our DXTV and Archive TV website can be found at the following address:- www.test-cards.fsnet.co.uk

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Collingham Gardens, Derby DE22 4FS. We can also use off-air pictures stored as JPG files on PC disks and good-quality video recordings.

Finally this month, don't forget our new-look DXTV and Archive TV website at www.test-cards.fsnet.co.uk







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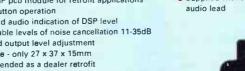
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admit that I am a close watcher of weather forecasts on television. My weather satellite (WXSAT) tracking dish remains at ground level, its base weighed down with paving slabs, bought for a not-yet-built garden path to the observatory. Having once seen the dish and motors damaged by an unexpected strong gust of wind, I am now concerned to be aware of any severe weather so that I can remove the dish from the mount.

The weather forecast on a January Saturday was designed to send my blood pressure sky-rocketing. Severe storms were announced for the following Monday, probably reaching well over 60mph. On the Sunday, they upgraded this to probably exceeding 70mph. Marion and I dismantled the dish, we then roped-up the observatory and dome - and waited. Marion reminded me that the forecasters don't always get it right.

Monday morning came quietly. I checked the forecast with trepidation - but all was calm. The storm centre was moving further south than predicted and all we experienced was a gentle breeze, even less than the previous day!

Forecasting is not yet an exact science! **Brian Dudman** sent me pictures of the storm centre received that morning from *NOAA-17*, showing the centre moving into France.

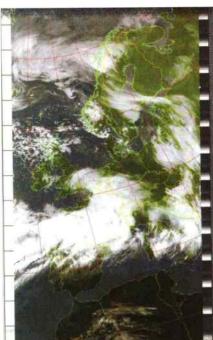


Fig. 1: *NOAA-17* 1033 12 January infra-red image from Brian Dudman.

Computer Crash

We had a cold snap in late January, see Fig. 2. The day before it arrived, the computer that I use for receiving METEOSAT-8 WXSAT data from HotBird-6, failed with a sudden re-set and a series of error messages. The message stream referred to memory locations that, on their own, conveyed little of use for diagnostic purposes.

I enjoy debugging computers and over the last 15 years (and more) this has been fascinating. On re-booting the computer, the series of beeps gave a clue about the basic cause of the problem, but - embarrassingly - I could not remember the identity codes. I have long since disposed of my DOS-6 manual!

Peter Benney kindly sent me a web reference and this indicated a motherboard failure. After noting that the case fan (or the power supply unit itself) had failed, there was a distinct smell of burnt dust from the p.s.u.s fan and that the processor was getting extremely hot, despite its own fan apparently working, I decided that a new machine was the best option.

You can buy a computer without monitor and without an operating system, so some good deals are possible. Out came the memory chips, hard drive, video card and finally the CD-ROM and DVD drives. I was able to order a higher specification computer

at a price lower than that which I paid six months ago.

The new computer arrived and after installing the Operating System I installed the various programs for my WXSAT systems. It is amazing just how long it takes to install all the software that I use during the day! Typically, I do word processing, look at the locations of various weather and other satellites, monitor and decode some a.p.t. and h.r.p.t. from the NOAA WXSATs, look at the HRIT from METEOSAT-8 and - if the sky is likely to be clear - check my planetarium software to do some basic planning for an evening at the telescope. After one week, I still have some more programs to install, but the extra speed -3GHz - and the huge hard drive, are proving useful for all the METEOSAT-8 images!

Encryption

METEOSAT-8 (formerly MSG-1) moved to routine operational status at the end of January. In preparation for the formal commencement of encryption, EUMETSAT Operations notified trial users of their new, individual user name and password. From 17 February, the new codes were required in order to continue to receive METEOSAT-8 data.

From 2 March, METEOSAT-8 data is formally encrypted, with just the six-hourly SEVIRI, Foreign Satellite data, meteorological products and the EUMETSAT ATOVS Retransmission Service data available unencrypted. To receive the data you have to have installed the Key Unit from EUMETSAT and the associated software. As of mid-February, I was still waiting for mine to arrive, as were many others.

MSG-1 Becomes METEOSAT-8

Darmstadt was the location for a meeting in February to mark the renaming of *MSG-1* (in its trial phase) to *METEOSAT-8*. **David Taylor** attended and kindly sent me notes and



Fig. 2: NOAA-17 29 January 1051 from Mike Jupp.



Fig. 3: Full size model of METEOSAT-8 outside EUMETSAT headquarters (David Taylor).



Fig. 4: EUMETSAT building and surrounding cranes (David Taylor).

pictures about his experiences.

EUMETSAT staff attended a morning session, where speakers and members of the user community introduced topics covering MSG-1 and 'How do users work with the MSG data'. There were parallel presentations from the user community in the afternoon and further presentations on Search and Rescue, Weather Phenomena seen from METEOSAT and the GERB instrument. During the afternoon, staff were able to visit the MSG Control Centre.

Tillmann Mohr's (Director-General of EUMETSAT) presentation was entitled 'Looking back with pride'. He noted that in 1984 a session in Avignon decided the basic concept requirements for MSG to follow the existing METEOSAT satellites. Dr Mohr has

been involved with EUMETSAT since its early days as a spin-off from ESRO/ESA.

Alain Ratier (Director of Programme Development) spoke about achievements throughout commissioning, including the various problems encountered and how they were handled. The major issue was the failure of the SSPA (solid state power amplifier) and the consequent move to dissemination of data via the *HotBird-6* DVB system.

User presentations from Herve Roquet (Meteo France), Wolfgang Benesch (Deutscher Wetterdienst - German Weather Service), Hans Rosenkrans (KNMI - Royal Dutch Weather Service) and David Taylor from SatSignal Software, were introduced in the morning.

Satellites & Segments

David had time to discuss some interesting questions regarding *METEOSAT-8*. "The first was about how you manoeuvre a spinning

satellite, for example to change the orbit. As far as I could tell, the only thrusters available were attached to the spinning part of the satellite, so if they were operated continuously they could not provide the unidirectional thrust required for an orbit change. The answer is that the thrusters are not operated continuously, but in very short bursts, for example a 100ms burst every rotation. It might take a hundred or more such bursts to get the desired momentum change.

"Many of us have experienced missing segments and wondered if it was our system or the transmission that was at fault. My FAQ Is it still working? triggered a chance to see how EUMETSAT themselves monitor missing segments. It's a lot more complex than I imagined, because they monitor the flow of segments as they are processed within EUMETSAT, as they are sent to the link for HotBird-6 satellite transmission, as they are transmitted back from HotBird-6 (at two receiving stations) and as they are retransmitted over the Atlantic Bird C-band link also at two receiving stations. Not only is the presence or absence of a segment known, but also the exact time of each event. Somewhat amusingly, at the moment EUMETSAT cannot monitor the C-band transmission as well as they would like because there are some cranes in the way - see Fig. 4! They need to find another location for their local C-band antenna.

"As a result of talking about missing segments and out-of-order segments, we chased through a problem that I had seen. I learned that the segment system works well for 'live' data, generated over a period of time as a satellite scans the earth. However, different problems are faced with some of the derived data and foreign satellite data. Because the entire image is generated at once, the segment files may all have the same time-stamp when they reach the point of transmission. Thus instead of the EUMETCAST system being simply able to transmit the data in the order it is generated, it may try and transmit all the data at the same time, resulting in a scrambled segment order. All the data is there, just not in the sequence you expected! This problem can be solved with some fine-tuning at the sender's end.

"Yet another thing that should have been obvious to me and yet only became so during my visit to the control room, was the way the correction of the images works. Basically, the satellite image will typically be slightly imperfect, as the satellite may be tilted or offaxis compared to an ideal orbit. You can correct this because the orbit is well known (from the Kepler data) and fine adjustments can be made by comparing the satellite image with well-defined points on the ground. However, I had always considered this as dealing with a complete scan and matching the whole picture to a map of the earth. Not so with METEOSAT-8! Because the image segments are transmitted in near real-time, the entire image is not available while the scan is in progress, so the image correction must be carried out using the predicted error rather than the as-measured error.

Presumably, after the scan the quality of correction is checked and used to make the correction for the next scan. Well, perhaps that is obvious now, but it only became obvious to me watching the process at work!".

David had the opportunity to meet Anne Taube, Sally Wannop - see Fig. 6 - and Nick Coyne from EUMETSAT and expressed his thanks for their help during his attendance. Similarly, my thanks to David for providing his notes for inclusion this month.

GEO Magazine Launch

Les Hamilton, formerly the make-up editor of the Remote Imaging Group's (RIG) quarterly magazine, is now producing the magazine for the Group for Earth Observation (GEO). He kindly sent me an early copy of their first edition. As one would anticipate from Les' previous productions, the new magazine is extremely well presented - and this time in A4 format.

The cover picture shows the Californian fires that we were able to view from the MSG-1 Foreign Satellite Data transmission images originating from GOES. The articles inside are all written by well-known names within the WXSAT field. Articles include notes about the Indian Space Programme, METEOSAT-8 reception, Envisat, setting-up your own WXSAT station and many other topics.

I read through this first edition and was impressed by the number and quality of the pictures. With such a variety of articles the reader is well catered for. A thought-provoking feature from NASA entitled 'The Disappearing Perennial Arctic Sea Ice' is one of several environmentally-based articles. This first issue is free and readers can also buy from a selection of software at nominal cost. The essential article - setting-up a weather satellite station - is included and references to information on the Internet are given. Some details are included of GEO's first symposium, to be held on Saturday 1 May at the Leicester Space Centre.

Next month I plan to include notes about the RIG magazine.

Starting METEOSAT-8 Reception

Some weeks ago **Kevin Hughes** asked me about *MSG-1* (now renamed *METEOSAT-8*) imagery. He subsequently installed a *METEOSAT-8* (via *HotBird-6*) monitoring system and sent me some notes about the problems that he discovered along the way. Kevin uses a 2.4GHz P4 computer running the *Windows-98 SE* operating system. There have been reports of problems experienced when using *Win-98SE* and in fact EUMETSAT recommends later versions of the Windows operating systems, specifically *Win-2000*.

Kevin's computer was also fairly close to the minimum specification stipulated for successful reception of EUMETSAT Multicast transmissions. Despite much effort, Kevin was unable to get the system to work, so he obtained a *Win-98SE* to *XP* upgrade disk. This brought a new set of problems because Kevin's computer also has to work with his



Fig. 5: Inside the foyer (note David's software on display).

company's software and there were apparently some compatibility problems - not uncommon with XP.

Kevin contacted **Julie** and **Pamela** at EUMETSAT, having spoken to them during previous weeks and been grateful for their help. They suggested that he could try the Wavelet software that is available free and is used to decompress the data and make the images readable. He downloaded this but couldn't get it to work.

Reverting to Win-98SE, Kevin decided to look around the Internet to see what METEOSAT-8 decoding software was available. Kevin did a search using 'WVT files' in Google and found a reference to Ron Ablas' program xrit2pc -

www.alblas.demon.nl/wsat/software/soft_msg.html

Kevin visited the site, studied the details, downloaded the manual and all of the files associated with the program and extracted them to the suggested directories. Kevin started the T-systems software and the shell program. He then started *Xrit2pc* and set it up. "It really is as simple as that", he explained. "You just click on the 'reload files' button and the latest received file information appears on the screen. You can produce

brilliant 'false colour'

images with
absolute ease.
Here are a
couple of
sample
images
received
by my
PC. I
really



Fig. 6 Sally Wannop of EUMETSAT User Service (picture from David Taylor).



Fig. 8: NOAA-17 Northern Norway from David Taylor.

didn't realise just what amazing detail *MSG-1* provides - especially the HRV images. I'm hooked!".

