shortwave magazine

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NOVEMBER 1998 £2.75

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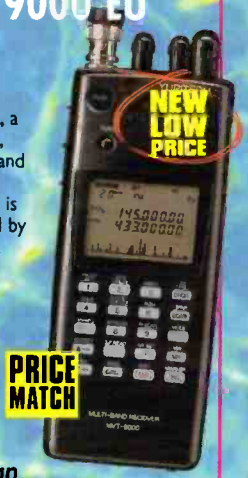

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66 AIRBAND

short wave magazine

November 1998 Issue

BROADCAST

WEATHER SATELLITE SPECIAL

by Lawrence Harris

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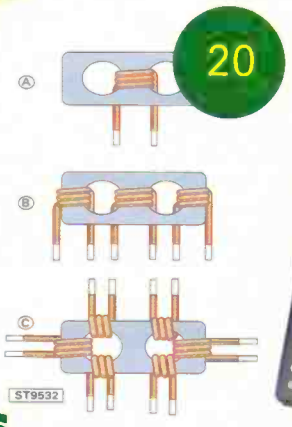
COVER SUBJECT

For more exciting satellite pictures like these, see Lawrence's feature section. You too could receive and decode these types of Images.

features



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NEW PRODUCTS

Two new Morse code related products from MFJ are now available from **Waters & Stanton PLC**. The first is an MFJ 414 classroom Morse

code tutor, incorporating every possible facility for teaching Morse to students, available for £189. Secondly, the MFJ 554 classroom

Morse practice oscillator, available for £79.

Two new clocks are also available. The compact pocket size MFJ 118 battery

operated 12 or 24 hour clock with l.c.d. and calendar plus variable language on the display is now in stock and priced at £28.95.

Secondly, a large free standing or wall mounted clock, the MFJ 119, again 12

or 24 hour with calendar, battery operated with giant display visible across any room. Also included is a room thermometer, the MFJ 119 one is priced at £48.95.

More information from Waters & Stanton direct at **Spa House, 22 Main Road, Hockley, Essex SS5 4QS, Tel: (01702) 206835/204965, FAX: (01702) 205843.**

RADIO & TVDX NEWS

The *Leonids* Meteor Shower will peak November 17th and it's anticipated that this year and '99 will see a massive peak of activity equalling that of 1966. The intense MS should peak in the early evening UK time.

The forecast shower will also mix with the debris trail from the *Tempel-Tuttle* comet giving the event even more sparkle - look out for Band 1 thru 3 TVDX and of course the amateur 50, 70 and 144MHz bands. I was active with TVDXing during the late morning of the 1966 peak and MS was just like a Sporadic-E opening, just a mass of signals.

I would recommend TVDXers to keep a check out in Band 3 once Band 1 is saturated as signals will be seen. Write into *SWM* with your observations...

Another legalised 'intruder' has been monitored in the Band 1 TV spectrum, that of a studio to transmitter link operating at 52.875MHz w.f.m. during the Wings-FM RSL at the Royal International Air Tattoo, RAF Fairford, in the Summer. It's likely this will be heard elsewhere since the equipment would have been hired in for that event.

And whilst on a low power radio theme, the UK army is seeking a broadcasting group to provide transmissions for several transmitters around four UK bases - Aldershot, Catterick, the Tidworth/Bulford/Salisbury Plain area and Colchester. The COI is organising the network, initially on a restricted service basis, and if successful will make them a permanent service. Applications to provide the service were due in by October 5th with decision time before the end of '98.

Although the UK digital broadcasting and manufacturing industries have been hoping for a terrestrial analogue TV switch-off within the next 10 years, the ITC is likely to recommend to the government a switch-off in the year 2018, giving the public time to replace all the domestic TVs, VCRs, etc., as they gradually expire.

Meanwhile in Germany, the government has agreed with ADR, the group that represents broadcaster equipment manufacturers and political figures, that a switch-off date for the terrestrial analogue TV network will be in the year 2010. At that time it's calculated that there will be 57 million TV sets in Germany and some 95% being digital.

Finally, the antenna company Chelcom have produced an interesting catalogue of equipment for the radio amateur, scanning and DXing enthusiast - they'll also make antennas to your request. Send three 26p stamps to **Chelcom, Riverside House, Homecroft Drive, Cheltenham, Glos GL51 9SN**. Chelcom have some very interesting log periodics arrays available.

NEW MODEL

Roberts Radio, renowned for premium quality and impeccable sound clarity, has introduced a new model to its world-band radios range - the R881 Stereo World-Band Radio. This sophisticated model is available in a stylish champagne colour and offers an impressive range of features, which will appeal to radio enthusiasts and keen travellers alike.

This great new portable has m.w., s.w. and f.m. stereo wavebands and for easy tuning it features direct frequency tuning via the keypad, also auto and memory scanning, which lets you quickly find the station with the best reception. Plus, it has the capacity to store up to 45 stations in its memory. So, wherever you are in the world, you can keep updated on news and music.

For the seasoned traveller, the radio also offers a whole host of useful functions. It has a dual time facility, handy travel pouch, stereo earphones and a short wave frequency guide. The digital clock allows you to choose from either 12 or 24 hour display and it has a radio/buzzer alarm with adjustable sleep timer to ensure that you don't miss that early morning flight!

The R881 Stereo World Band-Radio from Roberts Radio has a recommended price of **£79.99**. So why not call **(01709) 571722** for your nearest stockist.

OPEN WEEKEND PARTY

Celebrating his 8th year of trading, Martin Lynch and his team have decided to have a two-day event instead of the usual Saturday bash. Martin's main reason for this is to allow visitors to 'spread out' over two days instead of trying to cram themselves into one day.

This year the London store will be attended by the chiefs of the 'Big Three' Yaesu, Icom & Kenwood who will be displaying their new key products including the FT-100, FT-847, IC-746 and the VC-H1 Camera.

The Martin Lynch London emporium has recently had new antennas installed to allow multiple demonstrations and once again 'shoot outs' between all of the top models will be available for test.

The Open Day starts at 0900 until 1700 on the Saturday and 1000 until 1400 on the Sunday, 31st October to the 1st November 1998. There will be a live video feed on the Internet, so you can view the Open Day from all over the world!

Plus, all the new rigs will be on demonstration and at very special prices. There's a **free** rig check

LIONS CLUBS 81ST INTERNATIONAL CONVENTION

More than 2400 contacts in 96 countries were made during the five days that the Special Event Station **GB11ONS** was on the air. It was set up to commemorate the Lions Clubs 81st International Convention which attracted over 20 000 Lions and their partners from all corners of the world to Birmingham. The Station, with its callsign that could be read as GBLIONS, also marked 50 years of Lionism in Europe and 100 years of amateur radio.

Twenty seven operators volunteered to man the three stations. They were on the air for the five days of the convention, which was held back on 29th June to 3rd July 1998. For three of those days they maintained 24-hour cover during which greetings were sent to Lions all over the world.

Norton Clark M0BNC, a Lion member from Kenilworth, Warwickshire, who organised the station, extends his thanks to all the licensed operators, most of them non-Lions, who volunteered to help. Thanks also go to the sponsors without whose support the station would not have been possible.

The sponsors of the convention were **Icom (UK)**, **Yaesu (UK) Ltd.**, **Strumech Versatower**, **Swisslog HB9BJS**, **Radex CDT**, **Haydon Communications**, **SMC Ltd.**, **David Buswell** of Kenilworth, **Huddersfield Electronics**, **Emmerson Press** of Kenilworth and **Warwick District Council**.

The radio station provided a dramatic example of how amateur radio and Lionism can shrink the world. Among the visitors to the radio shack at the NEC in Birmingham were **Alexander Kovalec** and his wife from Makeeva in the Ukraine. Alexander, who founded the first Lions Club in the Ukraine, has been in radio contact for some years with **Steve Stephen** of Abingdon Lions Club in Oxfordshire. As a result of that radio friendship, Abingdon Lions Club regularly send parcels of much needed clothing to children's homes in the Ukraine.

To get to the convention, Alexander and his wife drove 4000km in a borrowed Shogun and stayed with their Abingdon radio contacts. Alexander and his wife have not escaped the economic problems in the Ukraine. He is selling his transceiver to pay for his son's fourth year in medical school. Word is going out on the 'radio network' in the hope that someone can help Alexander.

offered on both days and you will be able to receive free copies of *Ham Radio Today*, meet the *HRT* team (including Chris Lorek G4HCL and Henry Lewis G3GIQ), enter a free 'win the rig' raffle and have a bit of a nibble and drink. What more could you want?

So, put the date in your diary and get yourselves down to Martin's radio store at **140-142 Northfield Avenue, Ealing, London W13 9SB** to join in the party!

WHITE PAPERS

The well-known and respected RDI White Papers, which are produced by the International Broadcasting Corporation in the USA, give an in-depth report on the many popular receivers that are still available from the *SWM* Book Store.

Each report costs £6 and will be of tremendous value in helping you to make that vital decision before spending your hard-earned cash. The list of available White Papers is as below:

PW-01	*AOR AR3030*
PW-02	*Drake R8/R8E*
PW-03	*Drake SW8*
PW-04	*Icom R71A/D/E*
PW-06	*JRC NRD-535*
PW-07	*Kenwood R-5000*
PW-08	*Lowe HF-150*
PW-09	*Sony ICF-2010/ICF-2001D*
PW-11	*How to interpret receiver specifications and lab tests*
PW-12	*Popular outdoor antennas*

Please note that **P&P is included for any quantity!** Order from the Book Store now by contacting Shelagh or Michael on **(01202) 659930** or FAX your order on **(01202) 659950**. Alternatively, E-mail at: **bookstore@pwpub.demon.co.uk**

Send your news to Zoë Crabb at the Editorial Offices

rallies

October 24: The Carrickfergus Amateur Radio Group welcome everyone to their annual rally, which takes place at 1200 at the usual venue which is Downshire School, Carrickfergus, Northern Ireland. Talk-in on 145.550MHz (V44 (S22)).

November 1: The Tir Conaill Amateur Radio Society Annual Radio Rally, at Jackson's Hotel, Ballybofey, County Donegal. Attractions will include trade stalls and a Bring & Buy. There will be refreshments available all day with a bar in the hall. Doors open at 1200 and will end at about 1600 with an auction at the Bring & Buy stall. Tel: **(072) 52598** (Irish republic calls) or from Northern Ireland by calling **010 353 72 52598**.

November 1: The Great Northern Hamfest takes place at the Metrodome Leisure Complex, Queens Road, Barnsley, S. Yorkshire. A five minute walk from the centre of Barnsley bus and train station, less than two miles from the M1 junction 37, follow the large brown Metrodome signs. Doors open 1000. The venue is all on one level with excellent disabled facilities and plenty of free parking. There will be the usual trade stands, components and kits with specialist interest groups and the RSGB will be present. Morse tests on demand available from 1000 till 1500. There will also be a large Bring & Buy. Talk-in on 145.550. **Ernie G4LUE** on **(01226) 716339** and **(0836) 748958** 1800-2000.

November 4: The Bangor & DARS are holding a Surplus Sale at the Clandeboye Lodge Hotel, Bangor in Northern Ireland, at 2000 (1945 for disabled visitors). Free parking and bar services available. Admission is just £1. Talk-in on S22. **Roy GI0WVN** on **(01247) 460716**.

***November 7/8:** The Twelfth North Wales Radio & Electronics Show is to be held at Aberconwy Conference Centre & New Theatre, Llandudno Promenade. The shows opens at 1000 each day and the entrance fee is £1.50 for adults, children under 14 free. **M. Mee GW7NFY** on Tel/FAX: **(01745) 591704** or the Secretary **Greg Robbins GW7NAU** on **(01492) 878288**.

November 8: The Midland Amateur Radio Society (MARS - Birmingham) are holding their 10th Radio & Computer Rally at Stockland Green Leisure Centre, Slade Road, Erdington, Birmingham Doors open at 1000 and admission is £1. There will be a large free car park, a free hampers draw plus many trade stands, local clubs and special interest exhibits. For trader details contact **Norman G8BHE** on **0121-422 9787** or for general information, contact **Peter G6DRN** on **0121-443 1189**.

November 14: The SAMS '98 Computer & Electronics Show is to be held in the Bingley Hall, Staffordshire Showground, Weston Road, Stafford (A518 Stafford-Uttoxeter Road), signposted from junction 14 on M6, (bus shuttle from Stafford Railway Station). Doors open 1000 to 1600. Admission for adults is £3, children under 14, 50p, Concessions, OAPs, RSGB Members, Student Card, UB40, £2, (Advance Tickets £2 plus s.a.e.). There will be masses of free parking, a licensed bar from 1100 and refreshments, meals and a cafeteria. A great day out!

CONTINUED ON PAGE 7

OFFICIAL OPENING

Back on Saturday 8th August, over 50 guests attended the official opening and dedication of FEBA Zimbabwe's new studios and refurbished headquarters in Harare, the capital. The occasion was the culmination of a £62 000 development project, completed in several phases since the headquarters building was purchased in 1994.

The Rev. Mark Taylor, Chairman of FEBA Zimbabwe and also FEBA's International Council, dedicated the new facilities. Naming the Emmanuel Studios, he said "...the future of radio in Africa is bright, with an increasing number of opportunities to provide programming that is African in content, context and character. We commit ourselves to helping our national broadcasters to air quality religious programmes of relevance and importance".

Visitors toured the building and were treated to a demonstration of programme production in the airy, purpose-designed studios. The smaller of the two is self-operational, fitted with a new *Soundcraft RM105* self-op mixer, while the main studio has a separate control room. They provide FEBA Zimbabwe's programmers with all that is needed to turn out versatile, high quality recording.

Also at the event were local donors and supporters of the project. They were joined by representatives of other Christian programme makers and the national broadcaster Zimbabwe Broadcasting Corporation. The Board and staff of FEBA Zimbabwe were also there, some with their families and craftsmen who had worked on the building during the last year.

Visitors were able to watch a quiz programme, chaired by William Gwata (checked shirt) a member of the Board of FEBA Zimbabwe, being recorded in the main studio.

BIGGER & BETTER CATALOGUE

The latest version of the *Maplin Electronics Catalogue*, launched back the beginning of September, provides its users with a number of new features. Available in the traditional printed version (order code CA18U), September's issue is launching the semiconductor guide. This lists an additions 17000 new products, which makes Maplin Electronics the largest source of semiconductors from a single catalogue in the UK.

The catalogue also has price reductions on over 2000 products and includes range extensions of an addition 1000 new lines across the 42 product categories. Also available is the companies new and improved double CDROM catalogue (order code CQ02C) that features all of the above plus a number of other unique features. The companion CD includes a **free** copy of *MacAfee anti-virus* software, a **free** 30 day Internet trial with Demon Internet, including software and over 1000 datasheets.

The product information is easy to access via the comprehensive search facilities, selected by either Maplin order codes, alternatively through a keyword search or the product index. Once you have located the item you require, a comprehensive picture, technical specification and pricing appears on screen.

Ordering couldn't be easier, as you browse the catalogue and you find the product you require, press the add to order button and the CD automatically adds the item to your shopping basket. Once the order is complete, prices are automatically totalled and a finished order form can be printed - including all the personal ordering information entered by the customer.

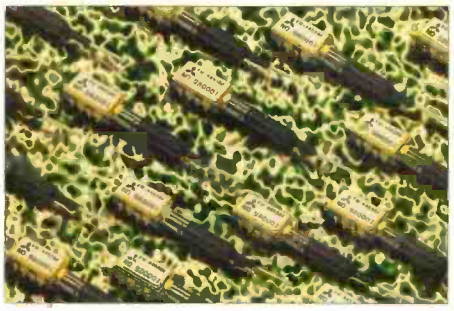
The new catalogues are available mail order from Maplin Electronics and from the chain's 48 stores nationwide. To order your new catalogue or for further details, store locations or opening times, etc., call **(01702) 554000**. Alternatively, visit the web site at **http://www.maplin.co.uk/**

NEW LASER DIODE

Mitsubishi Electric Europe have announced the introduction of its new generation FU-445SDF, uncooled, 1.3µm waveband direct feedback laser diode module, providing extremely low cost solutions for 2.5Gbps applications. Included are telecommunications applications, such as STM16, S16.1 and L16.1 for distances up to 50km, including high speed links in the access network. For data communications, the new laser diode is ideal for next generation 2.4Gbps Gigabit Ethernet transceivers.

The FU-445SDF is surface mountable and housed in a coolerless mini dual in-line, flat ceramic package. The high reliability device incorporates an optical isolator for a low RIN, typically less than 150dB/Hz. Input is 25Ω impedance with a bias tee. A thermistor is available for optimising the operating point over temperature.

The development by Mitsubishi supports the growing need for high speed links using fibreoptics and driven by the increasing need for even faster Internet access. The FU-445SDF typically consumes just 60mA at maximum operating temperature. SMSR is typically less than 40dB. The single mode optical fibre pigtailed device comes complete with an integrated photodiode to monitor optical output. Input impedance is 25Ω.



Mitsubishi unveils new generation FU-445SDF uncooled, 1.3µm laser diode modules at Madrid's EEOC '98.

In operation, the laser diode is rated at 6mW optical output power and 100mA forward current with a reverse voltage of 2V. The photodiode is rated at 20V reverse voltage and 2mA forward current. Operating current is typically 40mA at 2mW optical output at 25°C. Operating voltage at 25°C is typically 1.2V.

More information from **Mitsubishi Electric Europe BV, Semiconductors, Travellers Lane, Hatfield, Herts AL10 8XB, Tel: (01707) 276100, FAX: (01707) 278997** or visit the web site at **http://www.mitsubishichips.com**

AWARD TO WRN

World Radio Network, Britain's second international broadcaster, has been acclaimed as the *Most Innovative Webcaster*. The award was made by *Production Europe* magazine, the leading trade magazine for the European broadcasting and production industries, at a ceremony during the IBC in Amsterdam back on the 11th September. World Radio Network was also commended in the *Most Innovative Radio Broadcaster* award, coming second to the BBC's Digital Radio group.

The awards jury said "World Radio Network caught the editorial team's eye for its pioneering efforts to bring radio and Web into harmony". The jury went on to say that it was WRN's work in testing the cutting-edge MPEG-3 FM quality encoding system Audio Active that was a clincher for the editorial team.

In Amsterdam to collect the award, Simon Spanswick, Director of Corporate Affairs said "World Radio Network is honoured to receive this important award. This award, combined with our commendation, confirms our position as one of the broadcasting pioneers of the digital age. We provide a range of radio channels by traditional delivery methods, and at the same time, push back the boundaries of digital technology, both in production and distribution, helping us to reach an ever increasing number of listeners world-wide".

World Radio Network was also the first radio broadcaster to make its programming available via Internet audio in 1994, and today offers live relays of its English for North America and German for Europe services. WRN also provides on-demand radio in more than a dozen languages, plus a daily TV news service from South Africa.

World Radio Network is on the air via DAB Digital Radio - the radio system of the future - in the UK and Poland, extending the choice of listeners and helping to drive take-up of this new technology.

BANGOR'S EVENTS

The **Bangor & DARS** will host a Surplus Sale on Wednesday 4th November at the Clandeboye Lodge Hotel, Bangor, at 2000, (1945 for disabled visitors). There will be free parking and bar services available. Admission is just £1. Talk-in on S22.

The Society will also be holding their monthly meeting and Rig Clinic for members, at the Clandeboye Lodge Hotel, on Wednesday 2nd December at 2000. A Christmas dinner will be held at the same venue, but on Friday 11th December. Contact **Roy GI0WVN**, QTHR, on **(01247) 460716** for more details.

WORLD'S FIRST

Arcam, the UK's leading manufacturer of quality hi-fi electronics, is proud to announce the imminent launch of the world's first Digital Radio Tuner (DRT) for home use, the Arcam Alpha 10. Working products were shown at the Home Electronics Show, *Live '98* and a specialist press preview was shown at the Heathrow Hi-Fi News Show. However, initial production starts in late October and runs through December. Full volume production should start in January 1999.