Figure 8 shows a NOAA-17 channel 4 (infra-red) image from 21 Jan showing relatively clear winter weather over Northern Norway. The intense cold in the mountain regions shows as white, with the land being grey and the sea black. Valleys can clearly be seen, as can the island of Tromso. The Lofoten and Vesteralen Islands form the Y-shaped group on the left of the image. David adds: "The message: just because there is little light doesn't mean you can't make a great image!".

Fig. 7: METEOSAT-8 12 February 1415 (image © EUMETSAT 2004) from Kevin Hughes.

Frequencies

a.p.t.

NOAA-12 and NOAA-15 transmit a.p.t. on 137.50MHz. during overlap periods, NOAA-12's a.p.t. may be switched off.

NOAA-17 transmits a.p.t. on 137.62MHz. WEFAX: METEOSAT-7 (geostationary) transmits WEFAX on 1691 and 1694.5MHz and Primary Data on 1691.0MHz.

HRIT-LRIT and FSD (from METEOSAT-8) are transmitted by HotBird-6 on 11.096GHz.

Add 123 Enigma 17-21 Chapel Street, Bradford, West Yorkshire BD1 5DT. Fax: (01274) 77004 E-mail enigma@pwpublishina.itd.uk

Family III

Reader Stephen Malewski from Barnard Castle has asked us about stations which send far more null message transmissions than those carrying actual messages. We must remember that many stations certainly send dummy 'filler' messages or groups. Several families, however, use specific null message formats and one of them, Family III, has run certain of its schedules for years without sending a single message. In this column, we will concentrate on this fascinating family of stations.

It has several members, all running very similar formats. At present, these are M3 (Morse), E11 (English), G11 (German) and S11A (modified Russian). The Family III uses the following range of frequencies:

3.060, 3.250, 3.390, 3.450, 3.823, 3.924, 4.015, 4.090, 4.180, 4.370, 4.465, 4.540, 4.610, 4.670, 4.722, 4.780, 4.870, 4.900, 5.050, 5.090, 5.120, 5.150, 5.180, 5.220, 5.250, 5.360, 5.365, 5370, 5500, 5520 5.550, 5.610, 5.625, 5.670, 5.810, 5.830, 5.860, 5.870, 6.330, 6.520, 6.540, 6.640, 6.750, 6.810, 6.840, 6850, 6.905, 6.950, 7.208 (yes!), 7.256 (yes!), 7.439, 7.444, 7.450, 7.540, 7.580, 7.620, 7.710, 7.830, 7.840, 8.033, 8.088, 8.100, 8.180, 8.544, 8.760, 8.800, 9.030, 9.180, 9.272, 9.950, 10.125, 10.250, 10.520, 10.720, and 11.116MHz

Transmissions usually begin on the hour or half hour. The standard format consists of a three-figure Schedule Number followed by a stroke and then the group count in figures. Typically 'Two three two, oblique, zero zero' would be an English null message format. This is repeated for five minutes and finishes with 'out'. When a message is sent 'Attention' follows the call and then the message of single five-figure groups. The call is then repeated six times, then 'attention' followed by repeat of message, ending 'out'. In German, these words are 'strich', 'achtung' and 'ende'. In Russian, 'cherta', 'vnimanye' and 'kanyets'. The Morse format is similar, for example 496/50 (repeated five minutes), then BT BT, followed in this case by 50 paired fivefigure groups, then 496/50 (six times) BT BT followed by a repeat, but this time in single groups, then BT BT 000. The vast majority of schedules are in Morse, although there have been a few regular

voice schedules operating for many years and messages are very rarely sent using voice, especially English and German.

Different modes are used for particular schedules, which suggests that they are geared to the recipient's equipment and Morse reading speed. Voice in a.m. or u.s.b. Morse in i.c.w. or m.c.w., at speeds from very slow to fast. The Morse null message call ending has a familiar rhythm: dah-di-di-dah-dit dah dah (meaning /00).

Nearly all messages have group counts in the 50s. Longer messages are very rare, shorter ones quite rare. Previously identical messages would be sent on the same day a year or two years later, but this practice now seems to have ended. Over the years, particular schedules have varied from several times daily, twice daily, once daily, twice weekly, weekly, twice monthly, monthly and irregular (rare). They operate on a day-of-the-week basis. Morse schedules tend to be far more frequent that voice. Schedule Numbers are conservative, the same number pool being used for many years. SNs occur in clusters, such as 010, 011, 012, 016 or 040, 041, 044, 047 or 552, 553, 558, etc. Only SN496 has been known to be used for Morse and voice (German) transmissions. All other SNs are restricted to either Morse or a particular language, e.g. 231 is always English, 552 always Morse and 697 always German, etc.

For interest, the following English schedules were active on the higher frequencies in November/December 2003 (none sent messages apart from 184/32):

group, so far this has always been 77777. According to ENIGMA 2000 monitoring, this stutter group is only sent in messages consisting of between 30 and 37 groups. Before S11A appeared, **S11** operated. This used exactly the same format, but instead of the word 'cherta' for 'stroke', it used the word 'presta'.

The earlier voice stations in this family never used Schedule Numbers, but used music instead. The German network G10 used to play the Bert Kaempfert piece Wonderland by Night (twice) after which the message followed (or didn't!). Similarly S26 played (twice) a piece sung by Polish children entitled Zyt zyt! - meaning 'Hush hush!' - very appropriate. Agents wishing to know whether to take a message down (or not) would have to wait until the music had ended before they could find out. There may have been an English version too, but we have no details.

Schedule 287

This is the single exception to the rules. It is a special ID sending fast Morse only and tends to operate daily over a period and then disappear. During that period, schedules are predictable, but on its return, maybe months later, entirely new schedules may operate. It has been known to send several transmissions in one day, and some schedules may send nothing but null messages while others always send messages. Group counts do not restrict themselves to the usual 50-59, but vary widely. The M3B variant is common with this special schedule.

As always, our ENIGMA booklets are still available for £7.50 for the pair (including postage). These give a thorough introduction to the mysterious and complex world of Numbers Stations.

You may also like to contact ENIGMA 2000 which gives up-to-date news on Number Station activity, occasionally

SN	Time (UTC)	Day	
182	0830	Tuesdays	SN changes to 184 when message sent (rare)
183	1300	Tuesdays	
231	1030	last Tues of	month
232	0800	Thursdays &	& Fridays
312	1230	Tuesdays &	Fridays

Variants

The M3A variant sends a triplet (either 111 or 333) between the Schedule Number and group count during the call, e.g. 287/333/00 or 044/111/53. These occur occasionally - always with Morse transmissions. A second variant (M3B, E11B) which began around three years ago, sends a normal call, but the first and last group of the message consists of a stutter-

discusses certain stations in detail and includes an interesting review of espionage-related news. Their E-group is located at:

http://groups.yahoo.com/group/enigma20 00 and they can be paged at 0762-627 6417. Morse monitors are always needed, especially as there is more Morse activity than voice, yet fewer and fewer people can read it!



- Ben Hogan, clo SWM Editorial Offices
- E-mail ssb.utils@pwpublishing.ltd.uk

raham Tanner has written 'SSB Utilities' for SWM for many years and following on from a man of his ability and knowledge won't be easy. As a listener of many years standing, be assured I'll do my utmost to inform you of news and happenings in the 'Utility' sections of the h.f. bands.

In the February 2002 SWM Graham wrote that he was a subscriber to the 'results' theory which asserts that 'If I can hear the signals, then I'm happy.' I couldn't agree more, Graham.

I have a selection of wires in the air for my h.f. monitoring but tend to rely on a multi-band trapped dipole manufactured by **Richard Benham-Holman G2DYM**. This and a long wire antenna are connected to an old MFJ-949E tuner, which, in turn is wired up to a Yaesu FT-920 transceiver. The antenna isn't particularly high in the air, its centre being about 7.5m above the deck and the ends some metre and a half lower.

The FT-920 was purchased about four years ago and was chosen because it has the right coverage from l.f. up to 30MHz, it has a first rate d.s.p., which is extremely easy to operate swiftly, it has big buttons, ideal for a bloke with big hands. It's also fitted with a really useful digital audio recorder that requires two button hits to provide twenty seconds of recorded received audio. If necessary this can then be recorded on a computer hard drive using a program such as Xcorder. Of course headphones are in use for night-time operations.

For monitoring from hotel rooms or similar temporary locations I am currently using a Kenwood TH-F7E hand-held that really gives great results when fed with 5m of wire strung around the room. The purchase of another h.f. receiver as a standby is also planned. I'll keep you informed.

Digital Modes

I'm aware that many readers of Short Wave Magazine don't use the Internet and many don't possess a computer, but increasingly these days digital modes are being used by the governments and civilian operations to pass information. All this means that to grab intelligence from the air relies more and more on technology and less on an ability to decipher language and the need for a

'good ear' for Morse code.

Governments and military communicators are increasingly dependant on a system called Automatic Link Establishment (ALE), which is a method used to swiftly initialise h.f. communications and maintain such links. Previously a radio operator would manually set up a contact with his or her counterparts, using experience gained over decades by their predecessors and themselves, to choose a frequency commensurate with the time of day, their respective locations and band conditions.

As many readers will know, this usually means that higher frequencies are used in daytime with lower bands being utilised at night. They would tune to their selected frequency and then select and tune a suitable antenna, then establish contact. Every so often users of a net' would have to check in with test calls to ensure that they were still in contact with the others. Should band conditions or QRM force a frequency change, then the channel selection and tuning procedure would be repeated.

How times have changed. Manufacturers now market transceivers incorporating upgradeable ALE software. This enables the radio equipment to be pre-programmed with a number of channels throughout the h.f. spectrum (typically over 200 channels). When the system is operating each station transmits a test signal on each frequency allocated to the net'. Receiving stations record the signal strength and quality automatically.

If a station on the net' then requires contact with an individual station or group of stations then a frequency is selected by the system based on the quality of signals received by stations. A synchronising signal is transmitted to all the stations that require communication with each other who then automatically tune to the same channel and the net' is established. Typically channel selection and tuning take about thirty milliseconds. Now that's quick!

Many manufacturers are turning out equipment that is ALE capable, a typical unit is the Rohde & Schwarz RS150T. This is a rugged military standard 150W set with coverage from 1.5-30MHz on transmit and it receives from 10kHz to 30MHz. On receive it has the capability to store 401 pre programmed channels. When used with the matching automatic antenna tuner the channel capability reduces to 250

channels. It can be configured as a mobile or base station. This set up is fairly typical of a ground-based ALE unit.

Automatic Link Establishment can be monitored by the enthusiast using a first rate computer program written by the aptly named Charles Brain G4GUO. The program - PC-ALE - requires a fairly up-to-date PC with a soundcard (at best 600MHz clock). You'll need a mono patch lead to connect the receiver to the computer and possibly a 1:1 audio transformer for isolation (although I don't use one and I've been lucky so far).

The *PC-ALE* program can be set up to monitor any frequencies manually entered into the radio but, if you have a receiver that has computer control and that receiver is compatible with *PC-ALE*, then *PC-ALE* will switch the receiver to any pre-identified net' frequency that you have entered into the radio's memory.

Assuming that you just monitor one frequency, a series of brackets will be displayed on the screen. They variously indicate time, type of signal (typically SND is displayed indicating that a sounding signal is being sent), the next bracket is [TIS] or [TWS] meaning 'This IS' or 'That WaS' followed by a code indicating the station callsign. Then an encryption indicator is sent (often ALO indicating no encryption) followed by Bit Error Ratio reading and a signal to noise ratio indicator. As you monitor you'll notice other information being displayed.

PC-ALE is available as a free 1.5MB download from www.chbrain.dircon.co.uk/pcale.html If you have the requisite equipment and Internet access, then it's well worth trying.

Strange Transmission

On a different tack I monitored a strange transmission in Russian on 12.356MHz on the 9 February at about 1700. It went on for over an hour and was still running when I had to leave to attend a meeting.

Now I am aware that this is the Kaliningrad maritime frequency but this was no marine transmission or 'phone patch. It sounded like some sort of radio bug with two women, obviously in the same room, talking naturally to each other. They were not 'on mic' and seemed oblivious to the fact that they were being transmitted. Any ideas?

The Lincolnshire Poacher

As a *finale* for my first offering, I have discovered that those of us with mobile telephones are now able to download a number of different ring tones for them.

Guess what, the tune *The Lincolnshire Poacher* is available. Those of us who avidly read the 'Attention 123' column know that this is a nickname for the M16 'numbers station' signals transmitted from Cyprus. Now the question is – do I spend £1.50 on it?



E-mail skyhigh@pwpublishing.ltd.uk

y the time you read this, the latest in a series of changes to UK airspace will have taken place on 18 March. This time it is the turn of the Clacton Sector to be re-vamped along with the East Anglia ATA, (Aerial Tactics Area) and the Lakenheath MTRA, (Military Training Area). The Westcott Corridor has also been re-aligned.

Last month we saw that the major east - west TACAN route TR1 was re-aligned to the north so that it routed via Marham (MAM), rather than overhead Mildenhall. This has now opened the way for a new Airway, (P155/UP155), to be introduced running west/east from HONILEY to EBOTO - BANTO - SIVDA - UMBAG - BANEM - ABEDA - SOMVA and then onto the FIR boundary.

BANTO is approximately 64km northwest of Stansted and will be the entry point into northern end of the Westcott Corridor, the southern end of the corridor being at Brize Norton. The new airway from BANTO southwest to OLNEY and into the Westcott Corridor is P166.

This now all comes under the control of the revised Clacton Control Area, which is an area very approximately bordered by Lakenheath in the north and Cambridge in the south and from just south of Wittering in the west to the FIR boundary in the east. This new airway routes almost directly overhead Mildenhall and Honington.

The new East Anglia MTRA is sort of a rhombic shaped area than is located to the north of the new airway and encompasses the airfields of Wittering, Cottesmore, Marham and Coltishall. Unfortunately, I don't currently have a map, (that I can use), of this new airspace, hence the lengthy description. There are also other new airways within this area connecting this new major airway to other reporting points.

So all-in-all, the bottom line is that the existing controlled airspace has been extended north by around 32km to encompass this new airway structure and for the first time now envelopes Mildenhall and Lakenheath, etc. This appears therefore to pass some control of middle and lower airspace from the Clacton Sector to Terminal Control, (TC), or the Clacton Control area. The base of this new airspace varies from Flight Level 85 in some areas to Flight Level 205 above Mildenhall and Flight Level 195/215 above the southern part of the Lakenheath ATA in the North Sea.

So what's happened to the frequencies? I

am sure you are waiting with eager anticipation, has 8.33kHz spacing arrived at last in the UK? Well, the simple answer to the two questions is not a lot and no. The much documented on-going problems of equipment installation continue and the likelihood of 8.33kHz spacing in the UK has once again receded into the distance. The introduction is once again on hold, subject to the successful conversion of equipment being reduced to an overnight process rather than that of several weeks.

I would suggest that we are now possibly looking at the autumn. The one frequency change that has happened already is that a good old favourite, 123.9, had been brought into operation with London Terminal Control for inbounds and outbounds via Lambourne. The frequency previously used for this sector, 121.225, has been silent on the several occasions I have listened in and therefore I assume it has either been replaced by 123.9 and withdrawn or has been reduced to a standby status.

If time allows (and at present that is highly doubtful), I will attempt to include a basic map of the new Clacton airspace next month.

Tornado Base Station?

With regards to my recent comments on a letter from **Robbie L** regarding having a possible Tornado, (or similar), airband base station, I have had reply from **Bjoern** in Germany, (I have abbreviated it accordingly).

He says: "I think the best v.h.f./u.h.f. airband receiver, (hand-held), is the Yupiteru MVT-7100, it's even better than the ex-Government radios that you and I have access to via surplus dealers. The military radios you can buy these days at surplus dealers are very old and are not built to match very high sensitivity but low interference. I have an Rohde and Schwarz v.h.f./u.h.f. receiver from the 1970s and v.h.f. reception is OK, but on u.h.f. only strong stations are coming through. In fact, on both bands an up-to-date scanner is outperforming the Rohde and Schwarz RX. The same can also be said with an old Watkins & Johnson u.h.f. airband receiver.

So, if you would like to have a sensitive airband receiver look out for an MVT-7100 and a good antenna, you will never get an old military receiver for a reasonable price which will match the Yupiteru. (Or of course receivers from AOR or Icom, etc.). Plus, with a modern scanner you have more flexibility with scan and search and 50-1000 memories.

Only my Rohde and Schwarz u.h.f. coaxial dipole is better than all the other antennas tested before on my Yupiteru the combination of both works very well!".

So there you have it, it was a nice thought to own an ex-military set, but it seems that the modern all dancing wide band receivers will out perform these ex-military radios. (For reference, I suspect that the radios Bjoern refers to may be base stations rather than aircraft based sets, but the same conclusion applies). Thanks for your Email Bjoern, good to hear from a reader in Germany.

Following on with this story line three 'Sky High' readers have asked where these ex military v.h.f./u.h.f. sets might be obtained from. Well, there are a small number of military surplus firms around, a quick search around the UK Google search engine soon produced the Army Radio Sales Co. at www.armyradio.com Click on British Radios and you will find all sorts of ex military kits listed, (currently including a radio out of World War II Lancaster bomber), here's one example.

Racal RA-2091 v.h.f. Synthesised Communications Receiver, Solid State construction. Covers 20-400MHz in four bands using two interchangeable r.f. tuner heads. Tuner Head one covers 20-40 and 40-90MHz, Tuner Head two covers 90-195 and 195-400MHz. Large single tuning control with fast/slow tuning speeds and frequency lock facility. Featuring I.e.d. type frequency readout display, a.m., f.m., c.w. and Pulse operating modes. Other features include b.f.o., noise limiter, tuning and signal strength meter, a.g.c., carrier operated relay and externally available i.f. and Video/Audio outputs. Bandwidth 6, 20, 50 and 300kHz. Requires 110, 120, 220 or 240V a.c. @ 50-60Hz. (No prices were listed and the item was listed as sold out).

Here you have an ex-military receiver that in theory can receive both v.h.f. and u.h.f. airbands. But, (isn't there always a but), these sets are old and are sold in a variety of states but always 'as seen'. By all means, if you have the skills and fancy having one of these in the shack then go ahead, but always make sure you know what you are taking on, spares are likely to be a real problem. I would always remind you of the standard phrase, Caveat Emptor - buyer beware. Thanks to Jim, Martin S and Neil P.

Mildenhall Runway Closes

As I write this, Mildenhall is due to close in 10 days for five or six months for major runway resurfacing, (closure length subject to the



weather, etc.). According to NOTAM information, the airfield will have closed at 1000 on the 27 February, the NOTAM also lists a nominal date for re-opening as the 1 September.

Fairford MATZ, (Military Air Traffic Zone) was re-activated at 0730 on 19 February. The airfield is to host the fifteen 100th ARW KC-135s from Mildenhall, the first of which arrived at Fairford on 19 Feb, with others to follow shortly. (The 100th ARW currently only has a couple deployed abroad). Visiting or deployed KC-135s which originally would have transited Mildenhall, will operate through either Moron or Lajes, so visitors to Fairford may be limited.

The Special Operations C-130s will operate from Lakenheath whilst their helicopters will remain at Mildenhall. As this will limit the ramp space at Lakenheath the airfield is designated 'official business only', so this will probably restrict visitors to the airfield. Having said that, some special Ops C130s have been noted operating from Fairford.

As usual I would like to hear from anyone who notes any interesting frequencies in use at Fairford during the deployment. For reference, operations frequencies noted in the past year are 249.975 Fortress Control, (usually B-52 Ops), 379.475 Dragon Ops, (usually U-2

Ops). The KC-135s may well use their Mildenhall Ops frequency of 312.45 but early indicators are that the Mildenhall standby frequency of 249.75 is currently being used as 'Fairford Ops'.

Also, it is purely a guess on my behalf, but 371.2 sometimes has a habit of unexpectedly re-appearing as an operations frequency whenever KC-135s are deployed to Fairford - I am probably wrong, but it might be worth checking it out, just in case!

Airband Or Not?

Lastly, I have been politely taken to task by **Brian** L who writes, (abbreviated version), "Whilst I do enjoy your column, I thought that 'Sky High' was meant to be primarily about airband information but you do seem to go 'off topic' at times, to a lesser or greater degree. Also why do you not include readers logs".

Well, I suppose I would have to agree with that, but I do consider that the job of this column is to look at the broader picture and I try to include all sorts of aviation information, even if the direct link to the airbands is a bit tenuous. Consequently, I tend to include all sorts of related material such as readers comments on airband radios, books, equipment, websites, etc. From the response I get from readers the

balance seems to be about right.

It would be nice to be able to include loads of new callsign/frequency/airspace information every month, but generally this is not possible as more often than not there are little or no changes, or alternatively it all comes at once such as the various recent airspace changes. It is not always easy to compile a column like 'Sky High', as basically you can only report what there is to report. It would be easy for me to fill up the column with pages of logs, but I prefer to carefully scan the logs and extract the information that I feel of interest.

Concorde Photo

Several readers have been in contact regarding the Concorde landing photograph in the January edition of *SWM*. Anyone interested in obtaining a copy of this photo should go to **www.photav.demon.co.uk** where further information is available.

Our photo this month - having delved into the military archives two months ago - this time it is the turn of the civil archive. The airline that brought Transatlantic travel within the budget of us mere mortals. A Freddie Laker Skytrain DC-10, seen on the ramp at Gatwick in May 1982, note the new Gatwick Tower being constructed in the background.

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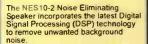
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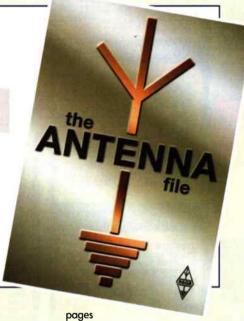
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STOCKTON & DARG, G4XXG. Meets at the Billingham Community Centre, Billingham, Cleveland, Details from David J. London G0VGB. Tel: (01642) 896395.

EID DURMAM BISHOP AUCKLAND RC, G4TTF. Meets at the Stanley Village Hall, Rear High Road, Stanley, Crook, Co. Durham. Details from Mark Hill GOGFG. Tel: (01.388) 745353.

DERWENTSIDE ARC, G4PFQ. Meets at the Steel Club, 36 Medomsley Road, Consett, Co. Durham. Details from Mr G. Darby G7GJU. Tel: 0191-370 2032.

GREAT LUMILEY AR & ES, G4EUZ. Meets at the Community Centre, Great Lumley, Chester-le-Street, Co. Durham. Details from Nancy Bone G7UUR. Tel: 0191-477 0036, mobile (07990) 760920.

PETERLEE RADIO CLU8, GOKVJ. Details from Andrew Pennell GONSK.

HUMBERSIDE

EAST YORKSHIRE ARS, GOECR. Meets at the Northern Foods Sports & Social Club, Millhouse Woods Lane, Cottingham, E, Yorks, Details from Dawid Taylor G4EBT, Tel: (01482) 876702.

GOOLE R & ES, GOOLE. Meets at the West Park Pavillion, Goole, South Humberside.

GRIMSBY ARS, G3CNX. Meets at Cromwell Social Club, Cromwell Road, Grimsby, South Humberside. Details fro Mr G.J. Smith G4EBK. Tel: (01472) 887720.

HORNSEA ARS, G4EKT. Meets at The Mill, Alwick Road, Hornsea, North Humberside. Details from Jeff Southwell G4IGY. Tel: (01964) 533331.