The Alpha 10 DRT is the result of a collaboration between two UK companies, Arcam of Cambridge and Roke Manor Research. Roke has played a leading role in the development of Digital Audio Broadcasting (DAB) and Arcam will be the first to use their advanced 'Gold Card' Digital Radio module. The combination of this module (built specifically for hi-fi use) and Arcam's own extensive digital audio experience, ensures exceptional sound quality.

The tuner will initially be available through around 150 Arcam dealers who are within range of a Digital transmitter and thus able to demonstrate the DAB system. Over 60% of the UK population can already receive BBC Digital Radio transmissions and rapid expansion is planned.

Tuning of the Alpha 10 DRT couldn't be easier! At first switch on, the tuner searches for available services, which can then the scrolled through and selected with a large rotary encoding knob. The name of the service (e.g. BBC R5L DIGITAL) is displayed on the top line of the display. Direct station access buttons allow the user to store up to seven favourite stations for instant access. Additional front panel buttons allow for programming and search functions, plus the display of scrolling RadioText on the lower line of the display.

For set-up and monitoring, the tuner has an 'engineering mode' which can display technical parameters associated with each multiplex. These include transmitter ID, data rates (in kilobits per second) and signal strength. The latter is a useful aid to aerial alignment in weak signal areas.

The Arcam Alpha 10 DRT Digital Radio Hi-Fi Tuner, UK designed and built, compatible with all existing hi-fi systems. Digital Radio will gradually replace all current radio broadcasting!

Expected selling price of the Alpha 10 DRT is **£799.90**. If you would like to find out more, contact Arcam at **Pembroke Avenue, Waterbeach, Cambridge CB5 9PB, Tel: (01223) 203203, FAX: (01223) 863384**, E-mail: **custserv@arcam.co.uk** or alternatively visit Arcam's web site at **www.arcam.co.uk**

Send your news to Zoë Crabb at the Editorial Offices

rallies

Sharon Alward, Sharward Promotions, Knightsdale Business Centre, 30 Knightsdale Road, Ipswich, Suffolk IP1 4JJ, Tel: **(01473) 741533**, FAX: **(01473) 741361** or E-mail: **services@sharward.co.uk**

November 22: The Bishop Auckland Radio Amateurs Club (BARAC) Rally will take place at Spennymoor Leisure Centre. **Please note that this is a new venue**, Ideally suited for both trader and disabled as it boasts good parking and easy access to large ground floor hall. There will be the usual radio, computer, electronics and Bring & Buy stalls as well as catering and bar facilities. Morse tests will be available on demand. As you can imagine, there is lots to do for all the family within the confines of the leisure centre for those of the family not quite interested in radio. Doors open at 1100 (1030 for any disabled visitors). Admission is £1, and under 14s go free of charge, if accompanied by an adult. Talk-in on S22. **Keith M0BLN** on **(01388) 601401** or **(0374) 417660**.

November 28/29: The London Amateur Radio & Computer Show is to be held at the Lee Valley Leisure Centre, Picketts Lock Lane, Edmonton, London N9 0AS. Doors open 1000 until 1700 each day. Admission is £3 for adults, £2 for OAPs and under 14s. There will be free parking for 2000 cars, a large trade show, Bring & Buy, catering, licensed bar, on-site camping, special interest groups, disabled facilities, cloakroom, Morse tests on demand, a talk in on 2m and 70cm and family attractions. **Steve Blayer G4UKR.**

December 5: The Rochdale & District Amateur Radio Society are holding their traditional radio rally at a **new venue**, two miles NW of Rochdale Town Centre on the A680 Rochdale to Edenfield Road at Cutgate. Look for the orange arrows. Talk-in on S22. There will be components, vintage radio and junk. More information from Rochdale & DARS, **John G7OAI** on **(01706) 376204** or **(0973) 689077** or E-mail: **johng7oai@which.net**

December 13: The Leeds & District Amateur Radio Society is to be held at the Pudsey Civic Centre (Dawsons Corner). There will be all the usual traders. Doors open at 1100 (1030 for any disabled visitors). There will be a talk-in, a licensed bar, etc. **John Mortimer M1CAI** on **(01943) 874650** or **Malcolm Robertson G7VCK** on Leeds **0113-225 3379**.

***December 13:** The Verulam Amateur Radio Club will hold its annual rally at the Watford Leisure Centre, Horseshoe Lane, Garston, Watford, Hertfordshire. **Ian Forsyth G0PAU** on **(01923) 265572**.

If you're travelling a long distance to a rally, it could be worth 'phoning the contact number to check all is well, before setting off.

The Editorial Staff of *SWM* cannot be held responsible for information on Rallies, as this is supplied by the organisers and is published in good faith as a service to readers.

If you have any queries about a particular event, please contact the organisers direct. Editor

ed's comments

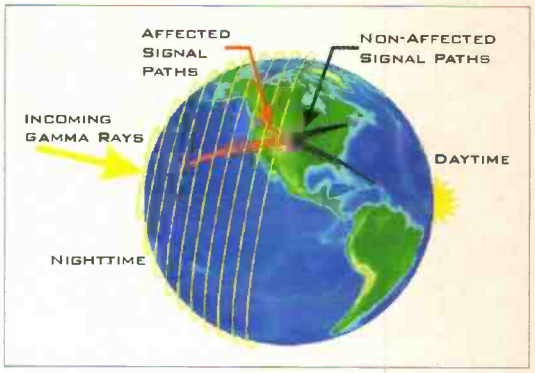
There are so many entry points into this hobby that we seem to call short wave listening. The very name is the cause of much confusion. Likewise, this magazine has the historical title of *Short Wave Magazine* - however examining its content will reveal, as I know you are aware, much more than short wave listening. We do after all cover activities in the spectrum from v.l.f. to 10GHz and beyond. As you will see this month our theme is WXSATs, Lawrence draws on his vast experience to pull together a very exciting and news packed feature section. Next month it is the turn of Broadcast satellites to take centre stage, Roger Bunney and John Locker together expand on the Satellite TV scene to provide leading edge material, including digital equipment and broadcast low downs.

It doesn't surprise me then, that I get lots of mail asking for some suitable reference work for absolute beginners. In fact it's all too familiar. Thinking back three decades or so I remember well being the one asking the question. At that time in the beginning of the seventies I was fortunate enough to have friends and relatives who were either like minded or were able to point me in the right direction. I ended up bumping into hobby magazines namely *Everyday Electronics*, *Practical Wireless* and *Short Wave Magazine*. Also, Bob the late G3UNR, lent me his *RSGB Handbook*, which was, and still is, stuffed full of information. Today though I'm not so sure that the scenario is the same.

I cannot, hand on heart, recommend any single publication that will take the raw beginner through the steps required to transform total confusion to a comfortable feeling of knowing. Maybe that's a pretty tall order in any case. So, here at *SWM* we are rising to the challenge and in the coming months we will be including within the pages of your favourite radio magazine a series for beginners. This I am sure is an emotive issue, as all of you out there who know all about the hobby will be rising to cast your vote against such a move. Please though, don't be negative and encourage those taking their first wobbly radio steps.

Magnetar Energises Ionosphere

On August 27th at about 1022UTC, an extremely intense gamma ray flare passed through the solar system, rapidly ionising the exposed part of the Earth's night facing side upper atmosphere, producing ionisation levels usually found only during daytime. This gamma ray flare originated at a faint X-ray star, located in the distant reaches of our Galaxy, some 23000 light years away. This star, known as Soft Gamma Repeater (SGR) 1900+14, is a new kind of star called a Magnetar; a dense ball of super heavy matter, no larger than a mountain but weighing more than the Sun, with a magnetic field far greater than known to exist anywhere else in the Universe. The flare lasted for about five minutes, and exhibited strong fluctuations at a rate of 5.16 seconds, believed to be rate of rotation of the spinning Magnetar.



The effect of the Magnetar's radiation
Courtesy of Standford University.

The intense burst of gamma ray photons which impinged on our atmosphere during this event were absorbed at altitudes of 60 to 90km, as they encountered the increasingly dense upper atmosphere. As they were absorbed, they ionised this region to a startling degree, to levels normally observed during daytime.

As a consequence, short wave radio broadcasts were effected reaching relatively shorter distances, due to the heavy absorption produced by the extra ionisation. Usually during night time, with less ionisation in the signal propagation path, losses are substantially lower and v.l.f. signals are observed at much higher levels.

Did any *SWM* readers notice any effect of the Magnetar Burst? For more details of the event see the web URL
http://hail.stanford.edu/gammaray.html

New Column

John Hodgkinson our man 'All At Sea'.

Lastly this month I'd like to welcome a new columnist to the fold - he's John Hodgkinson of the Admiralty List of Radio Signals, a section of UK Hydrographic Office and publishers the definitive radio guides for mariners. We are fortunate in that John will be, month by month providing the latest news on matters, maritime radio, in his new column 'All At Sea'. With this tap into the world authority on maritime radio, *SWM* is unique with the ability to be right up-to-date with news right 'from the horses mouth' so to speak. Exciting - eh?

Oh - hot news just in - heads up all you scanner enthusiasts out there - our regular Scanning Column will be back **very** soon.

73 es gud DX

Kevin Nice

Dear Sir

As a beginner in short wave radio, I have purchased your magazine a number of times and have read it from cover to cover. I especially read 'Bandscan America' and 'LM&S', which I do enjoy, but the problem now starts here.

I find 'LM&S' and 'Bandscan America' too advanced for me at this stage of my involvement in the hobby and I would like, or would suggest, that you include more of short wave radio information for beginners. You could improve on QSL address, information on receivers, etc.

Also, please tell me what could I use for a short wave antenna for a receiver covering 150kHz to 29.999MHz.

Scott McMurray (aged 14)
West Glamorgan

Scott, we plan to run a beginner's series in the not too distant future so keep a watch out. You don't say what type of receiver you have and whether or not it has connections available for external antenna and earth. If your set has these connections then your best bet is a length of copper water pipe - say two metres in length as an earth. This needs connecting to your receiver with preferably thick copper braid. For an antenna simply connect between 10 and 30m of wire suspended as high as possible. This is a very good starting point, in fact it's the kind of temporary solution that gets used for ever - believe me. As for QSL addresses for broadcast stations, these are transmitted during programmes, catching this detail is part of the hobby in my opinion. However, perhaps you need a copy of WRTH *or* Passport To Worldband Radio *for Christmas! -* ***Ed****.*

Dear Sir

As a long-time reader of *SWM* I was rather surprised that your E-mail correspondent should consider that scanning is not part of Amateur Radio (Ed's comments, August). Surely all Amateur Radio activities come under this heading, including monitoring using dedicated scanning receivers, manually tuned receivers and equipment used to improve reception. I am sure that many *SWM* readers would be disappointed if it did not include reviews of suitable equipment, etc.

This leaves a gap to be filled by your sister magazine, *Practical Wireless*, which covers a whole range of radio subjects, and I would say is complementary to *SWM* for many radio amateurs who want to advance knowledge of amateur radio. Also what would the *SWM* advertisers do who offer a wide range of equipment as well as scanners?

On the latter subject, I had recently decided to replace my big RA17L receiver with its adapters, etc. with a smaller receiver with comprehensive features.

TOP QSL

Dear Sir

I am a sea-going Engineer and unable to read all your issues as they come out, so this suggestion of mine may have already been covered by another reader. It concerns water tight integrity of electrical connections, especially outside antennas, but can be used in other applications where one is trying to keep corrosion at bay and water out of the likes of coaxial cable.

With nearly every vessel I join, I invariably have to put up a long wire antenna, now used in conjunction with an AT-2000 tuner, to listen mainly to the BBC World Service. My solution over the years has not been to just use electrical insulating tape, but also grease impregnated cloth tape, known as Denso tape, around the connections as well, and any fixings such as U-bolt threads and nuts.

For it's durability, this tape has also been used on hydraulic systems on deck, where it has been subjected to the severest weather and the sea for many years. After a long period of use, it can be peeled back to reveal pipe compression fittings in near perfect condition.

At my home in west Wales, I have moulded the tape to the shape of the antenna connection and mounting bolts. It is not expensive, though it can be difficult to find a supplier. In my experience either a yacht chandler or possibly a builders merchant should carry stock. For an even better level of protection, you have the option of covering initially the connection with insulating tape and then the Denso tape.

I hope that this information will help those with exposed antennas and coaxial cables, and fixings that are difficult to dismantle in awkward high risk areas.

Kevin Dunphy
MV *Clipper Cowbridge*
c/o Graigs Ship Management,
Cardiff

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

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

An advertisement in the current issue of *SWM* offered me the ICR-8500, recently enthusiastically reviewed by John Wilson, and with payments by instalments.

However, reading the small print I found that anyone over 70 was not eligible to pay by this method. Now, as Shakespeare was wont to say, I could depart this mortal coil! today or tomorrow, but this could also apply to anyone on a motorbike, car, plane or on foot, at 20+ having a heart attack, etc. or being made redundant and possibly leaving payment problems.

It seams easy to become a second class citizen and yet some of us may have been the ones that helped promote amateur radio activity and since WWII days for many years kept alive the amateur side of electronic sales. I see in this issue that the Radio Club of Thanet is being disbanded due to lack of young interest, so perhaps firms who impose such an age limit may in future be glad of business from us oldies!

So, back to the RA17L, at least it keeps me warm in the winter.

N. L. Smith
Staffs

Unfortunately, finance companies, like insurance companies, base their risk analysis on historical statistical data. They don't want to loose money. Take some consolation by the fact that you'll end up paying less if you save-up and buy in a while - ***Ed****.*

Dear Sir

I rushed to my Newsagent last Saturday to purchase the October issue of *SWM* and was disappointed to find that it did not contain the review of the Commtel COM214 scanner as promised in the September issue! I hope that I will see it in the November copy!

The reason for my interest lies in the fact that I had purchased a Uniden Sportcat 150 in the US and it appears to be identical apart from some differences in frequency coverage, which leads me to wonder if it is possible to modify the ranges. There is a large chasm between 174 and 406MHz. Apart from this, I find the performance very satisfactory.

Perhaps some of your readers know of some literature which might help me to 'tune' this scanner to my requirements? In the meantime, I look forward to that review of the Commtel!

Ben Healy
Ireland

Ben, I am sorry that you were disappointed that the COM214 review was not present in the October issue of SWM. *Unfortunately, due to space constraints we had to hold it over until this issue. You will find the review on page 27 -* ***Ed****.*

Dear Sir

I am very impressed on the detailed 'LM&S' chart pages and find them helpful with comparing my own listing with it. Referring to this, I was wondering if it could be possible to include a new f.m. chart of the regular 87.5-108MHz range and was wondering why this has not been included in such a first class magazine?

A. Pamphilon
Kent

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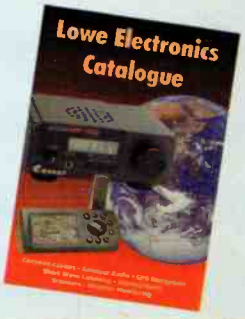

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Bandscan America

For the first time in many years, s.w.l.s the world over can again tune in on the broadcasts of the American Forces Network, the radio service provided by the American Forces Radio TV Service for American military personnel stationed around the world. AFN's sudden appearance on short wave was apparently a way of picking up a slack in coverage after a satellite feed was discontinued.

The broadcasts, aired in single sideband, seem to be running 24 hours per day and include a wide variety of programming - from major league sports coverage to selected programming from CNN Radio, National Public Radio, Public Radio International and others. Broadcasts are being aired on 4.2785, 6.458 and 12.6895 not simultaneously - indeed, different programming has been noted on different channels at the same time. The broadcasts are being relayed from a US Navy communications station in Key West, Southern Florida.

Just how long this situation continues is very much open to question. Some theories have it that short wave was put into service to provide coverage for a multi-national naval exercise in Caribbean and South American waters over a several month period. It is possible that the end of the exercise may also mean the end of the relays. Whatever happens, this has been a very welcome addition to the short wave menu and long missed by s.w.l.s who remember the decades of enjoyable service AFRTS short wave provided to military and non-military listeners alike.

New Commercial Station

The frequency 7.415 is home to the newest commercial short wave station in the United States. WBCQ, using the slogan 'The Planet', has begun operations on that frequency, initially mostly between 2200 and 0600.

The station in owned by Alan Weiner, who has a history of having operated several illegal stations over the years including an ill-fated attempt at unlicensed offshore broadcasting from a ship. This time, everything is properly signed and authenticated.

WBCQ's 50kW transmitter and antenna are on Weiner's farm, located Monticello, Maine, only three miles or so from the border of New Brunswick, Canada. Weiner intends to offer 'blocks' of time to pirate broadcasters, as well as other individuals, or organisations who want to get their story out. The station's address is:**WBCQ, 97 High Street, Kennebunk, ME 04043**.

Meantime, we are still awaiting the initial tests from WWBS in Macon, Georgia, which had FCC approval to put a station on the air long before Weiner had his. Keep an ear open on 11.905 or 11.910. This station, like most in the US, will air mostly religious programming.

The US government's Radio Free Asia service has bought station KHBI (in Saipan, Northern Marianas) from the Christian Science Church and will use the facility to improve coverage for RFA programming. However, several hours per day are still being made available to the church so its programs can still be heard via KHBI.

Plans To Upgrade

WMLK, operated by the Assemblies of Yaweh religious group in Bethel, Pennsylvania, has plans to upgrade its facility, including a revamping of its 50kW transmitter (originally converted from a medium wave unit) making it capable of 100kW, then take a second 50kW m.w. transmitter, convert it for 100kW short wave and then pair-up the two units to provide 200kW. A new antenna system will be built to handle the higher power.

Recent monitoring by North American DXers finds these Brazilian stations (see **Fig.1**) among those currently active.

New Religious Station

The new religious station in Chile, Voz Cristiana, continues to be well and widely heard on one or more of the following frequencies: 6.060, 9.635, 11.890, 15.375, 17.680, 21.500 and 21.550 from as early as 0900, with most programming in Spanish. This station has the same owners as Christian Voice, in Zambia, and is programmed from Florida. It announces an address of: **PO Box 2889, Miami, FL 33144.**

In Costa Rica, Radio 88 Estereo, Perez Zeledon, which was briefly active a year or so ago, has returned, this time perhaps for a more extended stay. It's using 6.075 to relay its local f.m. outlet. Most loggings of this are in the early mornings so it may be that the station is not active in the evenings or that reception is blocked by QRM.

Colombia's Radio Nacional (4.955) now has an English feature called *On Line* which is aired Tuesdays through Saturdays from 0200 to 0230 or so. Radio Nacional is on the air daily from 1700 to 0500, Saturdays to 0445, Sundays 1100 to 0500.

Argentina's Radio Nacional has resumed operations on its 6.060 frequency, now on the air Monday to Friday from 0900 to 1200, Saturdays and Sundays 0900 to 0400, running 30kW.

LRA36 - Radio Nacional Arcangel, San Gabriel, the Argentine station in Antarctica, is now scheduled Monday, Wednesday and Friday from 1230 to 1430 on 15.476, running a mere 1kW. Rumour has it that a new transmitter may be installed in a year or two, although whether this will be higher power or not is unknown. Back when it closed around 2330, LRA36 was sometimes heard in North America, but the new hours make it a much more difficult prospect.

The 60m band Mexican, Radio Transcontinental de America - XERTA, has come back now and seems in regular operation on 4.800. The exact schedule is proving a little hard to pin down (most Northern American logs have been in the local late night or early morning hours).

In Nicaragua, Radio Miskut on 5.770 has extended its schedule and is now on the air straight through from 1200 to 0430, with 500W and that number may be increased in the months to come. In addition, the station is adding new towers and antennas, which should improve reception even further.