HULL & DARS, G3AMW. Meets at the SWL Centre, Club Room, Goathland Close, Walton Street, Hull. Details from

RAYWELL PARK SCOUTS ARS, G4CMT. Details from Mr A.D. Russell MOAXU.

SCUNTHORPE STEEL ARC, G4FUH. Details from Alistair Butter M1FCF

NORTH YORKSHIRE

HAMBLETON ARS, GOJQA. Meets at the Mencap Centre, Northallerton, N. Yorks. Details from Ian Brickwood GOJQA Tel: (01609) 775598.

QUEEN MARY ARCG, G6QM. Meets at Blazefield, Pateley Bridge, Harrogate, North Yorks HG3 5DR. Details from Frank Hams G4IEY. Tel: (01242) 236715.

RIPON & DARS, G4SJM. Meets at The Bunker, rear of Ripon Town Hall, North Yorkshire. Details from Nigel Drumm M18DZ. Tel: (01423) 884733.

ROYAL SIGNALS SCARBOROUGH ARC, GORCS. Details from Mr A.W.W. Timme G3CWW. Tel: (01484) 842330.

SCARBOROUGH ARS, G4BP. Meets at the Scarborough Cricket Club, Pavillion, North Manne Road, Scarborough, North Yorks Y012 2TJ. Details from Mr D.P. Tipper G3JBR. Tel: (01723) 377296.

SCARBOROUGH SE GRP, GX0000. Details from Roy Clayton G4SSH. Tel: (01723) 862924.

THE VINTAGE & MILITARY ARS, RS183536. Details from H.A. Aspinali.

YORK ARS, G3HWW. Meets at the Guppy's Enterprise Club, 17 Nunnery 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.

NORTHUMBERLAND

NORTHUMBEIA ARC, GAAX. Meets at the Old Telephone Exchange, Cresswell Road, Ellington, Morpeth, Northumberland, Details from Mr D. Stansfield GOEVV. Tel: (01670) 513026.

SOUTH YORKSHIRE

FINNINGLEY ARS, G7HAH. Deta G4HOY. Tel: (01427) 872522.

MALTBY & DARS, G4SKM. Meets at the Centenary Hall, Clifford Road, Hellaby, Rotherham. Details from Keth Johnson G1PQW. Tel: (01709) 798098.

MEXBOROUGH & DARS, G4BTS. Meets at the Harrop Half, Mexborough, South Yorks. Details from Mr R.T. Sheppard G0KSK. Tel: (01709) 586329.

SHEFFIELD ARC, GOINF. NRAE/RAE turtion provided. Meets at the Sheffield University Staff Club, 197 Brook Hill, Sheffield. Details from Mrs Irene Glossop GOSFH.

TYNE & WEAR

HOUGHTON-LE-SPRING ARC, G3NMD. Meets at the Dubmire Royal British Legion, Dubmire, Fencehouses, Tyne & Wear DH4 6LJ. Details from Foster Aungles GOABF, Tel:

SOUTH TYNESIDE ARS, GXOWKQ. Meets at the Boldon Scout Hut, Grey Horse Car Park, Front Street, Boldon. Details from William Wilson MOBWI. Tel: 0191-421 9921.

TYNEMOUTH ARC GONWM. Meets at the Linskill Centre, Linskill Terrace, North Shields, Tyne & Wear. Details from Mr G.N. Thompson GOSBN.

TYNESIDE ARS, G3ZQM. Meets at the St Teresa's Club, 200b Heaton Road, Newcastle-upon-Tyne NE6 5HP. Details from Mr J. Pickersgill GODZG. Tel: 0191-265

WEST YORKSHIRE

HALIFAX & DARS, G2UG. Details from Mr S.P. Ortmayer G4RAW, Tel: (01422) 203062.

KEIGHLEY ARS, GOKRS. Meets at the Cncket Club, ingrow, Keighley, West Yorkshire. Details from Mr I. Townson M1BGY. Tel: (01274) 723951.

LEEDS & DARS, G4LAD. Meets at The Radio Shack, Yambury (Horsforth), RUFC Grounds, Brownberrie Lane Horsforth, Leeds LS18 5HB. Details from Mr E. Howde G0I8U.

NORTH WAKEFIELD RC, G4NOK. Meets at the East Ardsley Cricket Club, Nr. Wakefield. Details from Mrs Olga Parker 2E1ASV. Tel: 0113-253 9087. OTLEY ARS, G3XNO. Meets at The RAOB Club, Westgate, Otley, West Yorkshire. Details from Jack Worsnop GOSNV. Tel: (01274) 636197.

PONTEFRACT & DARC, G3FYQ. Meets at the Carleton Community Centre, Pontefract, West Yorkshire. Details from Colin Wilkinson GONQE. Tel: (01977) 677006.

SPEN VALLEY ARS, G3SVC. Meets at the Old Bank WMC, Mirfield, West Yorkshire. Details from Mr J.R. Wilde GOFOI 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 RPTR GP, GOKNR. Details from Mike Charlton G60XZ.

WHITE ROSE ARS, G3XEP. Meets at the Moortown RUFC, 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 Chews House, 77 High Street South, Dunstable, Beds LUG 3SF, Details from Phil Seaford G8XTW. Tel: (01525) 384419.

ST SWITHUN'S ARC, MOAJV. Meets at St. Swithun's Church, Rectory Rooms, Sandy, Beds. Details from Kelvyn Darton GOWOD. Tel: (01767) 683179.

CAMBRIDGESHIRE

CAMBRIDGE & DARC, G2XV. Meets at the Coleridge Community College, Radegund Road, Cambridge. Details from Ron Huntsman G3KBR. Tel: (01223) 501712.

DUXFORD ARS, GB2IWM. Meets at Building 177, Impenal War Museum, Duxford Alrfield, Cambs. Details from Mrs B.I. Pope. Tel: (01279) 656149.

GTR PETERBOROUGH ARC, G4EHW. Meets at the 6th Form Building, Stanground College, Farcet Road, Flett Peterborough. Details from Alan D. Ralph G8XLH.

HUNTINGDONSHIRE ARS, GOHSR. Meets at the Medw Centre, Medway Road, Huntingdon. Details from David Leech G7DIU, Tel: (01480) 431333.

MARCH & DRAS, G3PMH. Meets at the British Legion Club, Rookswood Road, March, Cambs PE15 8DP. Details from Mr J. Braithwaite G3PWK. Tel: (01353) 698885.

PETERBOROUGH R & ES, G3DQW. Details from Mr V. Edwards G8NGZ.

WISBECH AR & ELEC. CLUB, M5ARC, G4PQL, G8NED. Meets at RAFA Club, Old Market, Wisbech. Details from Alan Bridgeland MODUQ. www.warec.org.uk

OERBYSHIRE

BOLSOVER ARS, G4RSB. Meets at the Blue Bell, High Street, Bolsover, Derbys. Details from Colin Morris G0RXT. Tel: (01246) 822856.

BUXTON RA, G4SPA. Meets at the Leewood Hotel, Buxton. Details from Derek Carson G4IHO. Tel: (01298) 25506.

DERBY & DARS, G2DJ, Meets at Carlton Road United Reform Church, Carlton Road, Littleover, Derby, Details from Martin Shardlow G3SZJ. Tel: (01332) 556875,

FREWASH VALLEY ARG. GOPCX. Meets at The Sitwell Arms

Public House (between Horseley Woodhouse and Woodside). Details from Peter Russell MOAOL

MOUNT ST. MARY'S ARC, G4MSM. Meets at the College, Spinkhill, Sheffield. Details from Rev. P. McArdle G0DAG. Tel: (01246) 812230.

NOTTS & DERBY BORDER ARC, G4NID. Meets at Maripool United Reform Church, Chapel Street, Maripool, Illeston. Details from Graham Bromley G4UTN. Tel: (01773) 834308.

STH DERBYS & ASHBY W ARG, GOSRC. Meets at the Moira Replan Centre, 17 Ashby Road, Moira, Swadlincote, Derbyshire De12 6DJ. Details from Mrs B. Walley. Tel: (01283) 760822.

STH NORMANTON, ALFRETON & DARC, GOCPO. Meets at the New St. Community Centre, New Street, South Normanton, Derbyshire. Details from Peter Gething MOCLQ. Tel: 0115-955 5766.

GLOUCESTERSHIRE

CHELTENHAM CLUSTER SUPP GP, GB7DXC. 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 INDUSTRIES RS, G4MEN. Meets at the Sports & Social Club, Evesham Road, Bishops Cleeve, Cheftenham Social Club, Evesham Road, Bishops Cleeve 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 G3ILO.

WHITE NOISE LISTENING GOWNL. Details from Adnan Deane G7KCG.

HEREFORD & WORCESTER

BROMSGROVE & DARC, G3VGG. Meets at the Avon Arts Centre, Bromsgrove, Worcs, Details from Mr J.F Burford G40AZ.

8ROMSGROVE ARS, G4TUI. Meets at the Likey End WMC, **Bromsgrove**, Worcs. Details from Barry Taylor G0TPG. Tel: (01527) 542266.

DROITWCH ARC, G4PVO. Meets in the Community Hall, Doitwich Spa, Worcs. Details from Hector Wragg M18UV. Tel: (01905) 794399.

HEREFORD ARS, G3YDD. Meets at the Civil Defence HQ, Magistrates Court, Gaol Street, Hereford. Details from Tim Bridgland-Taylor GOJWJ. Tel: (01432) 279435.

MALVERN HILLS ARC, G4MHC. Meets on the second Tuesday of the month at the Town Club, Great Malvern. Details from Mile G3TGD. Tel: (01905) 830752, E-mail: mike@allenson.fsnet.co.uk 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 RAC, GOERA. Meets at the BBC Club, High Street, Evesham, Words. Details from Mr A.C. Lindsa G4NRD. Tel: (01386) 41508.

LEICESTERSHIRE

1F ATC, G7MCD. Details from Sqn. Cmdr. Adnan Ulting G1WZQ.

DEMONTFORT UNIVERSITY, G3SDC. Open to past & present students. Details from Mr R.G. Titterington. Tel: 0116-257 7059.

HINCKLEY AR & ES, G3VLG. Meets at the United Services Club, St. Mary's Road, Hinckley. Details from Mr R.A. Bennett G88FF. 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, Shepshed, Loughborough, Leics. Details from Chns Walker G1ETZ. Tel: (01509) 504319.

NATIONAL SPACE CENTRE ARS, M1NSC. Details from Mr J. Heath G7HIA.

TAMWORTH ARS, GBTRS. Details from Mr A.I. Dyson GOHUW, Tel: (01827) 830437.

LINCOLNSHIRE

WELLAND VALLEY ARS, G4WVR. Meets at The Village Hall, The Green, Great Bowden, Leics. Details from The

FIVE BELLS GROUP, G4SIV. Details from Mr B.K. Tatnall G40DA. GRANTHAM RC, GOGRC. Meets at the Kontak Social Club, Barrowby Road, Grantham, Lincs. Details from the Secretary, Tel: (01476) 657436.

UNCOLN SHORT WAVE CLUB, G5FZ. Meets At The Railway Club, Triton Road, Lincoln. Details from Mrs Pam Rose G4STO. Tel: (01427) 788356.

RAF CONINGSBY ARC, G3LQS. Meets at Essex Block, RAF Coningsby. Details from Peter Hanson G0NVY.

RAF WADDINGTON ARC, GORAF. Meets at Pyewipe Inn, Fossebank, Saxiby Road, Lincoln. Details from Robert Pickles G3VCA. Tel: (01522) 528708.

SPALDING & DARS, G4DSP. 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, 65KN. Meets at The Lilacs Public House, 39 Chuch Street, Isham, Kettering, Northants NN34 1HD. Details from Fay Barwell G6AKS, Tel: (01536)

MID NORTHANTS AR EXP, GOING. Details from Lionel Parker G5LP.

NORTHAMPTON RC, G3GWB. Meets at the British Timken, Social & Athletic Club, Cotswold Avenue, Duston, Northampton, Details from Norman Miller GOGBZ. Tel: (01327) 349188.

NORTHAMPTON SCOUT ARG, G6NDS. Meets at Overstone Scout Activity Centre, Northampton. Details from Ian Rivet G8WPU.

PARALLEL UNES CG, G4LIP. Details from Mr P.S. Lidsay G4CLA.

NOTTINGHAMSHIRE
ARC OF NOTTINGHAM, G3EAW. Mee
Road Community Association, Have ARC OF NOTTINGHAM, G3EW, 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 Ollerton, Notts. Details from Colin

HUCKNALL ROLLS ROYCE ARC, G5RR, Meets at the Hucknall Rolls Royce Sports & Social Club, Watnall Road, Hucknall, Nottingham. Details from Mr P. Hart G4JSM.

MANSFIELD ARS, G3GQC. Meets at the Debdale Park sports & Recreation Club, Debdale Lane, Mansfield Woodhouse, Notts. Details from David Peat GORDP. Tel: Woodhouse, Notts (01623) 631931.

NORTH NOTTS DATA GROUP, GOWNN. Details from Tony Jenkins G8TBF.

SIEMENS ARC, G8ZK, G8IGQ. Meets at the GPT Sports Ground, Beeston, Nottinghamshire. Details from Chris Archer G4VFK. Tel: 0115-943 3387.

SOUTH NOTTS ARC, GOOAU. Meets at the Fairham Community College, Famborough Road, Clifton, Nottingham NG11, 9AE. Details from Gery Bishop GOWUG. Tel: (01509) 672846.

WORKSOP ARS, G3RCW. Meets at the Club House, 59-61 West Street, Worksop, Nottinghan S80 1JP. Details from Terry Calvert G4GBS. Tel: (01302) 743130.

SHROPSHIRE

OSWESTRY & DARC, G4TTO, G10RA. Meets at the Sweeney Hall Hotel, Sweeney, Oswestry. Details from Ant Astley GW0AJA. Tel: (01691) 860545.

SALOP ARS, G3SRT, M1AXW. Meets at the Telepost Club, Railway Lane, Abbey Forgate, Shrewsbury. Details from John Bumford GoGTN. Tel: (01743) 249943. E-mail: john.bumford@vrgin.net

TELFORD & DARS, G3ZME. Meets at the Dawley Bank Community Centre, Dawley, Telford, Shropshire. Details from Mr M. Vincent G3UKV. Tel: (01952) 255416.

STAFFORDSHIRE

BURTON-ON-TRENT & DARS. G3NFC. Meets at the Stapehill Institute, Main Street, Stapehill, Burton-on-Trent, Staffs. Details from Mr M.W. Cotton G4HBY.

CANNOCK CHASE ARS, G6SW. Meets at the Fou Inn, Watling Street, Hatherton, Cannock. Details 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.

UCHFIELD ARS, G3WAS, Meets at the Queens Head, Sandford Street, Lichfield, Details from Roger Smethers G3NLY. Tel: (01543) 672762.

MOORLANDS & DARS, G4NHT, G1MAD. Meets at the Creda Works, Blythe Bridge, Stoke-on-Trent, Staffs ST11 9LJ. Details from Mr B.J. Butcher G4HKG. Tel: (01782) 395793.

NEWCASTLE-U-LYME SCOUT AR COM GR, G7U0G

OKE-ON-TRENT ARS, G3GBU. Meets at the '45' Club, 2 Lancaster Road, Newcastle-under-Lyme, Staffs. Details om Albert Allen G4DHO. Tel: (01782) 638801.

SUTTON COLDFIELD RS, G3RSC. Meets at the Rugby Club Walmley Road, Sutton Coldfield, West Midlands. Details from Paul G. Turner G7MWD. Tel: 0121-350 4263.

AVON VALLEY ARA, MORAD. Details from Mr Peter Bradham GOWXJ. Tel: (01905) 724531.

MID WARWICKSHIRE ARS, G3UDN. Meets at the St. John Ambulance HQ, 61 Emscote Road, Warwick, Details from Bemard Pittaway. Tel: (01926) 420913.

RUGBY ATS, G4APD. Details from Tony Humphnes G00LS. Tel: (01455) 552683.

STRATFORD-UPON-AVON & DRS, GOSOA. Meets at the Home Guard Club, Tiddingham, Stratford-upon-Avon, Warls. Details from Ron Horsley GOMRH. Tel: (07970)

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WEST MIDLANDS
ADRIGE & BARR BEACON ARC, GONEQ. Meets at the
Aidridge Central Hall Community Centre, Middlemore Lane,
Aidridge W39 BAN, Details from Mr C.J. Baker GONOL 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, GOSPM. Meets at The College, Simms Lane, Netherton, Dudley, West Midlands. Details from Stuart Viney. Tel: (01384) 232457.

KYNOCH R & TVS, G3HPP. Meets at the Club Workshop, IMI Ltd., Sportsfield, Perry Bar, Birmingham. Details from

Mr G. Nicholls. Tel: (01922) 635376.

MIDLAND ARS, G3MAR, Meets at Unit 22, 60 Regen Place, Hockley, Birmingham (jewelry quarter). Details John A. Crane GOLAI. Tel: 0121-628 7632.

SANDWELL AMATEUR RADIO CLUB, GOOWC. Meets at Sandwell ARC, Broadway, Oldbury, Warfey, West Midland B68 9DP. Details from Stuart Collins MOBTO. Tel: 0121-561 4663.

SIERRA HOTEL ARCG, GOOBS. Details from Warwick M.

SOLIHULL ARS, G3GE. Meets at The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. Details from Paul Gaskin G8AYY. Tel: 0121-783 2996.

SOUTH BIRMINGHAM RS, G3OHM, Meets at Hampstead House, Fairfax Road, West Heath, Birmingham. Details

STOURBRIDGE & DRS. G6OI, G6SRS. Meets at the Old Swinford Hospital/School, Stourbridge, West Midlands. Swinford Hospital/School. 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 GOPAI. Tel: 0121-561

WEST MIDLANDS POUCE ARC, GOCOP, G1WMP. Details from Steven Jones G6LRL.

WILLENHALL & DARS, G4ETW. Meets at The Liberal Club, Villiers Street, Willenhall, West Midlands. Details from Dave Bradbury. Tel: (01902) 411252.

WOLVERHAMPTON ARS, GSTA. 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 Brick Maker's Arms, Mount Pleasant, Brierley Hill, West Midlands. Details from Andy Evans G1PKZ.

LONDON & CENTRAL

BERKSHIRE

IELD ARC, G3IHH. Details from Mrs E.W. Harding

BRACKNELL AEC, G4BRA. Meets at the Coopers Hill Community Centre, Bagshot Road, Bracknell, Berks. Details from John Ellerton G3NCN.

BURNHAM BEECHES RC, G3WR. Meets at the Famham Common Village Hall, Victoria Road, Famham Common, Bucks. Details from Mrs Elleen Chislett G6EIL. Tel: (0162B) 625720.

MAIDENHEAD & DARC, G3WWX. Meets at the Red Cross Hall, The Crescent, Maidenhead, Berkshire. Details from Neil Savin GOSVN. Tel: (01628) 626210. re. Details from

NEWBURY & DARS, G5XV. Meets at the Rugby Club, Monk's Lane, Newbury. Details from Max Maxwell G7DXC. Tel: (01635) 253233.

READING ARC, G3ULT. Meets at the Woodley Pavillion, Woodford Park, Haddon Drive, Woodley, Reading, Deta from Mamoch Standen GOJMS. Tel: 011B-972 3504.

BUCKINGHAMSHIRE

AYLESBURY VALE RS, G4VRS. Meets at the Harw
Village Hall, Aylesbury, Bucks. Details from Mr L.I.
GODFC.

CHESHAM & DARS, G3MDG, G1MDG. Meets at the White Hill Centre, Chesham, Bucks. Details from Mr T.J. Thirtwell GOVFW. Tel: (01442) 832169.

CHILTERN ARC, G3CAR. Details from Roy Page G4YAN. Tel: (01494) 534216.

MILTON KEYNES ARS, G3HIU. Meets at Bletchley Park Museum (The Green Room, B Block Annexe), Wilton Avenue, Bletchley, Milton Keynes. Details from Mrs J. Battersby M1EPL (Secretary) on (01909) 556563 or Frank Collins MORPM (Chairman) on (01234) 713148

MILTON KEYNES SCOUT ARS, GOSMK. Meets at The Quarries, M.K. Scout Campsite, Cosgrove. Details from Mr P.A. Orchard GORYZ. Tel: (01908) 648186.

GREATER LONDON

ADDISCOMBE ARC, GAALE. Meets at the Lion inn,
Pawsons Road, Croydon. Details from Mr Q.G. Collier
G3WRR, Tel: 02/08-653 6948.

BARKING R & ES, G3XBF. Meets at the Parkside Community Centre. Details from Bill Chewter GOIQK. Tel: (01708) 474443.

BROMLEY & DARS, RS89030. Meets at the Victory Social Club, Kechill Gardens, Hayes, Bromley. Details from Alan G. Messenger GOTLK.

CLIFTON ARS, G3GHN. Meets at the Kidbrooke 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, Pansh Rooms, Beulah Hill, London. Details from Bob Burns G300U, Tel: (01737) 552170.

DARENTH VALLEY RADIO, GOKDV. Meets at the Crockenhill Village Hall, Swanley, Kent. Details from Mr K.W. Halls G8VJG. Tel: (01322) 663022.

ECHELFORD 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 GOPQB. Tel: 0208-953 2164.

HAVERING & DARS, G4HRC. Meets at the Fairkytes Arts Centre, 51 Billet Lane, Hornchurch, Essex.

RS OF HARROW, G3EFX. Meets at the Harrow Arts Centre, Uxbridge Road, Hatch End, Middlesex. Details from Mr C. Friel G4AUF. Tel: (01895) 621310.

SILVERTHORNE RC, G3SRA, G2HR, G8CSA. Meets at the Chingford Adult Education and Community Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. Details from Dave Christy G0KHC. Tel: 0208-504

MITCHAM & DISTRICT ARS. Meets at the ATC Hut, Commonside West, Mitcham, Surrey CR4 4HB. Details from Mr M. Knott GOWCR.

SOUTHGATE RC, G3SFG. Meets at the Winchmore Hill Cncket Club, Firs Lane, London N21 3ER. Details from Mr D.F. Berry G4DFB.

ST. DUNSTANS COLLEGE ARS, G4SDC. Details from Sam Kennard G4OHX. Tel: 01B1-690 1274.

SURREY RADIO CONTACT CLUB, G3SRC. Meets at the T.S. Terra Nova, 34 The Waldrons, Croydon, Surrey. Details from Maunce Fagg G4DDY. Tel: 0208-669 1480.

WEST LONDON ARS, RS95599. Details from Robin Clay GOVJI.

WHITTON ARG, GOMIN. Meets at the Whitton Community Centre, Percy Road, Whitton. Details from Ian Clabon GOOFN, Tel: 0208-894 9131.

BISHOPS STORTFORD ARS. G5ZG. Meets at the Royal British Legion Club, Windhili, Bishop's Stortford, Herts. Details from Tony Judge GOPQF. Tel: (01279) 506933

DACORUM ARTS, G7RIH, GOWIH. Meets at the Guide Meeting Rooms (next to the Royal British Legion), Queensway, Hemel Hempstead. Details from Ian Hamilton GOTCD. 1et: (01442) 211925.

HODDESDON RADIO CLUB, GOTSN. Meets at the Rye Park Conservative Club, Rye Road, Hoddesdon, Herts. Details from Don Platt G3JNJ. Tel: 0208-292 367B.

MIMRAM CONTEST GP, MOABC. Details from Alan Holdsworth G800. Tel: (01707) 392950.