New Name

The Radio Voice of Canada is a new name for the Radio Asia Canada broadcasts which, originally, were aimed at a Tamil audience. These are aired over German government transmitters from 0200-0400 on 9.560 in Tamil, 0200-0400 on 9.700 in Tamil, 1300-1400 on 11.720 and 15.510 in Tamil, 1400-1430 M-F in English, 1400-1600 Sat/Sun in Tamil on 11.720, 15.510, 1600-1630 in English Sat/Sun on 15.510, 1630-1700 English on 11.720, 1800-2000 Sat/Sun in Tamil on 15.210, 2000-2200 in Tamil on 15.560 and 2200-0000 in Tamil on 11.975.

Some odd goings on have been noticed on 5.025, the usual home of Radio Rebelde in Cuba. Radio Havana Cuba has taken over the spot on occasion and Cuba's Radio Reloj, which doesn't normally use short wave, has also been noted there.

Sometimes, it seems as though 99% of what comes out of Central and South America is in Spanish, Portuguese or English, but you can hear broadcasts in a couple of actual native languages via Radio Havana Cuba. Broadcasts in Creole are aired on 9.550 from 0000 to 0030, 0100 to 0130 and 2100 to 2130. Programs in Guarani are aired from 2230 to 0000 on 15.340 and in Quechua at 0000 to 0030, also on 15.340.

Watch for at least a temporary return of old time Venezuelan short waver, Radio Barquisimeto which says it plans to use 9.510 to broadcast local baseball. Back in 'the good old days' Radio Barquisimeto was widely and regularly heard on 4.990.

That's the story for now. Until next time, good listening!

MHz	Station
2.460	Radio Super Alvorada, Rio Branco
3.375	Radio Educadora, Guajara Mirim
4.755	Radiodifusora do Maranhao, Sao Luiz
4.755	Radio Educacao Rural, Campo Grande
4.795	Radiffusora Aquidauana, Aquidauana
4.845	Radio Cultura Ondas Tropicais
4.865	Radio Missoes da Amazonia, Obidos (ex R. Sentinela da Amazonia
4.865	Radio Alvorada, Londrina
4.865	Radio Verdes Florestas, Cruzeiro do Sul
4.885	Radio Clube do Para, Belem
4.915	Radio Anhanguera, Goiania
4.945	Emisora Rural, Petrolina
4.945	Radiodifusora Pocos de Caldas, Pocos de Caldas
4.985	Radio Brazil Central, Goiania
5.035	Radio Aparecida, Aparecida
5.970	Radio Itatiaia, Belo Horizonte
5.980	Radio Guaruja, Florinapolis
6.000	Radio Guaiba, Porto Alegre
6.040	Radio Clube Paranaense, Curitiba
6.135	Radio Aparecida, Aparecida
6.150	Radio Record, Sao Paulo
6.160	Radio Rio Mar, Manaus
6.180	Radio Nacional da Amazonia, Brasilia
9.505	Radio Record, Sao Paulo
9.515	Radio Novas de Pas, Curitiba
9.565	Radio Universo, Curitiba
9.630	Radio Aparecida, Aparecida
9.665	Radio Marumby, Florinapolis
11.780	Radio Nacional Amazonia, Brasilia
11.805	Radio Globo, Rio de Janeiro
11.885	Radio Aparecida, Aparecida
11.915	Radio Gaucha, Porto Alegre
11.925	Radio Bandeirantes, Sao Paulo
17.815	Radio Cultura, Sao Paulo

Fig. 1: Brazilian stations.

American Forces Radio (AFRTS) is being heard on short wave for the first time in over a decade.

Radio Havana Cuba offers programs in Latin American languages other than Spanish and Portuguese.

■ BRIAN ODDY G3FEX, THREE CORNERS, MERRYFIELD WAY, STORRINGTON, WEST SUSSEX RH20 4NS

LM&S

Although most of the information herein will still be applicable when this issue arrives on the bookstalls on October 22, some of the international short wave broadcasters may alter their schedules on the 25th to allow for seasonal changes in propagation. If you listen promptly to the announcements from your favourite broadcasters on frequencies quoted herein, it may be possible to ascertain the details of their schedule changes before they are introduced. Any information about them would be very welcome for LM&S - please send them to me at the above address.

Long Wave Reports

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

Particularly good reception of the broadcasts from Rikisutvarpid via Gufuskalar, W.Iceland on **189kHz** was noted at 0555UTC on August 30 by **John Slater** in Scalloway, Shetland. The transmission rated SIO444.

Medium Wave Reports

The broadcasts from two m.w. stations in Newfoundland were received at night by John Slater in Scalloway. On August 20 he logged VOCM in St.John's on **590kHz** as SIO333 at 0420UTC and CJYQ in St.John's on **930** as SIO222 at 0425. The following night he heard VOCM at 0400 but the conditions were less favourable - their transmission rated SIO222. There were no other reports of m.w. transatlantic reception during August.

Also received at night were the sky waves from some of the many m.w. stations in the Middle East, N.Africa, Europe and Scandinavia - see chart. On August 31 **Robert Shacklock** (Westwood, Notts) found the conditions poor after dark, with a background noise like running water. R.Sweden on **1179**, which is usually more like a local, could hardly be heard but he had no difficulty in picking up Spanish stations!

During daylight the ground waves from distant local radio stations attracted the attention of some DXers - see chart. **Peter Kay** (Abergele) revisited Trimley, near Felixstowe after a gap of four years and searched the band on August 29 from 1000 until 1200UTC. He heard eight new local radio stations but six previously logged were not apparent.

The m.w. outlet of BBC Isle of Wight Radio was non-operational when **Brian Keyte** (Gt.Bookham) visited the island in August. **George Millmore** (Wootton, IoW) has confirmed that they vacated **1242kHz** towards the end of July, some three months after the introduction of their f.m. service in the v.h.f. band.

LONG WAVE CHART

Freq (kHz)	Station	Country	Power (kW)	Listener
153	Bechar	Algeria	1000	G*
153	Donebach DLF	Germany	500	A*,B*,C*,D,E*,F,G*,H,K
153	Bod	Romania	1200	C*
162	Allouis	France	2000	A*,C*,D,E*,F,G*,H,J,K
171	Nador Medi-1	Morocco	2000	A*,G*,H*
171	B'shakovo etc	Russia	1200	A*,E*,F,G*,H*,K
171	Sasnovy	Belarus	1000	C*
177	Dranienburg	Germany	500	A*,C,E*,F,H,J,K
183	Saarlouis	Germany	2000	A*,D,E*,F,G*,H,J,K
189	Gufuskalar	W.Iceland	150	C*,I*
189	Tbilisi	Georgia	500	B*
198	Droitwich BBC	UK	500	A*,C,E*,F,H,J,K
207	Munich DLF	Germany	500	A*,B*,E*,F,G*,H,K
216	Roumoules RMC	S.France	1400	B,E*,F,G*,H,K
225	Raszyn Resv	Poland	?	A*,B*,C*,E*,F*,G*,H
234	Beidweiler	Luxembourg	2000	A*,D,E*,F,G*,H,K
243	Kalundborg	Denmark	300	B*,C,D,E*,F,G*,H,K
252	Tipaza	Algeria	1500	C*,F*
252	Atlantic 252	S.Ireland	500	C,D,E,F,G*,H,J,K,L
261	Burg(R.Ropa)	Germany	85	B*,C*,E*,F,G*,H
270	Topolna	Czech Rep	1500	B*,C*,D,E*,F,G*,H,K
279	Sasnovy	Belarus	500	E*,F*,G*

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

Listeners:-
(A) John Eaton, Woking.
(B) Simon Hockenhull, E.Bristol.
(C) Sheila Hughes, Morden.
(D) Rhoderick Illman, Oxted.
(E) Eddie McKeown, Newry.
(F) George Millmore, Wootton, IoW.
(G) Fred Pallant, Storrington.
(H) Robert Shacklock, Westwood, Notts.
(I) John Slater, Scalloway.
(J) Tom Smyth, Co.Fermanagh.
(K) Phil Townsend, E.London.
(L) Tom Winzor, Plymouth.

Short Wave Reports

Frequent checks were made in the **25MHz (11m)** band by some listeners during August but they found no evidence of broadcasting activity.

In contrast, good reception from stations in several continents was noted in the **21MHz (13m)** band. During the morning DW via Sri Lanka? **21.680** (Eng to Africa 0600-0650?) was rated 44333 at 0600 by **Frank Miles** in SW.London; RAI Rome **21.520** (It to Africa 0600-1300) 44444 at 0710 by **Vic Prier** in Colyton; Voice of Turkey **21.715** (Tur to W.Asia, Australia 0500-1000) 35443 at 0845 by **Ernest Wiles** in NE.Bedford; R.Australia via Shepparton? **21.725** (Eng to Pacific areas ?-?) 33333 at 0840 by **Tom Winzor** in Plymouth; R.Prague, Czech Rep **21.745** (Eng to S.Asia 0900-0930) 43333 at 0919 by **Darren Beasley** in Bridgwater; UAER, Dubai **21.605** (Eng to Eur 1030-1100) 45444 at 1031 by **Tony Hall** in Freshwater Bay; R.Portugal Int via Sines **21.655** (Port to Brazil 0800-2100) 44434 at 1108 by **Rhoderick Illman** in Oxted; BSKSA Saudi Arabia **21.495** (Ar [Holy Quran] to SE.Asia 0900-1200) 33333 at 1155 by **Robert Connolly** in Kilkeel.

After mid-day, Vatican R, Italy **21.850** (It to S.America 1200-1230) was noted as 44333 at 1223 by **John Eaton** in Woking; BBC via Ascension Is **21.660** (Eng to Africa 1100-1700) 32232 at 1310 by **Robert Hughes** in Liverpool; R.Prague via Rimavska Sobota **21.745** (Eng to E.Africa, M.East 1300-1330) 24222 at 1325 by **Vera Brindley** in Woodhall Spa; UAER, Abu Dhabi **21.630** (Ar to Far East 0900?-1400?) 35444 at 1332 by **Mike Casey** in Manchester; UAER, Dubai **21.605** (Eng to Eur 1330-1355) 54444 at 1335 by **Stan Evans** in Herstmonceux; RFI via Issoudun **21.620** (Fr to E.Africa 0900?-1500) 45343 at 1342 by **Eddie McKeown** in Newry; BBC via Cyprus **21.470** (Eng to E.Africa 1400-1700) 34333 at 1500 by **Gerald Guest** in Dudley; DW via Kigali, Rwanda **21.560** (Ger to M.East 1400-1755) 45444 at 1520 by **Simon Hockenhull** in E.Bristol; HCJB Quito, Ecuador **21.470** (Russ, Ger, Fr, Sp to Eur? 1800-2200?) 44444 at 1930 by **Bernard Curtis** in Stalbridge; R.For Peace Int, Costa Rica **21.465** (Sp? to USA?) 33333 at 2023 by **Thomas Williams** in Truro; HCJB Quito, Ecuador **21.455** (Eng [u.s.b. + p.c.] to Eur 1930-2200?) 34222 at 2000 in Scalloway.

Broadcasts from many areas were received in the **17MHz (16m)** band. During the morning R.Australia via Shepparton **17.750** (Eng to Asia 0600-0900) was rated 24533 at 0645 by **David Edwards** on in Wallsend; R.Austria Int via Moosbrunn **17.870** (Eng, Ger to Australasia 0930-1030) 33322 at 0930 in Truro; AIR via Bangalore **17.387** (Eng to Pacific areas 1000-1100) 24112 at 1004 in Newry; R.Pakistan, Islamabad **17.835** (Eng to Eur 1100-1120) 45243 at 1105 in Newry; R.Bulgaria, Sofia **17.585** (Eng to Eur 1100-1200) 44444 at 1125 in Herstmonceux.

After mid-day RCI via Sackville, Canada **17.820** (Eng, Fr to Eur, Africa 1330-1500 Mon-Sat) was 55544 at 1345 in NE.Bedford; BBC via Ascension Is **17.830** (Eng to W/C.Africa 0730-2100) 32122 at 1345 in Liverpool; Israel R, Jerusalem **17.535** (Eng to Eur, N.America 1400-1430) 44444 at 1427 in Woodhall Spa; BBC via Antigua, W.Indies **17.840** (Eng to S/C.America 1400-1700) 33343 at 1451 in Woking; R.Prague, Czech Rep **17.485** (Eng to Eur, E.Africa 1700-1727) 55555 at 1705 in Plymouth; R.Vlaanderen Int, Belgium **17.655** (Eng to Eur, M.East, Africa 1730-1755) 24322 at 1739 in Manchester; Israel R, Jerusalem **17.545** (Heb [Home Sce rly] to W.Eur, N.America 0500-1855) 34433 at 1800 in Colyton; VOA via Morocco **17.895** (Eng to Africa 1600-1900) 43444 at 1817 in Freshwater Bay; HCJB Quito, Ecuador **17.735** (Eng to Eur 1900-2300?) 44444 at 1905 by **David Hall** in Morpeth; HCJB Quito, Ecuador **17.795** (Russ, Ger, Fr, Sp to Eur? 1800-2200?) 33323 at 1930 in Stalbridge; R.Nederlands via Bonaire, Ned Antilles **17.605** (Eng to Africa 1830-2025) 44333 at 1952 by **Clare Pinder** in Appleby; RCI via Sackville **17.870** (Eng to Eur, M.East, Africa 2000-2100) 45444 at 2050 in E.Bristol; WYFR via Okeechobee, USA **17.555** (Ger, Eng to Eur, Africa 1600-2100?) 32442 at 2055 in Bridgwater; R.New Zealand Int **17.675** (Eng to Pacific areas? 2050 [2105 Fri/Sat] -0457) 34443 at 2110 by **Richard Reynolds** in Guildford; DW via Antigua, W.Indies **17.810** (Ger to S.America 2000-2200) 24422 at 2110 by Andreas Erbe in Landsberg, Germany; R.Taipei Int via WYFR **17.750** (Eng to Eur 2200-2300) 44444 at 2200 by **Sheila Hughes** in Morden; VOA via Philippines **17.735** (Eng to E/SE.Asia, Pacific 2100-0100)

33443 at 0055 in Kilkeel.

Noted in the **15MHz (19m)** band before noon were the Voice of Nigeria via Ikorodu **15.120** (Eng 0500-0700) rated 55544 at 0650 in Herstmonceux; BBC via Seychelles **15.420** (Eng to E.Africa 0400-0630 Mon-Fri, 0400-0700 Sat,Sun) 34222 at 0651 in Woking; R.Slovakia Int **15.460** (Eng to Australia 0700-0730) 55555 at 0700 in SW.London; R.Norway Int. **15.640** (Norw [Eng Sun] to Eur, W.Africa, New Zealand 0700-0730) 44344 at 0700 in Appleby; RFO Tahiti, Fr.Polynesia **15.170** (Fr to SE.Pacific) 23222 at 0730 in Scalloway; R.Australia via Shepparton **15.415** (Eng to Asia 0100-0400, 0600-0900) 24332 at 0808 in Wallsend; R.Africa 2, Eq.Guinea **15.185** (Eng 0700-1100) 24433 at 0844 in Guildford; BBC via Ascension Is **15.400** (Eng to Africa 0715-1130) SIO444 at 0930 by **Tom Smyth** in Co.Fermanagh; R.Vlaanderen Int, Belgium **15.595** (Eng to Eur, M.East 1030-1055) 33333 at 1036 by **Martin Cowin** in Kirkby Stephen; R.Pakistan, Islamabad **15.530** (Eng to Eur 1100-1120) 25454 at 1110 in Manchester.

During the afternoon R.Kuwait via Kabd **15.495** (Ar to M.East 0200-1305) was 55555 at 1210 in NE.Bedford; R.Sweden via Horby? **15.240** (Eng to Asia, Pacific 1230-1300) 54444 at 1231 in Plymouth; RCI via Sines, Portugal **15.325** (Eng to Eur, M.East, Africa 1330-1400) 43344 at 1330 in Dudley; R.Romania Int **15.390** (Eng to Eur 1300-1356) 44344 at 1337 in Newry; R.Sweden via Horby? **15.240** (Eng to N.America 1330-1400) 44444 at 1340 in Truro; R.Algiers Int, via Bouchaoui **15.160** (Eng, Sp to Eur, M.East, N.Africa 1600-2000?) 54444 at 1610 by **Adam Farnsworth** in Bridgnorth; DW via ? **15.415** (Eng to S.Asia 1600-1650) 53433 at 1600 by **Ross Lockley** while in Crete; VOIRI Tehran, Iran **15.084** (Home Sce relay) 54434 at 1710 in Colyton; R.Japan via Moyabi, Gabon **15.355** (Eng to Africa 1700-1800) 34333 at 1731 in Woodhall Spa; WYFR via Okeechobee **15.695** (Eng to Eur, Africa 1600-2100?) 33323 at 1755 in Stalbridge.

Later, Channel Africa via Meyerton **15.240** (Eng to W.Africa 1800-1830) was 45444 at 1823 in Freshwater Bay; Africa No.1, Gabon **15.475** (Fr to W.Africa 1600-1900) 35444 at 1846 by **Fred Pallant** in Storrington; WEWN via Vandiver, USA **15.745** (Eng to Eur 1000-2200) 44444 at 1932 by **Martin Venner** in St.Austell; LJB via Sabrata, Libya **15.415** (Ar to M.East, Eur, N.America 1800-0400) 54454 at 1940 in Liverpool; Voice of Nigeria via Ikorodu **15.120** (Eng 1900-2100) 54554 at 2000 by **Bill Griffith** in W.London; Voice of Indonesia, Jakarta **15.150** (Eng to Eur, Africa 2000-2100) 43543 at 2013 in Bridgwater; Voice of Russia **15.485** (Eng to Eur 1700-2100) 44444 at 2030 in Morden; RCI via Sackville **15.325** (Fr, Eng to Eur, Africa 1900-2129) 35333 at 2055 in E.Bristol; R.Taipei Int via WYFR 15.600 (Eng to Eur 2200-2300) 44444 at 2225 in Kilkeel.

Good reception from some areas has also been noted in the **13MHz (22m)** band. During the early morning R.Denmark via R.Norway **13.800** (Da to NW.Eur, M.East 0530-0600) was 34232 at 0530 in Scalloway; DW via Sines? **13.790** (Eng to W.Africa 0600-0650) 55555 at 0620 in SW.London; R.Norway Int **13.800** (Norw [Eng Sun] to E.Eur 0700-0730) 44222 at 0700 in Appleby; R.Austria Int via Moosbrunn **13.730** (Eng to Eur 0730-0800) SIO444 at 0733 by Francis Hearne in N.Bristol; SRI via Sottens? **13.685** (Eng, It, Ger, Fr to Australasia 0830-1030) 55555 at 0855 in Herstmonceux; R.Kuwait via Kabd **13.620** (Ar to Eur, N.America 0930-1605) 33233 at 0950 in Liverpool.

During the afternoon R.Austria Int via Moosbrunn **13.730** (Eng to Eur, N.America 1230-1300) was 44444 at 1242 in St.Austell; R.Prague via Litomysl **13.580** (Eng to Africa 1300-1327) 44333 at 1324 in Woodhall Spa; UAER, Dubai **13.675** (Eng to Eur 1330-1355) 54444 at 1334 in Plymouth; R.Norway Int **13.800** (Norw [Eng Sun] to E.Eur, M.East, S.Asia 1500-1530) SIO333 at 1529 by **Philip Rambaut** in Macclesfield; WHRI via Noblesville, USA **13.760** (Eng to E.USA, Eur 1500-2100) 43544 at 1555 in Manchester; R.Austria Int via Moosbrunn **13.730** (Eng to Eur, Africa 1630-1700) 55555 at 1650 in Bridgnorth; AWR (KSDA) Guam **13.840** (Ar? to M.East 1600-1800) 24222 at 1700 in Truro; Vatican R, Italy **13.765** (Eng to Africa 1730-1800) 32333 at 1755 in Stalbridge.