RADIO SCOUTING TEAM, GB2RST. Meets at Tolmers Scout Camp, Tolmers Road, Cuffley, Herts EN6 4JS, Details from Mill Livens G2CKB. Tel: (01992) 558493.

STEVENAGE & DARS, G3SAD. Meets at the Stevenage Day Centre, Chells Way, Stevenage, Herts SG2 OLT. Details from Peter Bell 2E1CRK, Tel: (01462) 674505.

ERULAM ARC, G3VER, G8VER. Meets at the RAF sociation HQ, New Kent Road, St. Albans, Herts. Details on 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 G7PWF. Tel: (07973) 560649.

BENTLEY ARC, GOVZS. Details from Derek Gilbert GONFA.

CATERHAM RG, GOSCR. Details from Mr P.N. Lewis G4API

COULSDON AMATEUR TRANS. SOC., G4FUR. Meets at St. Swithurs Church Hall, Grovelands Road, Purley, Surrey. Details from Andy Briers GOKZT. 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, Famborough, Hants. Details from Mr M. Hearsey G8ATK. Tel: (01252) 715765.

GUILDFORD & DRS, GGGS. Meets at the Guildford Model Engineers HQ, Stoke Park, Guildford, Surrey. Details from ngineers HQ, Stone . _ tella Whitbourn GOSWE.

KINGSTON & DARS, G3KIN. Details from Mrs Mary Ashdown G0BQV.

REIGATE ATS, G5LK, 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 GOBWV, Tel: 0208-644 9945. THAMES VALLEY ARTS, G3TVS. Meets at the Thames Ditton Library, Watts Road, Giggs 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. Det from Mr Reg Blackwell M1EEK. Tel: 0208-696 9857

SOUTH & SOUTH EAST

EAST SUSSEX
BRIGHTON RADIO CLUB, G4GQR. Meets at Vallance
Community Centre, Saciville Road, Junction of Connaught
Road, Hove.. Details from Hon. Sec GORNS, Tel: (01273)
699104.

CROWBOROUGH DARS, GOCRW. Meets at the Plough & Horses, Walshes Road, Jan's Brook. Details from Mrs M. Clark. Tel: (01892) 663666.

EAST SUSSEX AMATEUR TV GROUP, RS178475 was GB3VX. Details from Keith Ellis G8HGM. Tel: (01323) 720220.

SOUTHDOWN ARS, G3WQK. Details from Jim Han G4DRV. Tel: (01323) 728479.

THE QRZ ARG OF SUSSEX, GB3VX. Meets at the Coach Station, Warting Road, Eastbourne, Details from Stuart Constable MOCHW. Tel: (01435) 863020.

HAMPSHIRE

ANDOVER RAC, GOARC, Meets at the Village Hall, Wildhem, Andover, Hants. Details from Mr R.S. Coleman GOWYD.

BASINGSTOKE ARC, G3TCR, G8JYN. Meets at the GEMS Social Club, Lister Road, Basingstoke, Hants. Details from Bob Brown MOCJJ,

FAREHAM & DARC, G3VEF. Meets at the Ponchester Community Centre, Westlands Grove, Portchester, Hants. Details from Andrew Sinclair GOAMS. Tel: (01329) 235397.

HIGHFIELD PARK RC, G4WD. Meets at Highfield Park RC, National Air Traffic Service, Highfield Park, Heckfield, Hants RG27 OLD. Tel: (01734) 225019.

HORNDEAN & DARC, G4FBS, Meets at Lovedean Village Hall, Lovedean Lane, Lovedean, Hants. Details from Stuart Swain G0F/X. Tel; (01705) 472846.

ITCHEN VALLEY ARC, GOLVR. Meets at the Scout Hut, Brickfield Lane, Chandlers Ford, Eastleigh, Hants. Details from Sheila Williams GOVNI, Tel: (01703) 813827, SONY BROADCAST ARC, G4SZC. Accredited C&G RAE centre. Meets at Sony Sports & Social Club, Pnestley Road. Basinestoke, Details from Stephen Harding G4JGS. SOUTH HAMPSHIRE INT. TELE SOC., G3DIT. Meets at G3JZV's QTH, space is limited. Details from Rev. T.R. Mortumer G3JZV. Tel: (02392) 649254.

UBMARINE ARC, G3BZU. Meets at HMS Collingwood ewgate Lane, Fareham, Hants P014 1AS. Details for Ir W.S. Blyth G0PPH. Tel: (01329) 232386.

IREE COUNTIES ARC, G4WWR. Meets at the Bramsho irish Inst. & Club, Headley Road, Liphook, Hants. Deta im Damian Kamm G7RFV, Tel; (01428) 724456.

WATERSIDE ARS, G4JYN. Meets at the Applemore Scout HQ, Applemore, Hythe, Southampton. Details from Tony Horton GOLKG. Tel: (01703) 841794.

ISLE OF WIGHT

BRICKFIELDS ARS, GOBAR. Meets at Brickfields Horse Country Cent, Newnham Road, Binstead, Isle of Wight. Details from Mr Pebody.

ISLE OF WIGHT RS, G3SKY. Meets at The Old Cafe, Whiteciff Bay, Holiday Park, Bembridge. Details from Alan Reeves G4ZFQ. Tel: (01983) 294309.

OXFOROSHIRE

BANBURY ARS, GOBRA. Meets at St. John's Church Social Club, South Bar, Banbury, Oxon. Details from Mr R.S. Marsden G1YSY. Tel/FAX: (01295) 253509.

HARWELL ARS, G3PIA. Meets at the Social Club, Harv Laboratory, Didcot, Oxon. Tel: (01235) 223250.

OXFORD & DARS, G5L0. Meets at the Grove House Club, George Street, Summertown, Oxford. Details from Mr D. Walker G3BLS. Tel: (01865) 247311.

VALE OF WHITE HORSE ARS, G5RP, G4VWH, G6VWH. Meets at The Fox, Steventon. Details from Ian White G3SEK. Tel: (01235) 531559.

WEST SUSSEX

CHICHESTER ARC, G2NM. Meets at the St. Pancras Hall, Chichester. Details from Graham Swann GOWSD.

CRAWLEY ARC, G3WSC. Meets at the Tilgate Forest Rec. Centre, Hut 1B, Tilgate Forest, Crawley, West Sussex. Details from Mr J.S. Spence GOFPI.

HORSHAM ARC, GAHRS. Meets at the Guide Hall, Denne Road, Horsham, West Sussex. Details from Alister Watt G3ZBU. Tel: (01403) 253432.

MID SUSSEX ARS, G3ZMS. Meets at Marie Place, Leylands Road, Burgess Hill, West Sussex. Details from Mr C. Childs 2E1DCP. Tel: (01444) 244689.

T.S. VINDICATRIX ASN, GOWVB. Details from Don Still G000C.

WORTHING & DARC, G3WOR. Meets at the Lancing Pansh Hall, South Street, Lancing, West Sussex.

WORTHING & DISTRICT VIDEO RG, GB3VR. Details from the Treasurer. Tel: (01903) 211919 (w).

WILTSHIRE

CHIPPENHAM & DARS, G3VRE. Meets at the Sea Cadet HQ, Chippenham. Details from Jon Ainge G4LGZ. Tel: (01249) 462610.

SWINDON & DARC, G3FEC. Meets at the Eastcott Community Centre, Savenake St., Swindon. Details from Den Forrest MOACM.

TROWBRIDGE & DARC, G2BQY. Meets at the Southwick Village Hall, Southwick, Trowbridge, Writs. Details from Ian Carter GOGRI. Tel: (01225) 864698.

SOUTH WEST & CHANNEL ISLANDS

AVON

RC, G3TAD. Meets at the Lodgeside Club, Lodge swood, Bristol, Details from Dave Bendrey

(01275) B74001.

NORTH BRISTOL ARC, G4GCT. Meets at the Self H Enterprise, 7 Braemar Close, Northville, Bristol. De from David Coxon G0GHM. Tel: (01275) 790448.

SEVERNSIDE TV GROUP, GB3ZZ, Meets at NBARC, Filton, Bristol, Details from Paul Stevenson GBYMM. Tel: 0117-965-5386

SHIREHAMPTON ARC, GAAHG. Meets at the TS Enterprise Sea Cadet Unit, Station Road, Shirehampton. Details from Mr R.G. Ford G4GTD, Tel: 0117-985 6253. SOUTH BRISTOL ARC, G4WAW, Meets at the Whitchurch Folk House, East Dundy Road, Bristol. Details from Mr LF. Baker. Tel: (01275) 834282.

THORNBURY & SOUTH GLOS ARC, G4ABC. Meets at the United Reform Church Hall, Rock Street, Thombury, Bristol, Details from Stan Greenhill GORYM. Tel: (01454) 413177.

WESTON-SUPER-MARE RS, G4WSM. Meets at the Woodspring Hotel, High Street, Worle, Weston-Super-Mare. Details from Stephen Cole G3YOL. Tel: (01934) 843144.

CORNWALL & SCILLY IS

CORNISH RAC, GACRC. Meets at the Perran-ar-Worthal Village Hall, Perranwell, Nr Truro, Comwall. Details from Mrs Cheryll Hammett 2E1ADQ. Tel: (01726) 882758.

NEWQUAY & DARS, G4ADV, Meets at the Treviglas School, Newquay. Details from Mrs Maggie Reed GOKEM. Tel: (01726) 882752.

POLDHU ARC, GB2GM. Meets at the Club House, Cove, Mullion, Comwall TR12 7JB. Details from M Carolyn Rule MOADA. Tel: (01326) 240144. SALTASH & DARC, G4GXK, G8SAL. Meets at the Toc H Hall, Warraton Road, Saltash, Comwall. Details from Brian Giles. Tel: (01752) 844321.

ST AUSTELL ARC, GOECC. Meets at Poltair School. Details from Reg Pears G4TRV. Tel: (01726) 72951.

APPLEDORE & DARC, G2FKO. Meets at the Appledore Football Club. Details from Mr B. Jewell MOBRB,

AXE VALE ARC, GBCA, G7AXE. Meets at the George Hotel, Axminster, Devon. Details from Pat Cross GOGHH. Tel; (01297) 33756.

SWM. April 2004

DARTIMOOR RADIO CLUB, G1RCD, GOORC. Meets at the Yelverton War Memonal 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, GOXRC. Meets at The Scout Hut, Marlpool Hill, Exmouth.

NORMAN LOCKYER OBSERVATORY ARG, GOAXC. Meets at the Norman Lockyer Observatory, Salcombe Hill, Strongth Challes from Ron Hamson GONOC. Tel: (01395) 515349.

NTE (PAIGNTON) ARS, GOOSH. Meets at Paignton Community College, Upper School, Waterleat Road, Paignton. Details from Rod Maude GOSWM. Tel: (01803) 521066.

TORBAY ARS, G3NJA. Meets at the Highweek Family & Social Club, Highweek, Newton Abbot, Devon. Details from John Olway G3RMA, Tel: (01803) 556425.

UNIVERSITY OF PLYMOUTH ARS, GOUOP. Details from Alan Santillo GOXAW.

DORSET

BLACKMORE VALE ARS, G4RBV. Meets at Shaftesbury Club for Young People, Coppice Street. Shaftesbury, Dorset SP7 BPF. Details from Mr A, Marnott GOGFL Tel: (01258) 860741.

BOURNEMOUTH RS, G2BRS. Meets at the Kinson Community Centre, Kinson, Bournemouth, Dorset. Details from Chris R, Elis MSAGG, Broken Rdge, Fir Tree Close, St. Leonards, Ringwood, Hants BH24 2QW. Tel: (01202) 893126.

CHRISTCHURCH ARS, GOMUD. Meets at the Siemens Plessey Sports & Social Club, Grange Road, Somerfor Chnstchurch, Dorset. Details from Mr K.P. Hams G7M Tel: (01202) 484892.

FUGHT REFUELLING ARS, G4RFR. Meets at the FI Refuelling Social Club, Merley, Wimborne, Dorset. from Martin Axon 2E1DFZ. Tel: (01202) 693334.

POOLE RS, G4PRS, Meets at the Bournemouth & Poole CFE, Constitution Hill Site, Poole, Dorset. Details from Phil Mayer G0KKL. Tel: (01202) 700903.

PORTLAND ARC, GOVOP/G7VQP. Meets at Clifton Hotel, Grove Road, Portland. Details from Kerry Morris G1WIK. Tel: (01305) 788591.

SOUTH DORSET RS, G3SDS. Meets at the Church Hall, Chickerell, Weymouth, Dorset. Details from John Rose M0BQ0. Tel: (01305) 832057.

SWANAGE & PURBECK ARC, MOBLI. Meets at Kings Arms, Langton Matravers, Dorset. Details from Peter Wa M1WCH/M3WCH. Tel: (01929) 424413.

WESSEX AMATEUR WIRELESS CLUB, G1WAW, Details from Ken Powell G1NCG, Tel: (01202) 549376.

JERSEY
JERSEY ARS, GJ3DVC. Meets at the German Signal
Station, Rue Baal, La Moye, St. Bretade. Details from Mrs
Anne Mourant MJ0BJU. Tel: (01534) 734948.

SOMERSET

PRESTON COMMUNITY SCHOOL ARC, GOPCS, Details from Craig Douglas GOHDJ. Tel: (01935) 71131.

TAUNTON & DARS, G3XZW. Meets at The Memorial Hall, Trull, Taunton, Details from David Rosewam MOCIF.

WEST SOMERSET ARC, GOOWX. Meets at the West Somerset Community College, Minchead, Somerset. Details from Alan Elliott G7RSU. Tel: (01643) 707207.

WINCANTON ARC, GOWRA. Meets at King Arthur's Community School, West Hill, Wincanton. Details (G.A. Fingerhut GOENW. Tel: (01963) 370506.

YEOVIL & DARC, G3CMH, G8YEO. Meets at the British Red Cross HQ, 72 Grove Avenue, Yeovil, Somerset. Details from George Davis G3ICO. Tel: (01935) 425669.

BRAINTREE & DISTRICT AMATEUR RADIO SOCIETY, G3XG. Meets at the Braintree Hockey Club, Church Street, Bocking, Braintree, Details from John MSAJB. Tel: (01787) 460947.

CHELMSFORD ARS, GOMWT. Meets at the Marconi Social Club, Beehive Lane, Chelmsford, Essex. Details from David Bradley MDQC. Tel: (01245) 602838. E-mail: cars@g0rmwt.org.uk

CLACTON RADIO CLUB, G3CRC, Details from Mr O. Fitzpatnick MOCHL.

COLCHESTER ARS, G3VCO. Meets at the Colchester Institute, Sheepen Road, Colchester, Details from Frank R. Howe G3FU. Tel: (01206) 851189,

DENGIE HUNDRED ARS, GOUTT, G7SDH. Meets at the Henry Samuel Hall, Maryland, Essex. Details from Mrs Chnstine Wade. Tel: (01621) 772986.

HARLOW & DARS, GGUT. Meets at the Mark Hall Barn, First Avenue, Harlow, Essex. Details from Len Brackstor G7UFF. Tel: (01279) 832700. FAX: (01279) 864973.

HARWICH ARIG, GOGRH, Meets at the Park Pavillion, Barrack Lane, Harwich. Details from Eugene Kraft G4FTP.

LOUGHTON & EPPING FOREST ARS, G40NP, Details from Marc Litchman G0TOC, Tel: 0208-502 1645/(07803)

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, Cliftown Parade, Southend-on-Sea, Essex. Details from Alan Radley GOTTM. Tel: (01268) 741229.

STANFORD-LE-HOPE & OARC, G4SLH. Meets at the St Joseph Parish Rooms, Scratton Road, Stanford-le-Hope, Essex, Details from Ken Thompson G4PAD. Tel: (01375) 671238.

VANGE ARS, G3YCW. Meets at the Bamstable Community Centre, Basildon, Essex. Details from Mrs D. Thompson. Tel: (01268) 552606.

KENT

BREDHURST RX & TX SOC., GOBRC. Meets at Rock

Avenue Working Mans Club, Rock Avenue, Gillingham, Kent. Details from Mr T.M. Wheeler G7MIM

CRAY VALLEY RS. G3RCV. G1RCV. Meets at the Progres Hall, Admiral Seymour Road, Eitham, London SE9, Deta from Richard Perzyna G8ITB, Tel: (01689) 602948.

DOVER RADIO CLUB, G3YMD. Meets at the Dover Grammer School for Boys, Astor Avenue, Dover. Jim Caims M1Bkl. Tel: (01304) B52773.

EAST KENT RADIO SOCIETY, GOEKR, Meets at St. Bartholomew's Church Hall, Herne Bay. Details from Pa 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)

HILDERSTONE ARS, GOHRS. Meets at Hilderstone A.E.C., Broadstairs, Kent. Details from Mr G. Shaw MOAQA.

HOME COUNTIES ATV GRP, G6HCT. Meets at the Binfield Club, Binfield (near M4/J10), Details from Mr A. Brooker G4WGZ.

MAIOSTONE YMCA ARS, G3TRF. Meets at YMCA Sports Centre, Melrose Close, Maidstone, Kent, Details from Co Wilson G0VAR. Tel: (01622) 736636.

MEDWAY ARTS, G5MW, G8MWA. Meets at Tunbury Hall, Catkin Close, Tunbury Avenue, Walderslade, Chatham. Details from Mr J. Hale G3FTH.

NORTH KENT RS, G4CW. Meets at The Pop-in-Parlour, Graham Road, Bexleyheath, Kent. Details from Mr A,V, Fnbbens G8MLQ. Tel: (01474) 365694.

SWALE ARX, G4SRC, G6SRC, Meets at the My Leaf Club, Dover Street, Sittingbourne, Kent. Details from Gordon Powell MOAKA, Tel: (01795) 665559. THE MORSE CLUB, GXOOXE. Meets at The Five Wents Memorial Hall, Swanley/Hextable Road. Details from Ken M3CZA. Tel: 0208-306 3544.

WEST KENT ARS, G3WKS. Meets at the St. Marks School Hall, Tunbridge Wells, Kent. Details from Malcolm Sheppard G4FWG, Tel: (01892) 652272.

ANGLIA TELEVISION ARS, GOTXV. Meets at Anglia TV, Norwich NR1 3/G. Details from Jim Bacon G3YLA. Tel (01603) 615151.

GREAT YARMOUTH RS, G3YRC. Meets at the Bradwell Community Centre, Bradwell, Great Yarmouth, Norfolk, Details from Mr A.D. Besford G3NHU.

GRESHAM'S SCHOOL ARC, GX3PXO, Details from Rev. R.N. Myerscough G3PXO.

KINGS LYNN ARC, G3XYZ. Details From Derek Franklin

NORFOLK ARS, G4ARN. Meets at Norwich Aviation Centre, Norwich Airport. Details from John Wadman G0VZD. Tel: (01953) 604769.

NORTH NORFOLK ARG, GB2MC, Details from Tony Smith G4FAI. E-mail g4ai@connectfree.co.uk

SUFFOLK

BURY ST. EDMUNDS ARS, G2TO. Meets at the Culford School Culford, Bury St. Edmunds, Suffolk. Details from George Woods G3LPT.

ELIXSTOWE & DARS, G4ZFR. Meets at the Orwell Park shool, Nacton, Near Ipswich, Details from Paul Whiting 4YQC. Tel: (01473) 642595.

FRAMLINGHAM COLLEGE ARC, MOCBB. Tel: (0172B)

IPSWICH RADIO CLUB, G4IRC, Meets at the Golden Hind, Nacton Road (3rd Wednesdays at The Hollies, Bucklesham Straight Road), Ipswich. Details from Kerth Gaunt G7CIV. Tel: (01394) 420226.

LEISTON ARC, GOTUQ, Meets at Leiston Town Athletic Assn., Victory Road, Leiston, Suffolk, Details from Paul Cattermole M3MlG. Tel: (01728) 746044.

LOWESTOFT DRS, G3JRM. Meets at The George Barrow Hotel, Outton 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, GOSWI, G7SRA. Meets at the Old School, Wells Hall Road, Great Comard, Sudbury, Suffolk. Details from Bryan Panton G1TWY.

SUFFOLK DATA GROUP, GB7MXM. Details from Peter Pryke GBHUE. Tel: (01473) 631313.

NORTH WALES

CLWYD

CONWAY VALLEY ARC, GW6TM. Meets at the Studio, Penrhos Road, Colwyn Bay, Clwyd, Details from Mr R.W. Evans GW6PMC. Tel: (01745) 855068.

HALKYN & DARS, GW3HRG, Details from Mr D. Austin

NORTH WALES RS, GWONWR. Meets at the Old YMCA, Queen's Drive, Colwyn Bay, Clywd. Details from Ted Shipton GWODSJ. Tel: (01745) 336939.

WREXHAM ARS, GW4WXM, Meets at the Community Centre, Maesgwn Road, Wrexham, Details from Mr P, Moran GW0WER.

GWYNEDD

MEIRION ARS, GW4LZP. Meets at the Royal Ship Hotel, Dolgellau, Gwynedd, Details from Gervase Chavasse GW4URJ. Tel: (01341) 42102B.

PORTHMADOG & OARS, GWOMVI. Meets at The Yacht Club, The Harbour, Porthmadog, Gwynedd. Details from G. Cadwaladr MW10FN.

THE DRAGON ARC, GW4TTA. Meets at the Ebenezer Church Hall, Lon Foel Graig, Llanfaipwll, Isle of Anglesey, Details from Stewart Rolfe GW0ETF, Tel: (01248) 362229.

POWYS

POWYS ARC, GW4HVN. Meets at the ATC HQ, Park Lane, Newtown, Powys. Details from Mrs Jean Brown 2W1CEZ. Tel: (01686) 640814.

SOUTH WALES

DYFED ABERPORTH YMCA, GW4SZV. Meets at the Hut B17, The Alrfield, Aberporth. Details from Mr G. Carruther GW4HGJ. Tel: (01239) B11205.

ABERSYSTWYTH & DARS, GWOARA. Meets at the Scout Hut, Plascrug Avenue, Aberystwyth. Details from John Woodward GW6IOK, Tel: (01970) B90657.

CARMARTHEN ARS. GWAYCT. Meets at The Aelwyd Care Home, Carmarthenshire County Council, Tregymwr Road, Langunnor, Carmarthen SA31 3BS. Details from Mr W.O. Hughes GWAZXL. Tel: (01267) 231359.

CLEDDAU ARS, GWOSYG. Details from Trevor Pe GW4XQK. Tel: (01646) 600725.

LLANELLI ARS, GWOEZQ. Meets in the Furnace Community Hall, Furnace Square, Llanelli. Details from Roy Jones GWOK/ZK. Tel: (01554) B20207.

PEMBROKESHORE RS, GWOEJE. Meets at Furzy Park Community Centre, Furzy Park, Haverfordwest, Pembrokeshire. Details from Ian M. Jones MWOCAB. Tet: (01437) 76302B.

GWENT

ABERGAVENNY RS, GW4GFL Meets at the Hill Residential College, Pen-y-Pound, Abergavenny, Gwent. Details from Glyn Hughes GW0DQY. Tel: (01633) 483186.

BLACKWOOD & DARS, GW6GW. Meets at the Oakdale Comprehensive School, Oakdale, Blackwood, Gwent, Details from John Evans GW8ITI. Tel: (01495) 22517B.

EBBW VALE COLLEGE RS, GWOIW. Meets at the Gwent Tertiary College, Ebbw Vale Campus, College Road, Ebbw Vale, Gwent. Details from Mr T. Hayden GWOHCN. Tel: (01495) 305192.