Later, RCI via Sackville **13.650** (Eng, Fr to Eur, Africa 2000-2200) was 35533 at 2000 in Landsberg, Germany & 54444 at 2106 in Morpeth; Vatican R, Italy **13.765** (Eng to W.Africa 2000-2030) 54243 at 2006 in Woking; R.Ukraine Int, Kiev **13.590** (Eng to Eur 2100-2158) 44343 at 2124 in Newry; R.Havana Cuba **13.720** (Eng to Eur 2030-2130) 44433 at 2125 in Bridgwater; WHRI via Noblesville, USA **13.760** (Eng to Africa 2200-0000) 33333 at 2200 in Morden; RCI via Sackville **13.670** (Eng to USA, Caribbean, S.America 2200-0000) 43443 at 2230 in Kilkeel.

Sometimes R.New Zealand's broadcast to Pacific areas in the **11MHz (25m)** band reached the UK early in the morning. Their 100kW transmission on **11.690** (Eng 0459-1016) was rated 43343 at 0518 in St.Austell & 34443 at 0627 in Guildford. Also received during the morning were VOA via ? **11.995** (Eng to Africa 0600-0700), rated 43444 at 0645 in SW.London; HCJB Quito **11.960** (Eng to Eur 0700-0900) 44444 at 0700 in Dudley; BBC via Masirah Is **11.760** (Eng to M.East 0300-0800, 0900-1400) 33333 at 0905 in Morden; BBC via Skelton & Woofferton, UK **12.095** (Eng to Eur, N/W.Africa 0400-2000) 44454 at 0953 in Kirkby Stephen; R.Prague, Czech Rep **11.640** (Eng to Eur 1030-1057) 44444 at 1044 in Woodhall Spa; R.Cairo, Egypt **12.050** (Ar [Home Sce relay] to Eur, N.America) 43323 at 1059 in Woking.

During the afternoon R.Jordan via Al Karanah **11.690** (Eng to W.Eur, E.USA 1000-1630) was 44444 at 1330 in Herstmonceux; R.Australia via Shepparton **11.660** (Eng to Asia 1330-1700) 32333 at 1345 in Stalbridge; R.Japan via Sri

LOCAL RADIO CHART

Freq (kHz)	Station	ILR BBC	e.m.r.p (kW)	Listener
558	Spectrum, London	I	0.80	B,D,G,H,I,K
585	R.Solway	B	2.00	A
603	Cheltenham R.	I	0.10	A,C,D,H,I,K
603	Capital G,Litt'brne	I	0.10	G,H,I,J,M
630	R.Bedfordshire(3CR)	B	0.20	C,G,H,I,J,K,M
630	R.Cornwall	B	2.00	A,H,I,L,N
657	R.Clwyd	B	2.00	A,E,H,I,J,L,M
657	R.Cornwall	B	0.50	A,H,I,N
666	Gemini AM, Exeter	I	0.34	A,C,D,H,I,J,N
666	R.York	B	0.80	A,H,K,M
729	BBC Essex	B	0.20	G,H,I,J,K,M
738	Hereford/Worcester	B	0.037	A,C,E,H,J,M
756	R.Cumbria	B	1.00	A
756	R.Maldwyn, Powys	I	0.63	H,J,K
765	BBC Essex	B	0.50	B,F*,G,H,I,J,K
774	R.Kent	B	0.70	E,G,H,I,J,M
774	R.Leeds	B	0.50	A,K
774	Cl.Gold 774, Glos	I	0.14	A,C,H,I,J,K
792	Cl.Gold 792,Bedford	I	0.27	G,H,K,M
792	R.Foyle	B	1.00	A,L
801	R.Devon & Dorset	B	2.00	A,C,D,H,I
828	Cl.Gold 828, Luton	I	0.20	C,G,H,J,M
828	Asian Netwk Sedgley	B	0.20	K
828	2CR CG, Bournemouth	I	0.27	I
828	Townland R, Ulster	I	0.80	A
837	R.Cumbria/Furness	B	1.50	A
837	Asian Netwk Leics	B	0.45	A,H,I,J,K,M
855	R.Devon & Dorset	B	1.00	A,H,I,N
855	R.Lancashire	B	1.50	A
855	R.Norfolk, Postwick	B	1.50	E,G,H,J,K,M
855	Sunshine 855,Ludlow	I	0.15	E,H,J,K
873	R.Norfolk, W.Lynn	B	0.30	E,F,G,H,I,J,K,M
936	Brunel CG, W.Wilts	I	0.18	B*,F,H,I,J
936	Yks Dales R, Hawes	I	1.00	A,H
945	Cl.Gold GEM, Derby	I	0.20	A,K
945	Capital G, Bexhill	I	0.75	B,F,G,H,I,J,M
954	Gemini AM, Torquay	I	0.32	H,I,N
954	Cl.Gold 954, H'ford	I	0.16	H,K
963	Asian Sd, E.Lancs	I	0.80	A
963	Liberty R, Hackney	I	1.00	B,F,G,H,I
972	Liberty R, Southall	I	1.00	A,B,F,H
990	R.Devon, E.Devon	B	1.00	A,H,I
990	Cl.G, Wolverhampton	I	0.09	H
999	C.Gold GEM Nott'ham	I	0.25	H,K
999	Red Rose 9-99 P'stn	I	0.80	A
999	R.Solent	B	1.00	B,F,H,I,M
999	Valley R, Aberdare	I	0.300	C,H
1017	Cl.G, Shrewsbury	I	0.70	A,E,H,K,M
1026	R.Cambridgeshire	B	0.50	E,F,G,H,J,M
1026	Downtown R, Belfast	I	1.70	A,L
1026	R.Jersey	B	1.00	A,F,H,I,J
1035	RTL Country 1035	I	1.00	B,G,H,I
1035	R.Sheffield	B	1.00	A,K
1035	N.Sound 2, Aberdeen	I	0.78	A
1116	R.Derby	B	1.20	A,H,J,K
1116	R.Guernsey	B	0.50	A,B,H,I
1152	Cl.G Amber, Norwich	I	0.83	G
1152	LBC 1152 AM	I	23.50	H,I
1152	Pic'ly 1152,Manch'r	I	1.50	A
1152	PlymSnd AM,Plymouth	I	0.32	A,H,N
1152	Xtra-AM,Birmingham	I	3.00	K
1161	R.Bedfordshire(3CR)	B	0.10	H,M
1161	Brunel Cl.G,Swindon	I	0.16	A,C,H,J
1161	Magic AM,Humberside	I	0.35	A,H*,K
1161	Southern Counties R	B	1.00	B*,H,I,J
1161	Tay AM, Dundee	I	1.40	H*
1170	Cl.G Amber, Ipswich	I	0.28	G,H
1170	GNR, Stockton	I	0.32	A
1170	Capital G,Portsm'th	I	0.50	F,I,J
1170	Signal 2,Stoke-on-T	I	0.20	K
1170	Swansea Snd,Swansea	I	0.58	A
1170	1170AM,High Wycombe	I	0.25	H,J,M
1242	Capital G,Maidstone	I	0.32	B,G,H,I,J,M
1251	C.G Amber,Bury StEd	I	0.76	G,H,M
1260	Brunel CG, Bristol	I	1.60	I
1260	SabrasSnd,Leicester	I	0.29	K
1260	R.York	B	0.50	A
1296	Radio XL,Birmingham	I	5.00	A,H,I,K,L
1305	Magic AM,Barnsley	I	0.15	A,K
1305	Premier via ?	I	0.50	B,G,H,I
1305	Touch AM, Newport	I	0.20	C,I
1323	Capital G,Southwick	I	0.50	B,F,H,I,J
1323	SomersetSnd,Bristol	B	0.63	A,D,K
1332	Premier, Battersea	I	1.00	B,H,I
1332	Cl.Gold 1332,Pt'bo	I	0.60	G,K
1359	The Breeze,Chelms'd	I	0.28	F,G,H
1359	Cl.Gold 89, C'try	I	0.27	J,K
1359	R.Solent	B	0.85	B,I,J
1359	Touch AM, Cardiff	I	0.20	C
1368	R.Lincolnshire	B	2.00	H,K
1368	Southern Counties R	B	0.50	B,H,I,M
1368	Wiltshire Sound	B	0.10	I
1413	R.Gloucester via ?	B	?	C,D
1413	Premier via ?	I	0.50	B,G,H,I
1413	Yks Dales R,Skipton	I	0.10	A,K
1431	The Breeze,Southend	I	0.35	F,H,M
1431	Cl.Gold, Reading	I	0.14	G,H,I,J
1449	R.Peterboro/Cambs	B	0.15	A,H,K
1458	R.Cumbria	B	0.50	A
1458	R.Devon & Dorset	B	2.00	A,I
1458	Sunrise, London	I	50.00	B,G,H,I,K
1476	CountySnd,Guildford	I	0.50	A,B,F,H,I,M
1485	Cl.Gold, Newbury	I	1.00	H,J
1485	R.Merseyside	B	1.20	A,K,L
1485	Southern Counties R	B	1.00	B,G,H,I,J,M
1503	R.Stoke-on-Trent	B	1.00	A,D*,E*,H,I,J,K
1521	Heartbeat 1521AM,NI	I	0.50	A,L
1521	Fame 1521, Reigate	I	0.64	B,H,I,M
1530	R.Essex	B	0.15	B,G,H,I,J,M
1530	Cl.Gold W.Yorks	I	0.74	A,H,K
1530	Cl.Gold Worcester	I	0.52	H,I
1548	Capital G, London	I	97.50	B,G,H,I
1548	Magic AM,Merseyside	I	4.40	A,K,L
1557	R.Lancashire	B	0.25	A,K
1557	Mellow, Clacton	I	0.125	G,H,M
1557	Cl.Gold 1557,N.hant	I	0.76	H,J
1557	Capital G, So'ton	I	0.50	B*,H,I,J
1584	London Turkish R	I	0.20	B,F,H,I
1584	R.Nottingham	B	1.00	H,K
1584	R.Shropshire	B	0.50	A,H,I
1602	R.Kent	B	0.25	A,B,E,H,I,J,M

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

Listeners:-

(A) Robert Connolly, Kilkeel.
(B) John Eaton, Woking.
(C) Francis Hearne, N.Bristol.
(D) Simon Hockenhull, E.Bristol.
(E) Sheila Hughes, Morden.
(F) Rhoderick Illman, Oxted.
(G) Peter Kay, while near Felixstowe.
(H) Brian Keyte, Bookham.
(I) George Millmore, Wootton, IoW.
(J) Richard Reynolds, Guildford.
(K) Robert Shacklock, Westwood, Notts.
(L) Tom Smyth, Co.Fermanagh.
(M) Phil Townsend, E.London.
(N) Tom Winzor, Plymouth.

Lanka **11.880** (Eng to Asia 1400-1500) 24333 at 1445 in NE.Bedford; TWR via Monaco **12.080** (Arm to Eur 1500-1530 Mon-Fri, 1500-1515 Sat/Sun) 35444 at 1506 in Storrington; Israel R, Jerusalem **11.605** (Eng to C.Eur 1545-1600) 33333 at 1550 in Bridgnorth; Voice of Greece, Athens **11.645** (Gr to Balkans 1500-1700) 54454 at 1555 in Liverpool; R.Pakistan, Islamabad **11.570** (Eng to M.East 1600-1630) 43433 at 1616 in Bridgwater & 34433 at 1630 in Crete.

Later, R.Kuwait via Kabd **11.990** (Eng to Eur, N.America 1800-2100) was 54444 at 1800 in Appleby; Voice of Vietnam, Hanoi **12.020** (Eng to Eur 1900-1930) 45434 at 1915 in Freshwater Bay; WWCR Nashville, USA **12.160** (Eng to N.America, Eur 1400-2200) 43343 at 2003 in Morpeth; R.Bulgaria, Sofia **11.720** (Fr, Eng to Eur 2000-2200) 42342 at 2105 in Newry; R.Damascus via Adra **12.085** (Ar to Eur? 2000-2100) 44444 at 2012 in Plymouth; RCI via Sackville **11.690** (Eng to Eur, Africa 2000-2130) 45344 at 2101 in Manchester; R.Australia via Shepparton **11.880** (Eng to Pacific areas 1700-2200) 34433 at 2120 in E.Bristol; VOA via Morocco? **11.975** (Eng to Africa 1800-2230) SIO222 at 2200 in Co.Fermanagh; R.Prague, Czech Rep **11.600** (Eng to N.America 2230-2257) 44444 at 2240 in Kilkeel; R.Brasil Central, Goiania **11.815** (Port 0700-0300) 22222 at 0130 in W.London.

R.Australia has also reached the UK in the **9MHz (31m)** band. Their broadcast to Pacific areas via Shepparton on **9.710** (Eng 0800-0900) was rated 25533 at 0806 in Wallsend. Later, **9.500** from Shepparton (Eng to Asia, Pacific 1430-2200) was 22222 at 1902 in Morpeth. During the morning R.Havana, Cuba **9.820** (Eng to N.America 0100-0700?), rated 23232 at 0525 in Scalloway; BBC via Skelton, UK **9.410** (Eng to Eur, N/C.Africa 0300-0830, 1130-2230) 54444 at 0604 in St.Austell; Voice of Mediterranean, Malta via Russia? **9.600** (Eng to Eur, M.East 0630-0700 Mon-Sat) 44444 at 0631 in Woodhall Spa; R.Vilnius, Lithuania **9.710** (Eng to Eur 0930-1000) SIO222 at 0700 in Co.Fermanagh; R.Nederlands via Bonaire, Ned.Antilles on **9.720** & **9.820** (Eng to Pacific 0730-0925) **9.720** was 33323 at 0745 in Colyton & **9.820** was 33333 at 0835 in Stalbridge; HCJB Quito, Ecuador **9.640** (Eng to S.Pacific 0700-1100) 33333 at 0825 in Truro; RFI via Allouis? **9.805** (Fr, Eng to Eur, M.East, N.Africa 0600-1500) 55444 at 1028 in Freshwater Bay; Croatian R, via Deanovec **9.830** (Cr, Eng to Eur 0600-1230) 44444 at 1115 in NE.Bedford; R.Nederlands via Wertachtal **9.860** (Eng to Eur 1030-1225) 55555 at 1115 in Herstmonceux.