NEWPORT ARS, GW4EZW. Meets at the Brynglas Community Centre, Brynglas Road, Newport, Gwent, Details from Paul Nicholls.

PONTYPOOL ARS, GW3RNH. Meets at the Settlement, Rockhill Road, Pontypool, Gwent. Details from Graham Smith GW00LZ.

MID-GLAMORGAN

BRIDGEND & DARC, GW4LNP. Meets at the Club Brynmenyn, Brynmenyn, Bridgend. Details from A Hulmes. Tel: (01656) 721574.

HOOVER (MERTHYR) ARC, GW3RDB. Meets at the Hoove Sports Pavillion, Hoover Ltd., Pentrebach, Merthyr Mydfil, Mid Glamorgan, Details Robert Cummings GWORVG.

MID GLAMORGAN ARG, MWOCNA. Meets at Aberkenfig Sports & Social Club. Details from Menyn Carey GW4VSE. Tel: (01656) 734668.

SOUTH GLAMORGAN

BARRY ARS, GW3VKL Meets at Sully Sports & Leisure Club, South Road, Sully, S. Glamorgan. Details from Richard Mortimore GW4BVJ. Tel: (01446) 738756.

HIGHFIELDS ARC, GW4LFO. Meets at the Highfields Physically Handicapped Centre, Allensbank Road, Cardiff Tel: (01222) 561542.

WEST GLAMORGAN

PORT TALBOT (BS PLC) ARS, GW3EOP. Meets at the British Steel PLC Sports & Social Club, Margam, Port Talbot, West Glamorgan, Details from Mr J. Chinnock

SWANSEA ARS, GW4CC, Meets at the Applied Sciences Building, Swansea University, Details from Frank Bu GW8BME, Tel: (01792) 390233.

SCDTLAND WEST & WESTERN ISLES

CENTRAL REGION

FALKIRK & DARS, GMOFRC. Meets in the 62nd Forth Valley Scouts Hall, Denny Road, Larbert, Nr. Falkirk. Details from Bnan J. Waddell GM4XQJ, QTHR or E-mail:

STIRLING & DARS, GM6NX. Meets at Bandeath Industnal Estate, Throsk, Nr. Stirling, Details from John Sherry GM0AZC. Tel: (01324) B24709.

DUMFRIES & GALLOWAY

WIGTOWNSHIRE ARC, GM4RIV. Meets at the Aird Unit, Stranraer Academy, Stranraer, (entrance from Caimport Road), Details from Neil Macdonald GM4LQS.

STRATHCLYDE

AYR ARG, GMOAYR. Meets at the University of Paisley, University Campus, Beech Grove, Ayr KA8 OHN, Details from John Shankland MM1JAS. Tel: (01292) 445599.

CENTRAL SCOTLAND FM GROUP, RS3872B. Details from Thomas Stalker GM7TZU, Tel; (01698) B16793.

DALRY ARG, MMOARG. Mill Street, Dalry. Details fr Tel: (01294) B23295. MMOARG. Meets at The Turf, In Dairy Court,

DUNOON & DARS, GMOCOD. Meets at the Edward Street Community Centre, Edward Street, Dunoon. Details from A.B. Horton GMOBUL. Tel: (01369) 840217.

HELENSBURGH ARC, GM4HEL. Details from G. Capstick GM7OAF. Tel: (01436) 675922.

INVERCLYDE ARG, GMOGNK. Meets at the Cardwell Bar, Cardwell Road, Gourock, Strathctyde. Details from Andrew Greens GM3YOR. Tel: (01475) 638226.

KILMARNOCK & LOUDOUN ARC, GMOADX. Meets at Hurfford Community Centre, Cessnock Road, Hurffor Details from Steve Campbell GM40SS. Tel: (01560) 483800.

LARGS & OARS, GMOVKG. Details from Mr J. Clough GMOMDD. Tel: (01475) 568584.

LORN ARS, GMOLRA. Details from T. Olsen GMOEQW. Tel: (01866) 2580.

MIO LANARK ARS, GM3PXK. Meets at the Newarthill Community Ed. Cent., High Street, Newarthill, Motherwell, Lanarkshire ML1 5GU. Details from John Neary GM0XFX. Tel: (01698) 822860.

MILTON OF CAMPSIE ARS, GMOMOC, Meets at The Red Cross Hall, Kirkintilloch. Details from John MacKenzie GMOHJU. Tel: (01360) 312954.

PAISLEY ARC, GMOPYM, Meets at the Paisley YMCA Hall,

5 New Street, Paisley PA1 1XU. Details from John Quigley GM0TOA. Tel: 0141-889 6860.

SCOTTISH DIGITAL COMMS. GRP, GM7VSR, Details from Stuart Clink GM1VBE, Tel: (01698) 884803.

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CIENROTHES & DARC, GM4GRC. Meets at the Football Pavillion, Station Road, Thornton, Fife. Details from Alexander Adam GM0FVD. Tel: (01592) B74374.

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ABERDEEN ARS, GM3BSQ, Meets at the Red Cross HQ, 22 Queens Road, Aberdeen. Details from Robert Duncar Tel: (01224) 896142.

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LOTHIANS RS, GM3HAM. Meets at the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh EH11 1NH. Details from Thomas G. Main. Sec.

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CD. ANTRIM ets at the Clotworthy Arts Centre in the Castle Grounds in Antrim. Details from Day Hutchinson GI4FUM or visit www.gn4siw.co.uk

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CARRICKFERGUS ARG, GIOLIX. Meets at the Downshire Community School, Downshire Road, Carrickfergus.

Details from John Branagh GI3YRL. Tel: (01960) Details ... 367208.

Details from

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THE FOYLE & OARS, MIOAKU, Meets at 159 Victoria Road, Bready, Co. Tyrone. Details from Trevor Camp GI1XGA. Tel: 0287-134 5405.

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SWM, April 2004

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CD. FERMANAGH

International Radio Clubs

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Royal Navy Amateur Radio Society (RNARS -GB3RN, G3CRS, G1BZU)

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SCANNING SCENE Dave Roberts do SWM Editorial Offices, Broadstone E-mail scanning@pwpublishing.ltd.uk

hose readers with better memories than mine (by no means a minority) may recall that in December's SWM I mentioned that the immobiliser systems fitted to many vehicles in the European region occasionally are suffering 'lock-out' caused by adjacent signals at 400MHz. I received a letter on the subject from Jim, who our Editor, Kevin, apparently knows as 'Big Ears' (I know not why).

Jim has come up with a simple answer to this problem should anyone suffer from a dead immobiliser or remote locking fault caused by adjacent channel interference. When confronted with a similar difficulty on a Mercedes, Jim first checked out the area and located a radio mast that he considered to be the cause of the interfering signal. He then rolled the vehicle forward until some conveniently located metal storage tanks were between the mast and the car. It worked! On another occasion he utilised a metal tray and by moving it around the perimeter of the car and continually attempting to unlock the vehicle he eventually managed to disarm the unit.

Jim says that he thinks these problems have now been resolved with new vehicles. Don't you believe it, mate. I got locked out of my car the other day in precisely the same circumstances.

Another letter now, this time from regular correspondent, **Don** in Bury St. Edmunds. Don has a Yupiteru MVT-9000 scanner that he understands can be controlled from a PC.

Sorry, Don, it seems that this can't be done. There were rumours about two years ago that this may be the case, but I have heard no more on the matter. Also Don asks about a book specifically written for MVT-9000 owners and I have been unable to locate this publication if it indeed exists. Any ideas anyone? (I guess that Don may be referring to the re-written user guide produced by Rich Wells and distributed by ourselves at one time. Copies are still available for the price of a copied article - see page 69. Ed).

States On Radio

Although you need a Visa to visit or pass through the USA these days, you don't even need to like Coca-Cola and apple pie to listen to the USA on the radio. One signal that I have occasionally copied in England is the SIRS system. This is the Sheriff's (or Statewide - I'm not sure) Interdepartmental

Radio System.

In the past I've monitored surveillance operations on the SIRS frequency of 39.540MHz f.m. but usually the communications have been more mundane but should you find an American accent on this frequency, then there's a fair chance that it's the SIRS system from the State of Virginia.

If you should decide to holiday in the USA be advised that although it's legal to monitor a mass of radio traffic in America, this privilege is only afforded to USA citizens. Obviously, this would be a difficult case for the authorities there to prove but anti-terrorist laws in most nations have now shifted the burden of proof with regard to any activity that may be constituted as being a possible threat to security. So be warned.

Signals Come Out To Play

On Sundays all sorts of signals 'come out to play'. On this occasion may I draw your attention to the UK f.m. CB allocation. Not necessarily because you may wish to hear the general radio traffic that may be on that band but because on a Sunday many churches in the Republic of Ireland use CB frequencies to broadcast services to people who are unable to attend church in person. Although by no means legal in the UK, the authorities in Eire exhibit more of a laissezfaire attitude to this sort of thing and many of the channels are utilised on Sundays to bring worship to elderly or infirm congregation members in their local areas.

It seems that your average eighty Euro (that's the currency in the Republic) CB set would soon give up the ghost if flogged on transmit for the whole length of a service and it therefore appears that the churches may be using modified Amateur equipment for this purpose.

A friend of mine found a Telcom TE-150 PMR446 radio kicking around in an office at work. It had seen better days but seemed to work on the eight channels in that band. Fooling around with it he realised that it would transmit and receive on other bands as well. He's not sure whether this set had received some sort of modification but it certainly works well on the 70cm Amateur Band with 69 channels, spaced at 25kHz, being available.

A quick Internet search revealed that the Telcom TE-150 would also transmit and receive on 421MHz where 20 channels appear to be available. Forty channels come up on 477MHz with 14 around the 462/467MHz region.

It looks as though other bands are available too. Although this set seemed to work straight away, modifications to standard sets are available via the Internet and it appears that this radio was manufactured for the u.h.f. licence free market in many countries. The radio runs on 'AAA' cells, it has a neat folding antenna and what's more it also scans! (See also 'Ed's Comments' Feb 2003 and http://bigbloke.sdf-eu.org/telcommods/-Ed).

Vehicle Operations

Police in some police areas are involved in an ongoing programme of co-operation with the DVLA to catch up with users of unlicensed vehicles. I am told that they position an unmarked vehicle on a major road and have a digital link from the camera/computer combination in the vehicle to the Police National Computer (PNC).

The camera automatically checks registration numbers of vehicles on the PNC database to establish if they are lost or stolen, of police interest, if they have no current keeper and their current insurance status. The system in use is called Automatic Number Plate Recognition (ANPR). The officers turn up with a team of DVLA staff and police traffic officers.

Unlicensed vehicles are clamped in nearby streets by the DVLA staff. An unmarked saloon car is usually in attendance and it's a fair bet that the plain van will be painted up with 'Safety Camera' signs.

A recent operation netted a host of vehicle licensing and insurance offences, stolen vehicles and even an illegal immigrant or two. These events are normally publicised to some extent or other in the local press and many forces have roving teams that carry out these duties with traffic police doing the stopping at the bidding of the bloke in the van.

I certainly don't want to thwart any law enforcement business but I'm told that monitoring these operations is possible (albeit illegal) as many of the teams are using the old a.m. 147MHz allocation and as such will be audible of vast swathes of the Home Counties. I understand that a recent operation in the Reading area could be heard almost to Banbury, many kilometres away in a neighbouring county of Oxfordshire. As the team in that area are active most days, it appears that the simplex channel that they are using will be rather busy. What more can I say?

I made a mistake in my February column when I gave an incorrect URL for the search and rescue frequency list. Thanks to Francis B for pointing this out. I must have suffered serious finger trouble. The correct details are www.sarwatch.co.uk/freqs.php

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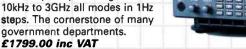
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