After mid-day R.Mediterranee Int via Nador, Morocco **9.575**

MEDIUM WAVE CHART

Freq (kHz)	Station	Country	Power (kW)	Listener
520	Hof/Wurzburg (BR)	Germany	0.2	G*
531	Ain Beida	Algeria	600/300	I*
531	Berg	Germany	20	A*,G*,I
531	RNE5 via ?	Spain	?	G*,I
531	Beromunster	Switzerland	500	I*,M
540	Wavre	Belgium	150/50	A,E,G*,I,L,M*,N
540	Sidi Bennour	Morocco	600	G*,I*
549	Les Trembles	Algeria	600	A*,I*
549	Thurnau (DLF)	Germany	200	E,G*,I,N
558	Espoo	Finland	100	I*
558	RNE5 via ?	Spain	?	G*
567	Tullamore(RTE1)	Ireland (S)	500	A*,B,E,F,I,L,M,N,O
576	Muhlacker(SDR)	Germany	500	I*,N
576	Barcelona(RNE5)	Spain	50	G*,I*
585	Paris(FIP)	France	8	E,L,N
585	Madrid(RNE1)	Spain	200	A*,G&,I*
585	Dumfries(BBCScot)	UK	2	G*
594	Frankfurt(HR)	Germany	1000/400	A,E,G*,I*,M,N
594	Dujda-1	Morocco	100	I*
594	Muge	Portugal	100	G*,I*
603	Sevilla(RNE5)	Spain	50	G*
603	Newcastle(BBC)	UK	2	F,G*,M
612	Athlone(RTE2)	Ireland (S)	100	A*,E,F,I,L,M,N
612	Sebaa Aioun	Morocco	300	G*
612	RNE1 via ?	Spain	10	I*
621	Wavre	Belgium	80	A*,E,G*,I,N
621	Barcelona(OCR)	Spain	50	G*,I*
630	Vigra	Norway	100	D*,G*
630	Tunis-Djedeida	Tunisia	600	A*,G*,I*
639	Praha(Liblice)	Czech	1500	G*
639	RNE1 via ?	Spain	?	A*,D*,G*,I*,L*
648	RNE1 via ?	Spain	10	G*
648	Drfordness(BBC)	UK	500	A,E,F,I,N
657	Madrid(RNE5)	Spain	20	A*,G*,I*
657	Wrexham(BBCWales)	UK	2	C,F,L,M*
666	MesskirchRohrd(SWF)	Germany	150	G*
666	Sitkunai(R.Vilnius)	Lithuania	500	G*
675	Lopic(R10 Gold)	Holland	120	A,E,H,D*,G*,I,L,N
684	Sevilla(RNE1)	Spain	500	A*,D*,G*,I*,L*
684	Avala(Beograd-1)	Yugoslavia	2000	A*,G*,I*
693	Tortosa(RNE1)	Spain	2	G*
693	Droitwich(BBC5)	UK	150	A,E,I,L,N
693	Enniskillen(BBC5)	UK	1	M
693	Startpoint(BBC5)	UK	50	O
702	Flensburg(NDR)	Germany	5	E,G*
702	Monte Carlo	Monaco	40	I*
711	Rennes 1	France	300	A,E,G*,I,L,N
711	Heidelberg	Germany	5	D*
711	Laayoune	Morocco	600	I*
720	Langenberg	Germany	200	E
720	Lisnagarvey(BBC4)	Ireland (N)	10	I*
720	Lots Rd,Ldn(BBC4)	UK	0.5	A,F,I,L,M
729	Cork(RTE1)	Ireland (S)	10	F,G*,I,M
729	RNE1 via ?	Spain	?	A*,D*,G*,I*,L*
738	Paris	France	4	E,I
738	Barcelona(RNE1)	Spain	500	A*,D*,G*,I*,L*
747	Las Palmas	Gran Canaria	20	G*
747	Flevo(Hilv2)	Holland	400	A,D*,E,G*,I,L,N
756	Braunschweig(DLF)	Germany	800/200	A*,D*,G*,I*
756	Bilbao(El)	Spain	5	G*,I*,L*
756	Redruth(BBC)	UK	2	F,I
765	Sottens	Switzerland	500	G*,I*
774	Enniskillen(BBC)	Ireland (N)	1	G*,M
774	RNE1 via ?	Spain	?	D*,G*,I*,L*
774	Plymouth(BBC)	UK	1	O
783	Leipzig(MDR)	Germany	100	A*,G*,I*
783	Miramar(R.Porto)	Portugal	100	G*
792	Limoges	France	300	I
792	Sevilla(SER)	Spain	20	A*,G*,I*
792	Londonderry(BBC)	UK	1	M
801	RNE1 via ?	Spain	?	A*,G*,I*,L*
810	Volgograd	Russia	150	I*
810	Madrid(SER)	Spain	20	G*,L*
810	Westerglen(BBCScot)	UK	100	F,I*,L,M
819	Batra	Egypt	450	G*,I*
819	Toulouse	France	50	G*,L*
819	S.Sebastian(EI)	Spain	5	G*
828	Rotterdam	Holland	20	G*,K,N
837	Nancy	France	200	E,G*
837	CDPE via ?	Spain	?	G*,I*
846	Rome	Italy	540	I*
855	Berlin	Germany	100	G*
855	RNE1 via ?	Spain	?	D,G*,I*,L*
864	Santah	Egypt	500	I*,L*
864	Paris	France	300	A,E,I,L,N
864	Socuellamos(RNE1)	Spain	2	A*,G*,I*,L*
873	Frankfurt(AFN)	Germany	150	B,G*,I*
873	Zaragoza(SER)	Spain	20	G*,I*,L*
873	Enniskillen(R.UI)	UK	1	G*,M
882	CDPE via ?	Spain	?	G*,L*
882	Washford(BBCWales)	UK	100	A,C,D,E,F,I,L,M,N
891	Algiers	Algeria	600/300	D,G*,I*,L*
891	Huisberg	Netherlands	20	E,I*
900	Brno(CRo2)	Czech Rep	25	I*
900	Milan	Italy	600	G*,I*,L*
900	COPE via ?	Spain	?	A*
909	B'mans Pk(BBC5)	UK	140	A,E,I,L,M
909	Clevedon(BBC5)	UK	50	D
918	Domzale	Slovenia	600/100	A*,C*,I*
918	Madrid(R.Int)	Spain	20	C*,G*,I*
927	Wolvertem	Belgium	300	D,E,G*,I,L,N
936	Bremen	Germany	100	E,G*,I*
945	Toulouse	France	300	G*
954	Brno (CRo2)	Czech Rep.	200	G*,I*
954	Madrid(CI)	Spain	20	G*,I*,L*
963	Pori	Finland	600	G*,I*,J*,L*
963	Tir Chonaill	Ireland (S)	10	M
972	Hamburg(NDR)	Germany	300	G*,I*,L*
972	RNE1 via ?	Spain	?	L*
981	Alger	Algeria	600/300	I*,L*
990	Berlin	Germany	300	I*
990	R.Bilbao(SER)	Spain	10	G*,I*,L*
990	Redmoss(BBC)	UK	1	G*,M
990	Tywyn(BBC)	UK	1	F
999	Schwerin (RIAS)	Germany	20	G*
999	Madrid(COPE)	Spain	50	G*
1008	Flevo(Hilv-5)	Holland	400	E,G*,I,N
1017	Rheinsender(SWF)	Germany	600	G*,I*,L*
1026	SER via ?	Spain	?	G*,L*
1035	Tallinn	Estonia	500	M*
1035	Lisbon(Prog3)	Portugal	120	G*
1044	Sebaa-Aioun	Morocco	300	I*
1044	SER via ?	Spain	?	G*
1044	S.Sebastian(SER)	Spain	10	I*,L*
1053	Zarogoza(COPE)	Spain	10	G*
1053	Talk R.UK via ?	UK	?	A,O,E,I,L,M,N,O
1062	Kalundborg	Denmark	250	A*,G*,I*
1071	Mostar	Bosnia	40	L*
1071	R.France via ?	France	?	G*,I*,M
1071	Bilbao(EI)	Spain	5	I*
1071	Talk Radio UK via ?	UK	?	L
1080	Katowice	Poland	1500	G*
1080	SER via ?	Spain	?	A*,C*,I*,L*
1089	Talk Radio UK via ?	UK	?	A,E,I,L
1098	Nitra(Jarok)	Slovakia	1500	A*,G*,I*
1107	AFN via ?	Germany	10	B,G*,I*
1107	Talk R.UK via ?	UK	?	A,E,F,I,L,N
1125	La Louviere	Belgium	20	G*,I*
1125	RNE5 via ?	Spain	?	I*
1125	Llandrindod Wells	UK	1	F
1134	COPE via ?	Spain	2	G*,I*
1134	Zadar(Croatian R)	Yugoslavia	600/1200	A*,G*,I*,L*
1143	AFN via ?	Germany	1	F,G*,L*
1143	COPE via ?	Spain	2	G*
1152	RNE5 via ?	Spain	10	G*
1161	S.Sebastian(EI)	Spain	50	L*
1179	SER via ?	Spain	?	L
1179	Solvesborg	Sweden	600	A*,F,G*,I*,L
1188	Kuurne	Belgium	5	A*,E,G*,I*,N
1188	Szolnok	Hungary	135	I*
1197	Munich(VOA)	Germany	300	G*
1197	Virgin via ?	UK	?	A,E,I,L,M,N
1215	Virgin via ?	UK	?	A,E,I,L,M,O
1224	Lelystad	Holland	50	A*,E,G*,N
1233	Liege	Belgium	5	G*,I
1233	Virgin via ?	UK	?	A,E,L
1242	Marseille	France	150	G*
1242	Virgin via ?	UK	?	L
1251	Marcali	Hungary	500	G*
1251	Tripoli	Libya	500	L*
1251	Huisberg	Netherlands	10	G*
1260	SER via ?	Spain	?	G*,L*
1260	Guildford (V)	UK	0.5	E,I,N
1269	Neumunster(DLF)	Germany	600	A*,G*,I*,L*
1269	CDPE via ?	Spain	?	L*
1278	Dublin/Cork(RTE2)	Ireland (S)	10	A*,F,G*,I*,L,M
1287	RFE via ?	Czech Rep.	400	G*,I*
1287	Lerida(SER)	Spain	10	A*,G*,I*
1296	Valencia(CDPE)	Spain	10	A*,G*
1296	Orfordness(BBC)	UK	500	E,F
1305	RNE5 via ?	Spain	?	G*
1314	Kvitsoy	Norway	1200	E,G*,I*,L
1323	W'brunn (V.Russia)	Germany	1000/150	F,G*,J*,N
1332	Rome	Italy	300	G*,I*,L*
1341	Lisnagarvey(BBC)	Ireland (N)	100	F,I*,L,M
1341	Tarrasa(SER)	Spain	2	I*
1350	Nancy/Nice	France	100	I*
1350	Cesvaine/Kuldiga	Latvia	50	G*,I*
1359	Madrid(RNE)	Spain	600	G*,L*
1368	Foxdale(Manx R)	I.D.M.	20	F*,G,I*,M
1377	Lille	France	300	A,D,E,G,I,L,N
1386	Bolshakovo	Russia	2500	A,G*,I*
1395	Fllake	Albania	1000	A
1395	TWR via Fllake	Albania	500	G*
1395	Lopic	Netherlands	120/40	A,D,E,G*,I,L,N
1404	Brest	France	20	A,D,G*,I,L*
1413	RNE5 via ?	Spain	?	G*
1422	Heusweiler(DLF)	Germany	1200/600	A,D,G*,I*
1440	Marnach(RTL)	Luxembourg	1200	D,E,G*,I
1449	Redmoss(BBC)	UK	2	B*,G*
1467	Monte Carlo(TWR)	Monaco	1000/400	G*,I*
1476	Wien-Bisamberg	Austria	600	G*,J*,L*
1485	SER via ?	Spain	?	G*
1494	Clermont-Ferrand	France	20	D,G*,I,L*
1494	St.Petersburg	Russia	1000	B*,G*,I*,J*
1503	Stargard	Poland	300	A,G*
1503	Tarragona(SER5)	Spain	5	C*
1512	Wolvertem	Belgium	300	A,B*,C*,D,E,G*,I*,L,N
1521	Kosice(Cizatice)	Slovakia	600	I*
1521	Duba	Saudi Arabia	2000	I*,L*
1530	Vatican R	Italy	150/450	A,B*,F,G*,I*,L*,M*
1539	Mainflingen(ERF)	Germany	350(700)	A,G*,I*,M*
1575	SER via ?	Spain	5	A*,G*,I*
1593	Holzkirchen(VOA)	Germany	150	G*,I*
1602	Vitoria(EI)	Spain	10	G*,I*
1611	Vatican R	Italy	15	F

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

Listeners:-

(A) John Eaton, Woking.
(B) Simon Hockenhull, E.Bristol.
(C) Sheila Hughes, Morden.
(D) Rhoderick Illiman, Dxted.
(E) Peter Kay, while near Felixstowe.
(F) Brian Keyte, Gt.Bookham.
(G) Eddie McKeown, Newry.
(H) Frank Miles, SW London.
(I) George Millmore, Wootton IoW.
(J) Clare Pinder, while in Appleby.
(K) Richard Reynolds, Guildford.
(L) Robert Shacklock, Westwood, Notts.
(M) Tom Smyth, Co.Fermanagh
(N) Phil Townsend, E.London.
(O) Tom Winzor, Plymouth.

TROPICAL BANDS CHART

Freq (MHz)	Station	Country	UTC	DXer
2.310	ABC Alice Springs	Australia	2017	B,K,N
2.325	ABC Tennant Creek	Australia	2115	B
2.485	ABC Katherine	Australia	2120	B
3.200	TWR Manzini	Swaziland	1945	P
3.210	REE via Costa Rica	Costa Rica	0100	F,I
3.220	R.Kara, Lome	Togo	2125	B
3.255	BBC via Meyerton	S.Africa	2014	B,K,O,P
3.270	SWABC 1, Namibia	S.W.Africa	2013	B,K,N,P
3.290	Namibian BC,Windhoek	S.W.Africa	2013	B,C,K,P
3.300	R.Cultural	Guatemala	0419	I
3.306	ZBC Prog 2	Zimbabwe	2019	B,K,P
3.316	SLBS Goderich	Sierra Leone	2018	B,K
3.320	SABC (RSG) Meyerton	S.Africa	1940	B,K,P
3.365	GBC R-2	Ghana	2325	B
3.915	BBC via Kranji	Singapore	2300	A,B,E,H,I,O,Q
3.955	BBC via Skelton	England	0450	C,I,J,R,S
3.955	Nexus, Milan	Italy	2130	B
3.960	RFE/RL Biblis	Germany	1930	F
3.965	RFI Paris	France	2232	C
3.970	R.Korea via Skelton	England	2100	I,L
3.975	R.Budapest	Hungary	1900	F,I,L,O,S
3.985	Nexus, Milan	Italy	1945	F
3.985	China R.Int via SRI	Switzerland	2100	A,B,H,I,L,D,Q,R
3.995	DW via Julich	Germany	2128	A,B,C,H,L,J,O,S
4.005	Vatican R.	Italy	2131	B,I,O
4.330	Xinjiang BS, Urumqi	China	2330	B
4.500	Xinjiang BS, Urumqi	China	2345	B
4.735	Xinjiang, Urumqi	China	2335	B
4.750	Xizang BS, Lhasa	China	2340	B
4.760	AIR Port Blair	India	2350	B
4.770	FRCN Kaduna	Nigeria	2034	H,I,K,N,O,P,R,S
4.775	TWR Manzini	Swaziland	0415	I,P
4.783	RTM Bamako	Mali	1942	B,I,P
4.790	Azad Kashmir R.	Pakistan	0012	I
4.800	LNBS Maseru	Lesotho	2135	B,P
4.805	R.Nac.Amazonas	Brazil	2355	B
4.815	R.diff TV Burkina	Ouagadougou	2023	A,B,C,K,O
4.820	R.Botswana, Gaberone	Botswana	2205	A,B,I,M,N,O,P
4.820	Xizang, Lhasa	Tibet	2340	B
4.828	ZBC R-4	Zimbabwe	1857	K,P
4.830	R.Tachira	Venezuela	0402	B,I
4.832	R.Reloj	Costa Rica	0450	D,E,N
4.835	ABC-Alice Springs	Australia	2130	N,O
4.835	RTM Bamako	Mali	2202	B,O
4.840	AIR Bombay	India	0032	P
4.845	RTM Kuala Lumpur	Malaysia	1952	P
4.845	ORTM Nouakchott	Mauritania	1949	K,O
4.850	R.Yaounde	Cameroon	2030	B,C,I,K,O
4.860	AIR Delhi	India	1856	G,K,O,P,S
4.865	R.Alvorada, Londrina	Brazil	2221	C
4.865	PBS Lanzhou	China	2324	O
4.870	R.Cotonou	Benin	2023	A,B,I,K,O,P,S
4.870	Voz del Upano	Ecuador	2224	C
4.875	R.Roraima, Boa Vista	Brazil	2350	B
4.885	R.Clube do Para	Brazil	0336	I,N,P
4.885	R.Difusora Acreana	Brazil	0010	B
4.885	KBC East Sce Nairobi	Kenya	1850	I,K,P,S
4.890	RFI Paris	via Gabon	0436	F,I,P
4.900	Haixia 2,V of Strait	China	2117	N,O
4.910	Tennant Creek	Australia	2135	N
4.910	R.Zambia, Lusaka	Zambia	2135	B
4.915	R.Anhanguera	Brazil	0555	B,S
4.915	GBC-1, Accra	Ghana	2048	A,B,I,K,N,O,P
4.915	KBC Cent Sce Nairobi	Kenya	1849	K,O
4.915	R.Cora de Peru, Lima	Peru	0355	F,P
4.920	R.Quito, Quito	Ecuador	0410	D,F,N,P
4.920	AIR Chennai	India	1652	K,P
4.925	R.Nacional, Bata	Eq.Guinea	0537	N
4.930	R.Internacional	Honduras	0330	A,F
4.935	KBC Gen Sce Nairobi	Kenya	1847	F,G,H,I,K,N,P
4.950	AIR Srinagar	India	1730	P
4.950	VOA via Sao Tome	Sao Tome	2021	A,C,I,K,L,O,P
4.955	R.Nac. de Colombia	Colombia	0435	B,E,F,P
4.960	VOA via Sao Tome	Sao Tome	0300	I
4.965	Christian Voice	Zambia	2218	B,O,P
4.975	R.Uganda, Kampala	Uganda	1851	A,G,I,K,O,P
4.980	Ecos del Torbes	Venezuela	0335	A,B
4.985	R.Brazil Central	Brazil	0010	A,B,C,H,O,P
4.990	FRCN Lagos	Nigeria	2145	B
4.990	R.Ancash, Huaraz	Peru	0430	P
5.005	R.Nacional, Bata	Eq.Guinea	1945	P
5.010	AIR Thiru'puram	India	0035	I,P
5.020	PBS-Jiangxi Nanchang	China	2124	N,O
5.020	Xizang-Tb, Lhasa	China	0005	B
5.020	La V du Sahel,Niamey	Niger	1910	B,I,P
5.025	ABC Katherine	Australia	2136	N
5.025	R.Parakou	Benin	1852	B,I,K,N
5.025	R.Rebelde, Habana	Cuba	0310	A,B,E,F,N,S
5.025	R.Uganda, Kampala	Uganda	1945	A,I,P
5.030	AWR Latin America	Costa Rica	0406	B,F,P
5.035	R.Educacao Rural	Brazil	0010	B
5.035	R.Bangui	C.Africa	1854	F,K
5.045	R.Cultura do Para	Brazil	0015	B
5.047	R.Togo, Lome	Togo	2020	A,B,C,E,I,K,N
5.050	Haixia 1,V of Strait	China	2118	N
5.050	R.Tanzania	Tanzania	1854	A,I,K,P
5.055	RFO Cayenne(Matoury)	French Guiana	0541	B,N
5.060	PBS Xinjiang, Urumqi	China	0005	B,I
5.075	Caracol Bogata	Colombia	0003	A,B,H,I,N,P
5.100	R.Liberia, Totota	Liberia	2023	A,B,H,K,O,P

DXers:-

(A) Michael Casey, Manchester.
(B) Robert Connolly, Kilkeel.
(C) John Eaton, Woking.
(D) David Edwardson, Wallsend.
(E) Bill Griffith, W.London.
(F) David Hall, Morpeth.
(G) Robert Hughes, Liverpool.
(H) Sheila Hughes, Morden.
(I) Eddie McKeown, Newry.
(J) Frank Miles, SW.London.
(K) Fred Pallant, Storrington.
(L) Clare Pinder, while in Appleby.
(M) Vic Prier, Colyton.
(N) Richard Reynolds, Guildford.
(O) Robert Shacklock, Westwood, Notts.
(P) John Slater, Scalloway.
(Q) Tom Smyth, Co.Fermanagh.
(R) Martin Venner, St.Austell.
(S) Ernest Wiles, NE.Bedford.

(Fr, Ar to N.Africa, S.Eur 0500-0100) was 24222 at 1426 in Woking; Voice of Vietnam, Hanoi **9.840** (Eng to Africa 1600-1630) 32122 at 1610 in Liverpool; Voice of Russia **9.765** (Eng to Eur, Africa 1700-2000) SIO555 at 1710 in Maccelsfield; Africa No.1, Gabon **9.580** (Fr to C.Africa 0500-2300) 43343 at 1846 in Storrington; Voice of Armenia, Yerevan **9.965** (Eng to Eur, USA 2015-2045) 54544 at 2016 in Bridgwater; China R.Int, Beijing **9.920** (Eng to Eur 2000-2157) 44333 at 2100 in Morden; R.Sweden **9.430** (Eng to Eur 2130-2200) 55555 at 2130 in Bridgnorth; R.Bulgaria, Sofia **9.700** (Eng to Eur 2100-2200) SIO444 at 2151 in N.Bristol; AIR via Aligarh? **9.950** (Hi, Eng 1745-2230) 45444 at 2206 in Manchester; R.Prague, Czech Rep **9.435** (Eng to N.America 2230-2257) 55455 at 2233 in Newry; R.Nac del Paraguay **9.735** (Sp 0800-0400) 32322 at 0115 in W.London.

The early morning occupants of the **7MHz (41m)** band include KTBN via Salt Lake City **7.510** (Eng to N.America 0000-1600), rated 34232 at 0420 in Scalloway; Christian Science BC via WSHB **7.535** (Eng to Eur 0500-0600, Wed only) 44444 at 0515 in Morden; Voice of Nigeria, Ikorodu **7.255** (Eng, Fr, Hau to W.Africa 0500-0900) 35433 at 0628 in Guildford; WYFR via Okeechobee **7.355** (Eng to Eur, Africa 0600-0800) 33333 at 0635 in Stalbridge; R.Japan via Woofferton, UK 7.230 (Jap, Eng to Eur 0500-0700) 55544 at 0655 in Herstmonceux; R.Prague, Czech Rep **7.345** (Eng to Eur 0700-0727) 55555 at 0718 in Bridgnorth; R.Vlaanderen Int, Belgium **7.290** (Eng to Eur, Australia, S.America 0730-0755) 34433 at 0730 in Colyton.

Much later, R.Norway Int, Oslo **7.485** (Norw to Eur 1700-1730) was noted as SIO555 at 1715 in Macclesfield; RAI Rome **7.145** (Eng to Eur 1935-1955) 44444 at 1937 in St.Austell; R.Thailand via Udon Thani **7.210** (Eng to Eur 1900-1958) 32333 at 1944 in Woodhall Spa; R.Nederlands via Madagascar **7.120** (Eng to S/E/W.Africa 1730-2025) 45554 at 1957 in Wallsend; VOIRI Tehran **7.260** (Eng to Eur 1930-2028) 44444 at 2017 in Plymouth; RCI via Skelton, UK **7.235** (Eng to Eur 2000-2130, also to Africa) 54334 at 2025 in Freshwater Bay; Voice of Nigeria, Ikorodu **7.255** (Eng to W.Africa 1900-2100) 32442 at 2045 in Bridgwater; AIR via Aligarh? **7.410** (Hi, Eng 1745-2230) 53333 at 2050 in Liverpool; R.Ukraine Int, Kiev **7.180** (Eng to Eur 2100-2200) 44444 at 2100 in Appleby; R.Tirana, Albania **7.165** (Eng to Eur 2130-2200) 44444 at 2140 in Crete; Voice of Turkey, Ankara **7.190** (Eng to Eur, USA 2200-2300) 44444 at 2222 in Newry; Vatican R, Italy **7.305** (Eng to Asia, Pacific 2245-2305) 35344 at 2255 in Manchester; BBC via Kranji, Singapore **7.110** (Eng to Asia 2200-0045) SIO343 at 2256 in Woking; R.Corp of Singapore **7.170** (Chin?, Tam? 2200-1700) 23222 at 2300 in W.London; WJCR Upton, USA **7.490** (Eng to E.USA 24hrs) 34443 at 0035 in Kilkeel.

Logged in the **6MHz (49m)** band during the evening were R.Finland via Pori **6.135** (Eng to Eur 2000-2030), rated 54444 at 2000 in Appleby; R.Prague, Czech Rep. **5.930** (Eng to Eur, USA 2000-2030) 55555 at 2020 in Liverpool; China R.Int via Russia? **6.950** (Ger, Eng to Eur 1900-2157) 43334 at 2100 in Dudley; R.Yugoslavia **6.100** (Eng to Eur 2100-2130) 43433 at 2125 in E.Bristol; R.Sweden via Horby **6.065** (Eng to Eur 2130-2158) 44444 at 2130 in Colyton; R.Austria Int via Moosbrunn **6.155** (Eng to Eur 2130-2200) 33333 at 2130 in Truro; R.Austria Int via Moosbrunn **5.945** (Eng 2100-2130) 55555 at 2134 in Plymouth; VOA via Botswana? **6.035** (Eng to Africa 1800-2230) 43323 at 2150 in Stalbridge; Bayerischer Rundfunk, Germany 6.085 (Ger 24hrs) 42333 at 2225 in Woking.

After midnight R.Nederlands via Ned.Antilles **6.165** (Eng to N.America 2330-0125) was 34443 at 0020 in Kilkeel; R.Slovakia Int. **5.930** (Eng to N.America 0100-0127) SIO444 at 0104 in N.Bristol; R.Havana, Cuba **6.000** (Eng to N.America 0100-0500) 33333 at 0150 in W.London; WHRI South Bend, USA **5.745** (Eng to E.USA, Eur 2200?-1000) 54444 at 0350 in Morpeth; REE via Noblejas? **6.055** (Eng to N.America 0500-0600) 54454 at 0500 in Newry; WEWN Birmingham, USA **5.825** (Eng to USA, Eur 0000-1000) 55555 at 0630 in SW.London; R.Japan via Skelton, UK **5.975** (Eng to Eur 0600-0700) 55544 at 0655 in Herstmonceux; BBC via Rampisham & Skelton, UK **6.195** (Eng to Eur, N.Africa 0200-0730, 1530-2230) SIO444 at 0700 in Co.Fermanagh; Deutschland R. Berlin **6.005** (Ger to Eur 24hrs) 55555 at 0715 in NE.Bedford; WWCR Nashville, USA **5.935** (Eng to USA 0100-1400) 24332 at 0717 in Oxted; Caribbean Beacon, Anguilla **6.090** (Eng to N.America) 21331 at 0735 in Scalloway.

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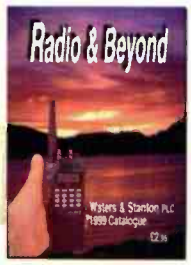

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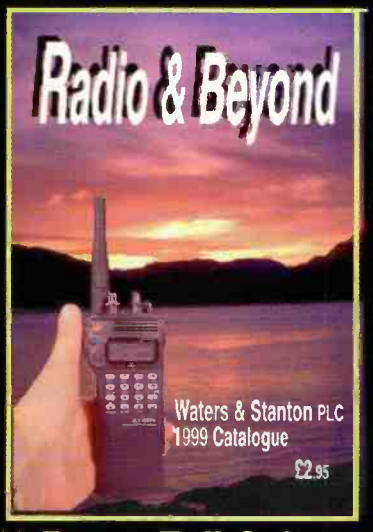

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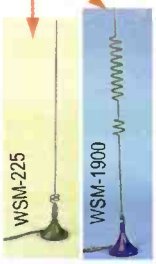

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Toroids, Binoculars, Rods and Beads

How To Use Ferrite and Powdered Iron Cores

Part 3: Binoculars, Rods, Bobbins and Beads

In the first part of this three-part series, Joe Carr K4IPV looked at the basics of ferrite and powdered iron cores for inductors and transformers. In Part 2 he looked at the toroid core: how to wind it and how to mount it. Finally, Joe picks up the loose ends and looks at the remaining types of form: binocular 'BALUN' cores, rods, bobbins and beads.

Binocular Cores

The binocular core, **Fig. 3.1**, is sometimes - erroneously - called a 'BALUN core'. Perhaps it gets this 'street name' from the fact that it was once used extensively in making wideband BALUN input transformers for television and f.m. broadcast receivers. The 'two-hole BALUN core' designation used by Amidon Associates in the USA is a little nearer the case. The top and bottom view of the binocular core shows it to be square or rectangular, while a view of the ends shows a pair of through holes spaced equidistant from the centre line. The binocular core is usually made of ferrite materials, although I suppose powdered iron versions can be found as well.

Fig. 3.1: Binocular or 'two-hole BALUN' core.

Table 3.1 shows the dimensions (inches and millimetres) and A_L values of some of the commonly available binocular cores. In the ferrite versions with very high A_L values, tremendous inductance values can be achieved (with correct selection of core material) using relatively few turns. The A_L values in **Table 3.1** are in terms of millihenrys per 1000 turns, so the required number of turns is found from:

FORMULA 1

$$N = 1000\sqrt{\frac{L\,(mH)}{A_L\,(mH/1000t)}}$$

Where:
N is the number of turns (t)
L(mH) is the inductance in millihenrys (mH)
A_L is a property of the ferrite (mH/1000t)

Turns Counting on Binocular Cores. A 'turn' on a binocular core is one pass through each hole. In **Fig. 3.2a** we see a core with a one-turn winding, while in **Fig. 3.2b** the two-turn case is shown. Additional turns are counted similarly.

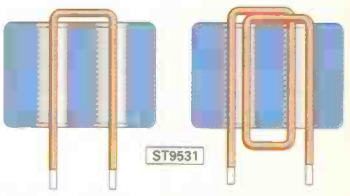

Fig. 3.2: Turns counting in the binocular core: a) one-turn, b) two-turns.

Winding Styles on Binocular Cores. **Figure 3.3** shows three different methods for winding a Binocular core. The preferred method (some would say 'correct' method) is shown in **Fig. 3.3a**. The winding is made through the two holes, and is not outside the core. If two more windings are used, then it is common practice to lay down the primary winding first, and then lay the secondary winding on top of it. Bifilar and trifilar winding methods can also be used, but these are a little more difficult to achieve than on toroid cores.

Alternate methods of winding are shown in **Figs. 3.3b** and **3.3c**.

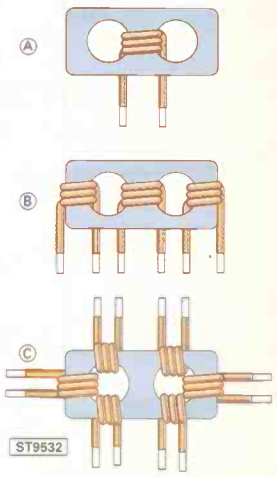

Fig. 3.3: Winding styles for binocular cores (Fig. 3.3a preferred).

Table 3.1: dimensions and A_L values of binocular cores.

Part No.	Outside diameter (o.d.) (in.)	(mm)	Inside diamter (i.d.) (in.)	(mm)	Height (H) (in.)	(mm)	T (in.)	(mm)	Type	A_L Value
BN-43-202	0.525	13.335	0.150	3.810	0.550	13.970	0.295	7.493	1	2890
BN-43-2302	0.136	3.454	0.035	0.889	0.093	2.362	0.080	2.232	1	680
BN-43-2402	0.280	7.112	0.070	1.778	0.240	6.096	0.160	4.064	1	1277
BN-43-7051	0.765	19.431	0.187	4.750	1.000	25.400	0.375	9.525	1	5400
BN-43-3312	1.130	28.702	0.250	6.350	1.130	28.702	0.560	14.224	1	6000
BN-61-202	0.525	13.335	0.150	3.810	0.500	12.700	0.295	7.493	1	425
BN-61-2302	0.136	3.454	0.035	0.889	0.093	2.362	0.080	2.232	1	100
BN-61-2402	0.280	7.112	0.070	1.778	0.240	6.096	0.160	4.064	1	280
BN-61-1702	0.250	6.350	0.050	1.270	0.470	11.938	0.000	0.000	2	420
BN-61-1802	0.250	6.350	0.050	1.270	0.240	6.096	0.000	0.000	2	310
BN-73-202	0.525	13.335	0.150	3.810	0.550	13.970	0.295	7.493	1	8500
BN-73-2402	0.275	6.985	0.070	1.778	0.240	6.096	0.160	4.064	1	3750

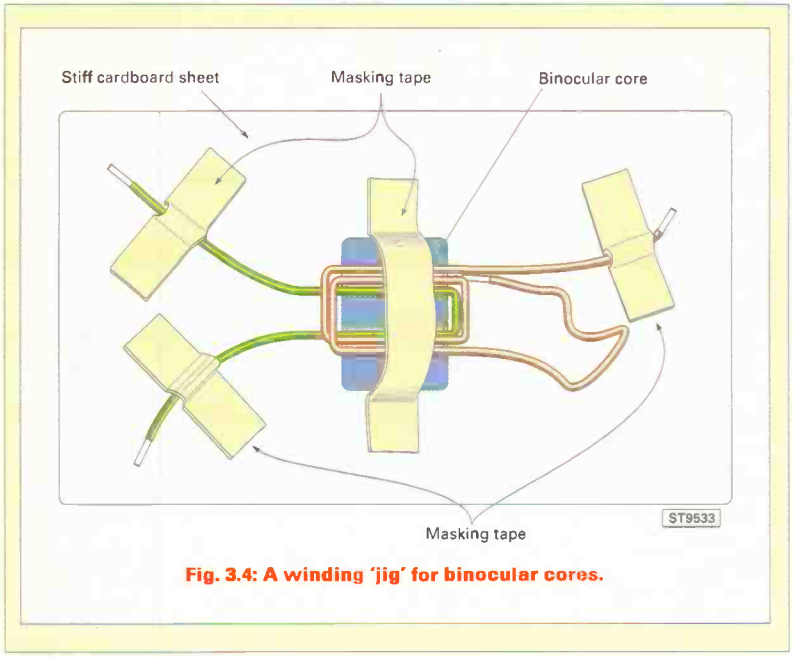

Fig. 3.4: A winding 'jig' for binocular cores.

In **Fig. 3.3b**, one winding is placed in the centre of the core in the manner of **Fig. 3.3a**. Two additional windings are placed on the outsides of the two holes. In **Fig. 3.3c** the two coils are wound separately through the two holes, but are spaced orthogonally to each other. Both **Figs. 3.3b** and **3.3c** are used, especially when there is a wire size or fit problem, but are not highly recommended compared with **Fig. 3.3a**.

Winding a Binocular Core. In the 1950s there was a comedy act on American TV in which a chap - who obviously could be described as about a half-bubble off dead level - attempted to assemble a child's toy on Christmas eve. To say that he was "all thumbs" is to be charitable...it was more like "all toes." My first attempt to wind a binocular core was all too reminiscent of that early TV comedy. Later, I was shown a simple procedure that made it easy. **Figure 3.4** shows this method.

The base of the assembly fixture is a piece of cardboard. I use the sort of cardboard insert that comes with men's shirts when they are returned "boxed" from the cleaners (*you'll find that most breakfast cereal packets will do nicely - **Ed***). When cut into two halves the inserts are just about the right size and stiffness. The binocular core is fastened to the cardboard with a bit of masking tape (preferred over other types of tape because it is easy to remove). The first (inner) winding is started by taping one end of the wire to the cardboard a few tens of millimetres from the core. The wire is snaked through both holes of the core as many times as needed for the coil being constructed. The end of the first winding is then taped to the cardboard with another bit of masking tape. The second winding is overlaid on the first using a similar procedure. After the windings are completed, a little 'Q-dope' or polystyrene cement can be used to secure the wires to the core.

Ferrite Rods

Ferrite rods are used for high powered r.f. chokes, filament chokes in grounded grid linear amplifiers and as directional antennas for receivers. **Figure 3.5** shows the basic ferrite rod. The critical dimensions are its length (L), outside diameter (o.d.) and A_L value (mH/1000t). **Table 3.2** shows the dimensions, permeability, A_L values and other data for commonly available 100 to 190mm ferrite rods. The A_L values are only approximate because they are affected by other factors. Note that, although the usual formulas to find number of turns can be used, the actual inductance achieved depends somewhat on the position of the winding on the length of the rod.

The rods made of Type 61 material are used as radio antennas at frequencies from below the medium wave to about 10MHz. These antennas are highly directional, with two major lobes at right angles to

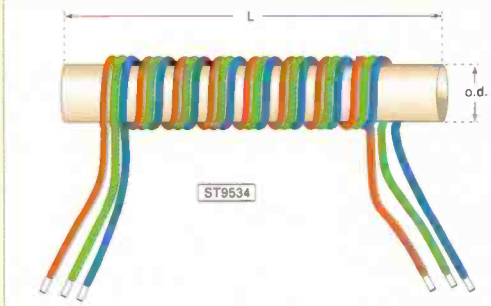

Fig. 3.5: Trifilar winding on ferrite rod.

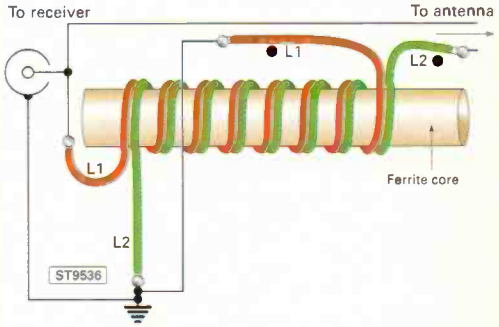

Fig. 3.6: 4:1 BALUN on ferrite rod.

Table 3.2: dimensions and A_L values of ferrite rods.

Rod Type No.	Material	Permeability	Outside dia. (o.d.) (in.)	Outside dia. (o.d.) (mm)	Length (in.)	Length (mm)	A_L Value	Ampere Turns
R61-025-400	61	125	0.25	6.40	4.00	101.60	26.00	110
R61-025-400	61	125	0.50	12.70	4.00	101.60	32.00	185
R61-025-400	61	125	0.50	12.70	4.00	101.60	43.00	575
R61-025-400	61	125	0.50	12.70	7.50	190.50	49.00	260
R61-025-400	33	800	0.37	9.40	4.00	101.60	62.00	290
R61-025-400	33	800	0.50	12.70	2.00	50.80	51.00	465
R61-025-400	33	800	0.50	12.70	4.00	101.60	59.00	300
R61-025-400	33	800	0.50	12.70	7.50	190.50	70.00	200

												A		B		C		D		
Bobbin No.	A_L	NI	20	22	24	26	28	30	32	34	36	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	s.w.g.
B-72-1011	39	130	24	39	60	93	148	230	425	535	1050	0.372	9.449	0.187	4.750	0.75	19.05	0.50	12.70	22
B-72-1111	17	60	9	14	23	35	56	88	154	205	400	0.196	4.978	0.107	2.718	0.75	19.05	0.50	12.70	24

Table 3.3: dimensions and A_L values of ferrite bobbins.

the rod. As a result, they can be used for radio direction finding (r.d.f.). The nulls off the ends of the antenna are used to discriminate station direction. Antennas for the v.l.f. and l.f. frequency ranges are made using rods made of Type 33 material. When used as an r.f. choke, use Type 33

Part Number	Type	43	64	73	75	77	Z-Factor
FB-xx-101	1	510	150	1500	3000	n/a	1.00
FB-xx-201	1	360	110	1100	n/a	n/a	0.70
FB-xx-301	1	1020	300	3000	n/a	n/a	2.00
FB-xx-801	1	1300	390	3900	n/a	n/a	2.60
FB-xx-901	2	n/a	1130	n/a	n/a	n/a	7.50
FB-xx-1901	1	2000	590	5900	n/a	n/a	3.90
FB-xx-2401	1	520	n/a	1530	n/a	n/a	1.02
FB-xx-5111	3	3540	1010	n/a	n/a	n/a	6.70
FB-xx-5621	1	3800	n/a	n/a	n/a	9600	6.40
FB-xx-6301	1	1100	n/a	n/a	n/a	2600	1.70
FB-xx-1020	1	3200	n/a	n/a	n/a	n/a	6.20
FB-xx-1024	1	n/a	n/a	n/a	n/a	5600	3.70

Table 3.4: dimensions and A_L values of ferrite beads.

material for the 40 and 80m bands, and type 61 for 10 through to 40m.

The inductance achieved for any given number of turns, the permeability of the rod, actual A_L value, the *Q* of the rod, and the ampere-turns rating are affected by both the length-diameter ratio of the rod and the position of the coil on the rod. Also affecting performance of the coil are the spacing between the turns of the coil and the spacing between the coil and the rod. Best A_L value and overall performance is achieved when the coil is centred on the rod's length, while highest *Q* is achieved when the coil is spread out over the length of the rod. Because of the inherent variation in rods, the inductance (if it is critical) should be checked before the coil is put into service.

Both **Fig. 3.5** and **Fig. 3.6** show winding schemes for ferrite rod transformers. The trifilar method is shown in **Fig. 3.5**. All three wires are held parallel and adjacent to each other as they are wound along the length of the rod. A 4:1 bifilar wound BALUN transformer is shown in **Fig. 3.6**. The filament choke used in grounded grid amplifiers is wound in this same manner, although the connection scheme is different.

Magnetometer. A magnetometer is an electronic sensor that produces a voltage or current output that is proportional to an applied magnetic field. The flux-gate magnetometer uses a pair of inductors with a ferrite core (**Fig. 3.7**). This circuit uses two ferrite rods. Coil L1 is wound separately around each rod, while L2 is wound around both. When a square wave excitation voltage is applied to the **excitation** port, the **output** signal is proportional to the applied magnetic field.

Note: Low-cost commercial flux-gate magnetometer sensors are made by **Speake & Co. Ltd., Elvicta Estate, Crickhowell, Powys, Wales, UK**. In the United States, the Speake sensors are distributed by Fat Quarters Software, 24774 Shoshonee Drive, Murrieta, CA 92562, USA. Tel: 001-909 698 7950 and FAX 001-909 698 7913, who also make a printed circuit board and parts kits for a practical magnetometer. The FGM-x series of magnetometers is useful for measuring earth's magnetic field, and is a bit classier than the 'jam jar' version used by radio propagation students.

Bobbing Along

Ferrite bobbins **(Fig. 3.8)** offer a convenient way to make small r.f. chokes and other coils. The bobbin is a former that permits the easy winding of such coils. They have a winding area, with end blocks to keep the

Continued on Page 26...

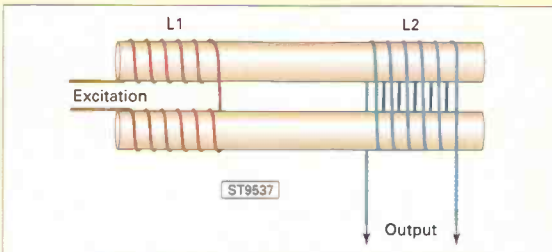

Fig. 3.7: Ferrite rod flux-gate magnetometer.

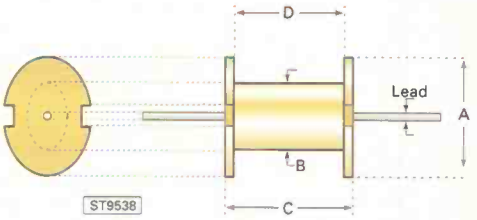

Fig. 3.8: Bobbin core.

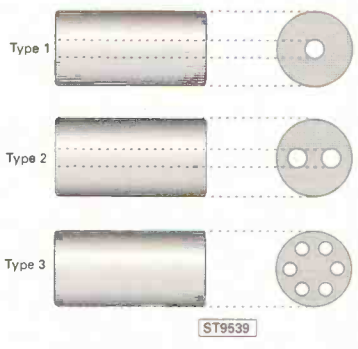

Fig. 3.9: Ferrite beads.

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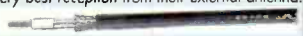

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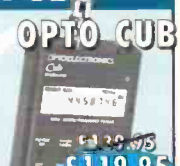

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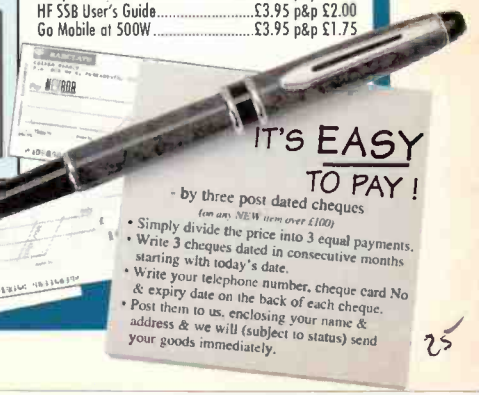

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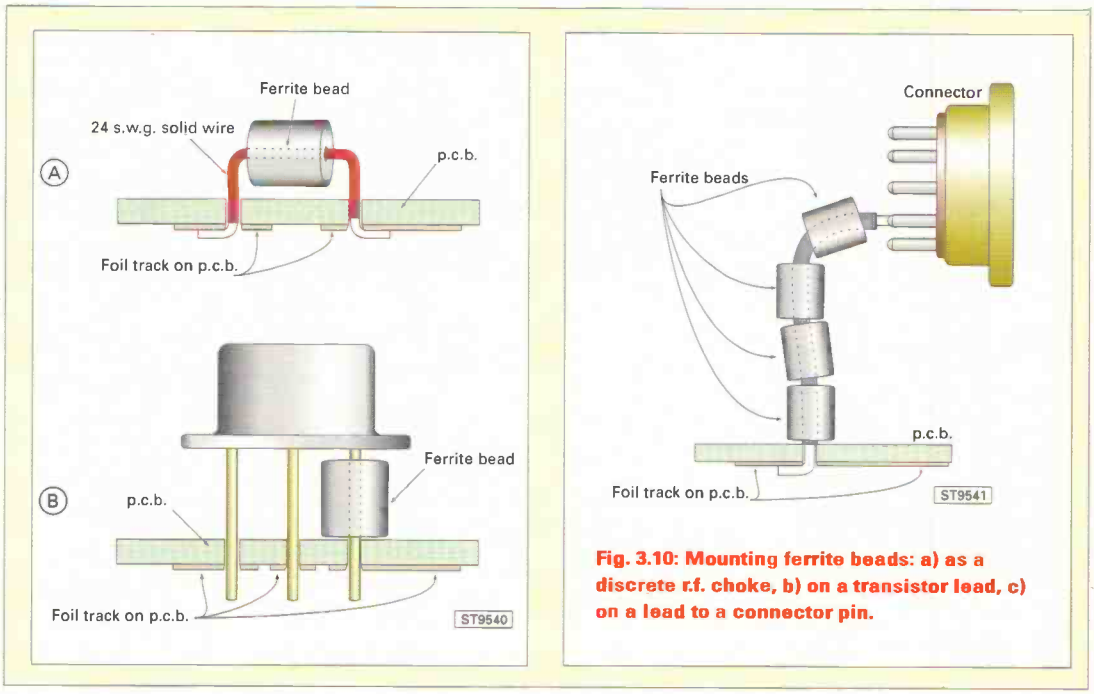


Fig. 3.10: Mounting ferrite beads: a) as a discrete r.f. choke, b) on a transistor lead, c) on a lead to a connector pin.

Continued from Page 22

wires in the correct space. They also have leads coming from each end to make connection to the circuits easier. The A_L values given in **Table 3.3** are in mH/1000t.

Ferrite Beads

Ferrite beads see **Fig. 3.9**, are used to create small-value r.f. chokes and EMI shielding between adjacent conductors. They are especially useful in higher frequency applications where even a small run of wire is a significant portion of a wavelength. Small ferrite beads, with a high o.d./i.d. ratio, produce a lossy inductance when inserted into a circuit. Such cores are low *Q* and lossy at higher frequencies, hence their use as an r.f. choke or EMI filter.

The three principal types of ferrite bead are shown in **Fig. 3.9**, while their characteristics are shown in **Table 3.4**. The A_L values are in terms of mH/1000t. Type-1 has a single through-hole, Type-2 has two through-holes in the manner of the binocular core, and Type-3 has six through-holes. The inductance of a coil based on these cores is dependent on the number of turns and the A_L value. Unlike other cores, however, the small size and high o.d./i.d. ratio makes it difficult to put more than one turn (or very few if smaller wire is used) in the core. For Type-3 cores, which have six holes, the specific inductance achieved for any given number of turns is dependent on the winding pattern through the holes.

Another advantage of the ferrite bead choke is that it provides low value of inductance and capacitance, so there is little chance of spurious self-resonance at frequencies within the passband of the amplifier or circuit in question. Amidon's literature recommends type 73 and 77 material for RFI resulting from h.f. amateur radio operation. Type 43 material is used for 30 to 400MHz operation, and type 64 above 400MHz. Type 75 material is recommended for v.l.f. through 20MHz operation.

Mounting Ferrite Beads. Ferrite beads are mounted in a variety of ways. In wideband MMIC amplifiers such as the MAR-x series of devices, a ferrite bead is often used as an r.f. "peaking coil" to smooth the frequency response over the entire band (there tends to be a roll-off at high frequencies). **Figure 3.10a** shows how a ferrite bead 'choke' is mounted to a printed circuit board. The single-turn is a piece of solid insulated wire, 24s.w.g. passed through the hole in the bead.

If the top of the p.c.b. has a copper foil ground plane, then some ferrite materials must be mounted in a special manner. Certain ferrite materials are semiconductors, so can cause a short-circuit to a metal conductor. In those cases, either space the bead a short distance off the foil, or place an insulating layer below it. The latter, however, can cause an unwanted capacitance. If you control the design of the printed circuit board, then etch out a small area of metal around the bead to reveal the underlying insulating material.

The mounting in **Fig. 3.10b** shows how an r.f. choke can be placed in series with the collector (or other element) of a transistor. Slip the ferrite bead over the transistor lead, and then insert the lead in the hole through the printed circuit board.

Figure 3.10c shows the use of one to several ferrite beads slipped over a lead to the pin of a connector to or from the outside world. This method is used to either 'keep r.f. at home', or prevent it from entering the shielded enclosure. Keep the lead as short as possible, or the whole exercise will be for nothing. ***SWM***

Connections...

I can be contacted at PO Box 1099, Falls Church, VA, 22041, USA, or via E-mail at **carrjj@aol.com**

Source of Supply

Amidon Associates, PO Box 25867, Santa Ana, CA 92799; Tel: 001-714 850 4660; FAX: 001-714 850 1163, a subsidiary of Amidon, Inc., offers ferrite and powdered iron products of interest to radio enthusiasts. They have no minimum order according to the web site. The URL that has the full Amidon catalogue is: **http://bytemark.com/amidon/index1.htm**

Commtel COM214

Some time ago I mentioned to our esteemed Editor that I would like to have a crack at a radio review. As a consequence, a package was delivered a few weeks back and proved to be a new hand-held scanner from Commtel, the COM214. This was a make I had not used before, so I approached the review with anticipation

First Impressions

The COM214 is a fairly standard hand-held design, standing around 150m tall. On the top of the set are the squelch and volume knobs, a headphone socket and a BNC connector for the antenna. The only other socket is on the left hand side of the set for the re-charging plug.

I have to say that the squelch control was at first rather unnerving as it is the only one I have ever encountered that closes the squelch in an anti-clockwise direction! The volume control works in the more traditional clockwise direction and I have to admit that this combination took a little getting used to.

On the front panel is the speaker, liquid crystal display and a small notepad with a clear plastic cover, (more later). There are two rows of five buttons, numbered 1 to 9 and 0, each button is also annotated with one of the memory banks. These keys are used to enter frequencies and to select which banks are to be scanned. Below them is a selection of fifteen buttons of differing shapes, which control all the other functions of the receiver.

The '214 is equipped with a rubber coated helical antenna similar to those supplied with Realistic hand-held receivers, (not surprising as Commtel and Realistic have both badged the same receivers). Also supplied is a belt clip, instruction manual, rechargeable batteries and a mains charger/adapter. It is the mains unit that was the source of my first difficulty.

Frequency Coverage

The frequency coverage is split into four bands, which are as follows: 66-88MHz, 108-174MHz, 406-512MHz and 806-956MHz. This gives the listener access to a wide variety of different bands, including the civil airband, marine band, p.m.r. and the v.h.f./u.h.f. bands used by the emergency services.

I know that my listening habits are a bit predictable, but a comment was very quickly made by a colleague that it was a long, long, time since he had seen me operating a scanner without the u.h.f. airband!

Scanning - Bank Scan

In total, the COM214 has 100 memory channels, which are split into 10 banks of 10. These banks have the traditional channel numbering, 1-10, 11-20, 21-30, etc.

Entering frequencies into a memory is quite simple, first press the 'HOLD' button to stop any scan or search mode. Select a memory channel by either using the up/down arrows or by entering the number for the required channel and then pressing the 'MANU' button. Then using the numerical and decimal point keys, enter the desired frequency and then press the 'E' key (Enter).

The frequency flashes twice and is then stored. Unfortunately, it is not possible to select either a.m. or f.m., as this is done automatically by the set. I was a little surprised that there was no mention of this in the manual.

I personally would have liked the numerical keys to be slightly larger for easier use, but even so it only took me about 20 minutes to store frequency information into 90 channels. If you make a mistake during entry, one or two presses of the decimal point button will clear the incorrect frequency.

If you want to delete the entire content of a memory, first select the frequency and then press the zero '0' key and enter 'E'. Deleting a frequency returns the display back to 000.000 and this channel will then be skipped during a scan.

For evaluation, I entered a variety of frequencies, which included the v.h.f. airband, marine band and a selection of p.m.r. frequencies including some emergency services.

Scanning the memories is straightforward - to enter BANK SCAN just press the 'SCAN' button and select whichever banks you require using the numeric keys. (To select banks 1, 2, 4, 6, 8, just press 'SCAN' followed by those numbers and away you go).

If you wish to remove banks from the scan, just press the relevant numeric key and it is removed. Banks can be added or removed without stopping the scan, which makes it very flexible. (Why, oh why, can't my Icom R8500 do this - sorry to mention that again!). To stop any scan or search mode, just press the 'HOLD' button.

The factory settings allocate the first memory in each of the 10 banks as a priority channel. By pressing the 'PRI' button the priority channel will be sampled every two seconds for a transmission and if a signal is received the scan will stop on that frequency.

The priority channel can be moved to a different memory in a bank by first selecting it and then holding down the 'PRI' key for at least two seconds. Confirmation is made by a beep and the letter 'P' appears in the display.

Once entered, each memory channel can have a two second delay attached to it by pressing the 'DELAY' button. This will ensure that the scan will not restart for two seconds after the transmission has finished.

Individual channels in each bank, including the Priority channel, can be locked out from the Scan by pressing the 'L/OUT' button. To unlock the memory channel, just press the 'L/OUT' key again.

When each of the functions mentioned above is selected, this is reflected in the digital readout. Apart from the frequency, the selected scan banks and channel number the display also shows which functions are selected. This gives a clear visual reminder of what mode you are in. Some examples of what is displayed are: Scan ('SCN'), Delay ('DLY'), Priority ('PRI'), Hold ('HOLD') and Lockout ('L/O').

Apart from BANK SCAN, a second scan mode is included which is called DIRECT SCAN. During scanning, a press of the 'DIRECT' button gives you immediate access to scan bank 1, (memories 1-10). The idea being that if you were scanning all 10 banks with your favourite frequencies in memories 1 to 10, you can switch to them instantly without deselecting banks 2 to 10.

The same effect is of course gained by selecting scan and bank 1 only. A further press of the 'DIRECT' button takes you back to your original scan.

As can be seen, several of the functions are controlled by single key pushes, (push once for on and again for off). This is refreshingly simple after the multiple key pushes needed on some of the more up-market hand-helds.

Searching - Band Search

According to the manual, the COM214 has 12 pre-set search bands. I tried my best to find 12 but I could only find 10! They are as follows: 66-88, 108-137, 137-144, 144-148, 148-174, 406-420, 420-450, 450-470, 470-512 and 806-956, (all MHz).

The banks are selected by continuously pressing the 'BAND' button to circulate through the 10 pre-set ranges. When the desired band is selected, BAND SEARCH will automatically start after about two seconds. When a BAND SEARCH is selected, SRCH appears in the display.

During searching, the rate can be increased to from 100 to 300 steps per second, by pressing the 'PRI' button. This is TURBO SEARCH, to indicate that this mode is

Peter Bond puts the new hand-held scanner from Commtel through its paces.

selected, SRCH flashes on the display.

TURBO SEARCH is only available in those banks that utilise 5kHz steps. The direction of the search can be changed by pressing the up or down arrows on the keypad.

As with the Bank Scan, the DELAY operates in the same way as in Search mode, pausing the search until two seconds after a transmission finishes. When a frequency of interest is found, it is easy to store it into a memory. Press 'HOLD' to stop the search on the desired frequency, the next available empty memory channel number will then flash in the display.

Press 'E' and the frequency is stored. To store the frequency into a specific memory channel press 'HOLD' as before, then press the selected memory channel plus the 'MANU' key, wait two seconds for the frequency to appear in the display and the press 'E' to store it.

I would have much preferred to have the facility to change the search ranges and specifically to make them smaller. For example, to search the civil airband you do not really need to include 108.0 to 117.975MHz, (unless you are into listening to the three letter Morse codes of aeronautical beacons).

Also, to search all the way through from 148 to 174MHz when you may only want to search the Marine band, means that you have to plough through all the other band allocations to get to the item you want. (And that includes numerous collections of irritating data bursts which can be hard on the ears!).

Commtel have provided a 'DATA' key, which when activated, prevents the search from remaining on data or unmodulated transmissions, but you still get a short burst of data before it moves the search on.

The search increments are set automatically and once again cannot be changed. All of the bands are set to 12.5kHz steps except for 66-88MHz, 137-144MHz and 148-174MHz, which are set to 5kHz.

Taking the example of the airband it means that it is searched in 12.5kHz steps rather than the 25kHz I would have chosen. Also, a frequency such as 155.3875 cannot be set due to the pre-set 5kHz, steps. Any strong signals would be heard on either 155.385 or 155.390MHz, with some inevitable signal deterioration due to not being in the centre of the i.f. pass band. Perhaps I am expecting too much from a budget receiver, but then again, perhaps not?

During a search, you have the facility to lock out up to 100 frequencies. This enables the listener to remove unwanted transmissions such as constant weather broadcasts on the airbands (ATIS), or internally generated signals, (birdies), which break the squelch.

The plug-in heat shrink NiCad battery pack.

Other Facilities

The manual supplied with the COM214 is a pocket sized 40-page booklet which is split into five, eight page sections. Covering English, French, German, Dutch and Spanish translations, confirming the radio's intended European market. The information is presented clearly and the instructions are reasonably simple to follow. I did find a couple of anomalies such as the reference to 12 search banks when I could only access 10!

Two keys I have not mentioned so far are 'LOCK' and 'LIGHT'. Holding the 'LOCK' key down for two seconds, locks the keyboard and prevents accidental key presses, a further two second press, reverses the function.

Pressing the 'LIGHT' key, turns on and off the back-light in the display. If the light is left on it will automatically switch off after 15 seconds.

Found below the display is an unusual feature. Removing a small clear plastic cover gives access to thin card strip, which is a small notepad, split into 10 sections. The idea being that you can make a brief note of the contents of 10 memories or 10 banks. A few spare cards are also provided in the box.

Hands On - Scan & Search

Time for some 'Hands On'. A press of the scan button followed by banks one to five and we were ready to scan all the London Control frequencies and a few v.h.f. London Military frequencies. Unfortunately, it wasn't long before I encountered a few problems.

The active London Control frequencies 118.825, 127.7, 129.375 and 133.975 at varying times, all had to be locked out of the scan. The frequency 118.825 was getting cross channel interference from gas board p.m.r., 127.7 suffered from regular databursts and 129.375 was suffering from internal 'birdies'.

The London Military frequency 133.9 had the local Police on it loud and clear! A check with other bands revealed similar problems.

With the offending frequencies locked out I proceeded to scan the airbands. The COM214 is reasonably sensitive for a budget hand-held, picking up airband transmissions at a good distance. Aircraft working the upper airways on the Lakes sector, some 320km away could be heard faintly, but clearly.

Scanning known frequencies from other v.h.f./u.h.f. bands produced fairly consistent results. The received audio from strong local signals was quite good but some more distant weaker signals could sometimes have a warble or whistle in the background.

Because of the breakthrough problems I was suffering, I decided to instigate a search on the airband. The results were rather illuminating. The search stopped numerous times through a mixture of spurious out of band signals, (both voice and data) and general unmodulated noise breaking the squelch.

The primary signal breakthrough was noted between 118.0-119.0MHz and 131.0-132.0MHz. To cut out the data-bursts, a facility I thought I could bring into use here was the 'DATA' skip key. Several prods of the 'DATA' key brought no success and the DATA function would not activate.

I carefully re-read the 'Using DATA Skip' section of the manual but still could not get it to work. It was only later, I noticed in a different part of the manual that it stated that the DATA function would not work on the airband. Ho-hum, back to square one!

As the data key could not be used it meant that the Lockout L/O function had to used exclusively to remove the unwanted signals. As a consequence, I would estimate that I used a large percentage of the 100 lockout channels on just the airband. This in itself reinforces the argument for search banks that can be varied.

If I am brutally honest, the number of frequencies that had to be locked out, and in particular active airband frequencies, was unacceptably high. If you have to lockout some of your favourite frequencies so that the scan can continue to operate it does seem to defeat the basic principle of owning a scanning radio.

It was already fairly obvious that the signal handling of the set was not as good as I might have expected. The cross channel break-through caused by poor selectivity/filtering started to take on a pattern.

By using two other receivers I started to track down the signals that were being received from out of band. A few quick calculations and it was soon determined that a spurious mirror image of the signal was being heard 21.6MHz below the correct frequency. For example, p.m.r. on 140.425 heard on 118.825, Police on 155.5125 heard on 133.9, Data on 149.3 heard on 127.7, etc. This was very close to being a multiple of the i.f.!

This lead to the conclusion, that the Image Rejection characteristics of the set were not very good. Further checks showed that the mirror image also appeared above the correct frequency. For example, radio amateurs using 145.65 could be heard on the COM214 on 167.25MHz.

The Bottom Line

I have to admit that I ended up being disappointed with the COM214. Even taking into consideration that it is at the budget end of the hand-held market, I still feel that the performance should have been better. It is a smart looking set, which is relatively easy to operate and is reasonably sensitive. It has a few little quirks, such as the squelch control, but this in itself, would not necessarily put me off the radio.

The main complaint has to be the poor front-end. When so much cross-mod interference is encountered it makes operation of the scanner rather frustrating. If only the signal handling and selectivity could be improved, the COM214 would be a good addition to the budget end of the hand-held market. On the positive side, both search and scan speeds are good at 300 steps per second and over 25 channels per second respectively.

I wish to extend my thanks to **SRP Trading, 1686 Bristol Road, South Rednal, Birmingham B45 9TZ**. The COM214 costs £129.99 + £5 P&P. ***SWM***

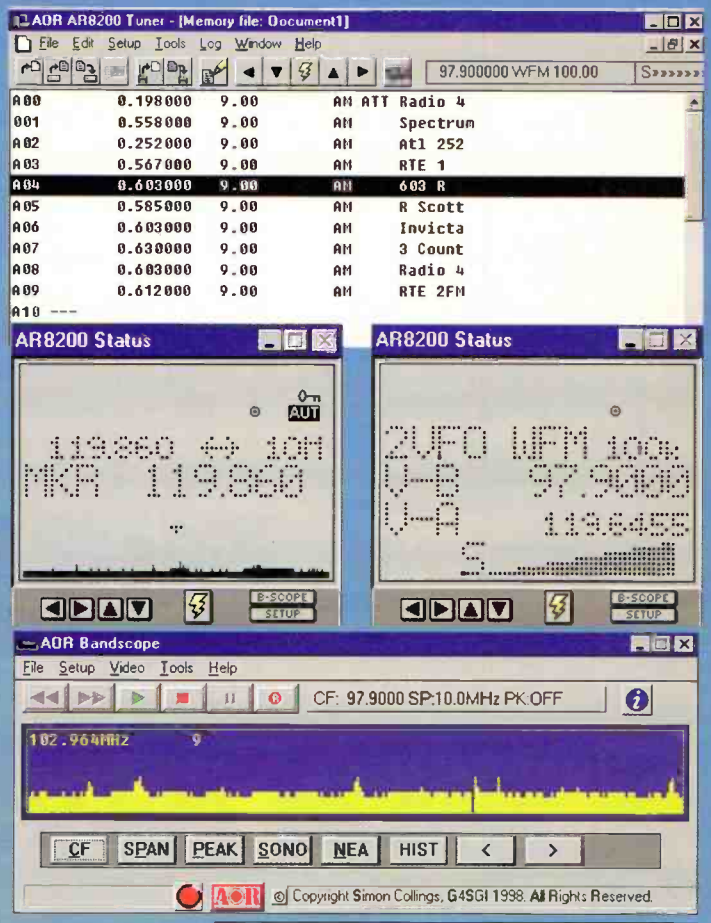
AR8200 *The Superior Concept* AOR®

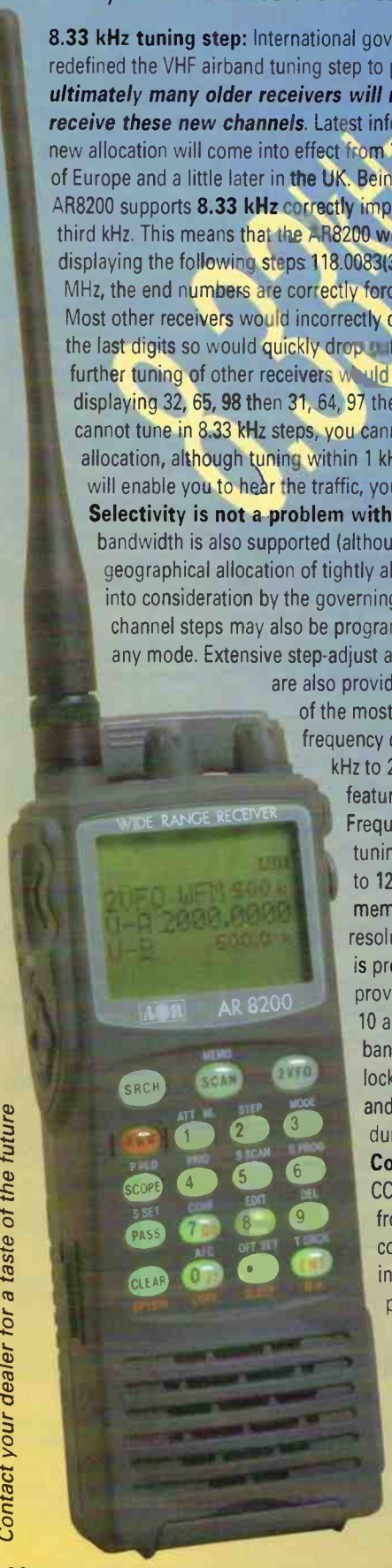
✓8.33kHz steps ✓Slot cards ✓FREE PC control software ✓Opto Scout reaction tune ✓Dynamic memory sizing ✓AFC and Noise limiter

The AR8200 is the ***'first'*** and ***'only'*** (so far) receiver to correctly implement the new **8.33kHz** airband channel step enabling spot on reception with correct tuning and searching. Consider the options and flexibility which makes the AR8200 the obvious safe investment beyond 1999.

8.33 kHz tuning step: International governing bodies have recently redefined the VHF airband tuning step to provide additional frequencies, ***ultimately many older receivers will not be able to correctly receive these new channels***. Latest information suggests that the new allocation will come into effect from **7th October 1999** for parts of Europe and a little later in **the UK**. Being at 'the cutting edge' the AR8200 supports **8.33 kHz** correctly implemented as eight-and-one-third kHz. This means that the AR8200 will tune the VHF airband displaying the following steps 118.0083(3), 118.0166(6), 118.0250(0) MHz, the end numbers are correctly forced to **33** then **66** then **00**. Most other receivers would incorrectly display **33** then **66** then **99** as the last digits so would quickly drop out of channel synchronisation, further tuning of other receivers would result in the end digits displaying 32, 65, 98 then 31, 64, 97 then 30, 64, 96 etc. If your radio cannot tune in 8.33 kHz steps, you cannot correctly search the new allocation, although tuning within 1 kHz (or tuning in 1 kHz steps) will enable you to hear the traffic, you will not be able to search.

Selectivity is not a problem with the AR8200 as a narrow AM bandwidth is also supported (although undoubtedly the geographical allocation of tightly allocated channels will be taken into consideration by the governing bodies??). The AR8200 channel steps may also be programmed in multiples of 50 Hz in any mode. Extensive step-adjust and frequency offset facilities are also provided to ensure accurate tracking of the most obscure band plans. A wide frequency coverage is available from 530 kHz to 2040 MHz with no gaps. Other features include **A.F.C.**: Automatic Frequency Control for spot on tuning, **Alpha text**: Alphanumeric text comments of up to 12 characters may be added to memory channels, memory banks and search banks, **Band scope:** A high resolution signal meter and **multi-function band scope** is provided, **Flexible dynamic memory bank layout** is provided (memory banks may be varied in size between 10 and 90 channels each. 1,000 memories, 20 memory banks, 40 search banks, select scan list, priority and lockout facilities are included. It is also possible to edit and delete individual memories, swap, copy, move and delete whole banks including dumping all data.





AR8200 receiver	£399.00
EM8200 external memory slot card	£49.90
CT8200 CTCSS slot card	£59.90
RU8200 record / playback slot card	£49.90
TE8200 tone eliminator slot card	£34.90
VI8200 analogue voice inverter	£49.90
CC8200 PC lead with CD-ROM	£69.90
OS8200 Opto Scout & ACC lead	£12.90
CR8200 tape record lead	£34.90
CO8200 clone lead for data exchange	£TBA
SC8200 clear plastic protective case	£17.95

Computer control is available via a metallic side mounted robust connector. The CC8200 PC lead features a 9-pin D-type plug with built-in level shift and is powered from the radio. The CC8200 is also supplied with a CD-ROM featuring ***FREE*** PC control software (see screen shots in this ad), RS232 protocol listing plus other files including Adobe® Acrobat® reader and promotional PDF material. This software and protocol listing is also available as a ***free download*** from the AOR internet website **www.aorja.com**

£399 inc VAT

Contact your dealer for a taste of the future

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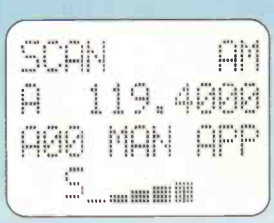
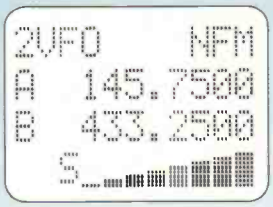
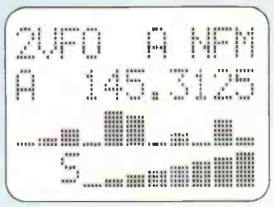
Belper, Derbyshire, DE56 2UA England
Tel: 01773 880788 Fax: 01773 880780 info@aor.co.uk www.demon.co.uk/aor *E&OE*

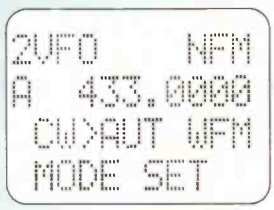
AR8000 *All Mode Wide Band World Band Radio Receiver*

First introduced in 1994, the AR8000 was the result of AOR's long term ambition to produce a new breed of radio receiver which combines full computer compatibility with advanced wide-band radio receiver technology. Today the AR8000 is acknowledged as breaking the mould of conventional radio receiver design and is still as popular as ever.









The AR8000 is no ordinary radio but launched THE NEW CONCEPT in radio design. The modern new cabinet design measures approx 152mm (H) x 69mm (W) x 40mm (D) excluding projections and weighing only 350g including NiCads (but not aerial).

The AR8000 hand held receiver boasts a very wide frequency coverage of 500 kHz to 1900 MHz without gaps in the range (actual acceptable frequency input from 100 kHz). Step size is programmable in multiples of 50Hz for smooth tuning. The all-mode reception provides AM, USB, LSB, CW, NFM and WFM. An independent ± 2.0 kHz SSB filter is fitted as standard and the USB/LSB modes use true carrier re-insertion with correctly calibrated frequency read-out (not offset by 1.5 kHz).

The high visibility LCD displays two VFO frequencies, one providing a stand-by frequency available for quick transfer. When frequencies are entered, ALPHANUMERIC comments may be stored along with frequency, mode & attenuator status simplifying the job of recalling and identifying memory channels. The AR8000 may be connected to a computer via the optional CU8232 and 'reaction tuned' with the Opto Scout using the optional SAC8000 lead.

AR8000 £299 inc VAT

AR5000 True high performance, voted best wide band receiver by readers of the German "funk" magazine in 1997. ***£1345***
The enhanced **AR5000+3** includes AFC, Synchronous AM and noise blanker, voted best wide band receiver by readers of the German "funk" magazine in 1998. ***£1574***

Government departments on both sides of the Atlantic have carried out extensive trials against rival units and we are pleased to find they are placing orders for the AR5000, good sensitivity at frequency extremes, excellent range of facilities, compactness & light weight leading to great flexibility in operation. Features include automatic electronic preselection between 500 kHz - 999.999999 MHz. 'True receive' throughout it's range, not an up-converter above 1GHz.

Capabilities have been further increased with the launch of the AR5000+3 providing three enhanced facilities: A.F.C. switchable automatic frequency control for accurate tracking of unusual bandplans, noise blanker, switchable to help reduce the effects of ignition noise especially while mobile, synchronous AM, featuring double and selectable sideband with an easy to use wide lock range.

- Very wide frequency coverage 10kHz - 2600MHz
- All mode reception: AM, FM, USB, LSB & CW
- Automatic electronic preselection of the front end
- Excellent strong signal handling
- NCO (Numeric Controlled Oscillator) with tuning steps down to 1Hz
- TCXO fitted as standard
- Multiple I.F. bandwidths 3, 6, 15, 30, 110 & 220kHz (500Hz optional)
- Auto mode bandplan selection
- Multi-function LCD with 8 character alpha-text comments
- Extensive search & scan facilities
- "Cyber Scan" fast search & scan speeds up to 45 channels / increments per second
- Analogue S-meter
- 1000 memory channels and 20 search banks with EEPROM storage
- Auto memory store
- Extensive RS232 command list
- Sleep timer / alarm
- Standard DTMF decode / display
- Optional CTCSS search & decode
- Two aerial inputs with programmable switching from the front panel
- Flexible BANK LINK menu with enhanced features such as DELAY, PAUSE, VOICE etc
- Built-in squelch tone eliminator
- Audio and discriminator out plus tape recorder control
- SDU ready
- More, more, more...!

AR7030 High dynamic range, short wave receiver, awarded table-top receiver of the year 1996/97 by WRTH and 5-star editor's choice by Passport to World Band Radio 1997/98 **£799**
AR7030 PLUS Enhanced version, fitted with narrow AM filter, optical encoder, features CPU with 400 memory channels with alpha-tag, optimised components for highest performance. **£949**

Welcome To The Wea

This edition of Short Wave Magazine brings together a collection of features about the world of weather satellites. Earlier this year I attended the residential conference of the Remote Imaging Group where I met many 'Info' readers, and many celebrities, the latter not necessarily all being amongst the former! My notes and experiences are recorded within this 'Info Special'.

Reviews of two weather satellite receivers - one from RIG and one from Timestep - are also included. The number of hardware suppliers in Britain is still in low single figures, and likely to remain so. One or two 'Info' readers have mentioned the availability of foreign equipment (for import), though the difficulty of obtaining such hardware for review is evident.

During the next few years we will see a transformation in the whole process of decoding images. The change from the current analogue transmissions - a.p.t. (automatic picture transmission) and WEFAX (weather facsimile) to l.r.p.t. (low rate picture transmission) and l.r.i.t. (low resolution information transmission) will require new hardware and software - but should bring improved images and data.

Indications from some suppliers are that prices may be lower due to simpler designs. The time scale remains of the order of years, so little impact on current purchase decisions seems likely. The feature on these changes was written with considerable co-operation from Dr. Donald Hinsman of the World Meteorological Organisation.

A collection of some readers' images completes this 'Info Special'. It is worth noting that just because a picture sent in has not been published, this is not indicative of a lack of quality or interest. Several readers have sent in several pictures, including one collection of about 15 colour prints. The main limitation is that of space.

Lawrence Harris

Our Geostationary Neighbours

Figure 1 shows the latest footprints of *GOES-8* and *GOES-10* over America. These are America's geostationary WXSATs and both transmit WEFAX.

For anyone new to the subject, WEFAX is short for 'weather facsimile' - images that can be produced by decoding the telemetry received from such satellites on 1691.0MHz. My monthly column 'Info in Orbit' often describes the type of equipment needed for such decoding.

Regular readers of 'Info' may recall my particular interest in the GOES satellites because my location in south-west Britain enables me to 'tune' to *GOES-8*, the current GOES-east satellite located at 75°W longitude. *GOES-8* is barely 3° above my western horizon, and a chance gap between neighbours' houses and bushes allows my 45-element Yagi to receive enough signal on 1691.0MHz to obtain usable images.

Fig. 2: Launch of *GOES-10* on 25 April 1997.

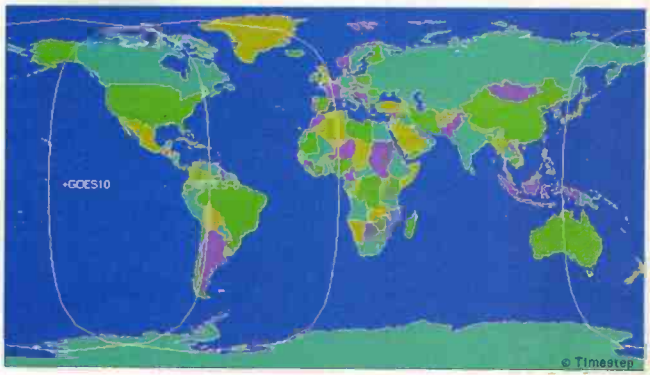
Other readers, such as Alan Jarvis in south Wales, have taken Yagis to local places where a suitable view of the western horizon affords the opportunity of capturing *GOES-8* telemetry.

The satellite is one of a pair (the other being *GOES-10*, the GOES-west satellite) and, like METEOSAT, provides a continuous stream of fascinating images. Some years ago I did a feature on *GOES-8*, and with the recent failure of the momentum wheels on *GOES-9*, the latter's replacement - *GOES-10* - was brought out of storage on 9 July this year.

Fig. 3: The spacecraft - the next generation.

It therefore seems a suitable opportunity to update coverage to include some of the images

Fig. 1: Graphic showing footprints of *GOES-8* and *GOES-10*. Notice that *GOES-8* just overlaps certain areas of Britain.



ther Satellite Special

WEATHER SATELLITE SPECIAL WEATHER SATELLITE SPECIAL

Fig. 4: NOAA/NASA graphic.

originating from *GOES-10*. Just as METEOSAT relays images from GMS, GOMS and *GOES-8*, so *GOES-8* itself relays images from METEOSAT, *GOES-10*, and *NOAA-14*.

As mentioned, the satellites *GOES-8* and *GOES-10* work together, separated in longitude. *GOES-10* is currently ending a slow manoeuvre, following its change in status from 'backup' to 'operational' GOES-west satellite. During this slow drift westwards (from its mid-position between *GOES-8* and *GOES-9*) it was brought into active service, images were collected during the drift.

GOES-K (renamed *GOES-10* when in orbit), was launched, deployed and tested for three months at 105°W. It was then stored 'sleeping' facing away from the Sun, in what is called the ZAP mode (Z-Axis Precession, one rotation per year relative to the Earth).

Storage in space avoids ground storage costs,

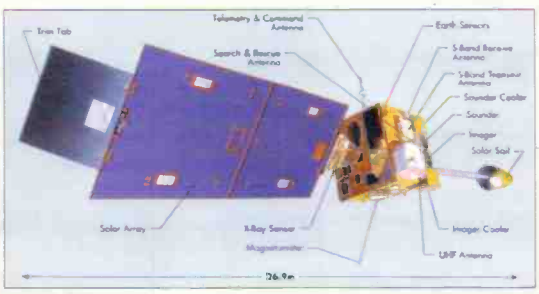


Fig. 5: GOES NOAA/NASA graphic.

post-storage testing and the 12 month delay expected between NOAA's call-up and launch. Please note that several of these pictures have been supplied by NASA's Goddard Space Flight Centre, for which I am very grateful.

Fig. 6: *GOES-10* 27 August at 1200UTC northern hemisphere (NHIR).

As is usual for geostationary WXSATs, *GOES-10* performs a very large number of tasks, including monitoring 'Search and Rescue', solar studies and, of course, earth weather imaging. **Figures 3** to **5** depict the spacecraft in orbit.

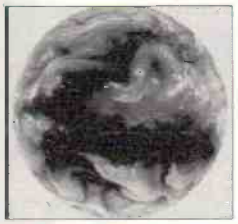


Fig. 7: *GOES-10* 27 August at 1200UTC full disc water vapour (FDWV).

GOES-10 Images

I used a day of calm weather to set up my *GOES-8* Yagi to collect images. As has been the case before, I found myself looking in disbelief at the initial data flow - pictures from METEOSAT! There are several multiple-image sessions during which METEOSAT frames are transmitted. A schedule of *GOES-8* WEFAX transmissions is available so at least we know what is on the way!

At 1402UTC, an image showing the northern hemisphere from *GOES-10* is transmitted - see **Fig. 6**. Being in the 'hurricane season' it was not surprising to see a vigorous weather system heading towards the American coastline.

At 1514UTC a *GOES-10* image taken in the near-infra-red 'water vapour' band is transmitted - see **Fig. 7** - in whole disc format. This shows the same weather system in greater overall detail.

Figure 8 shows the comparable infra-red image. There are slight differences in the image noise levels. I have used a software 'smooth' option to reduce the appearance of the noise in some images.

With such a limiting signal strength available from a satellite barely above the local horizon, fluctuations are inevitable. It may be possible for me to mount the antenna higher and perhaps obtain a better signal - but not just yet.

GOES-8 Polar

The two polar images (W043 and W044) transmitted by *GOES-8* at 0914 and 0926UTC, are mosaics of *NOAA-14*'s successive infra-red scans of both poles. The onboard scanners cannot cover the whole region simultaneously so several are combined to form a mosaic.

The transmission schedule for *GOES-8* includes 24 hours of almost continuous imagery, with repeated regular scans of sectors of the northern hemisphere, computer generated forecasts for the globe and different localities, *NOAA-14* composites, *GOES-10* re-transmissions, satellite status reports and schedule transmissions. If you live in a region where you could possibly receive a signal, give it a try. The results could amaze you!

Equipment For WEFAX

To receive WEFAX images from METEOSAT and/or

Fig. 8: *GOES-10* 27 August at 1200UTC full disc infra-red (FDIR).

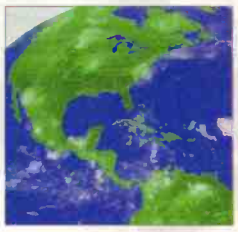


Fig. 9: *GOES-8* 27 August at 0745UTC NHIR showing hurricane Bonnie.

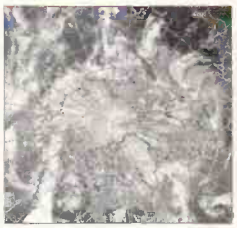


Fig. 10: *GOES-8* W043 *NOAA-14* composite of north pole on 26 August.

Fig. 11: *GOES-8* W044 *NOAA-14* composite of south pole on 26 August.

WEATHER SATELLITE SPECIAL WEATHER SATELLITE SPECIAL

GOES, you first need to ensure that your location is suitable. METEOSAT is located approximately due south, at an elevation of about 30° (varying according to your own latitude and longitude). If you cannot get a clear view of this area of the sky then you may not get a signal from METEOSAT of sufficient strength for decoding. A north-facing upstairs flat is unlikely to be suitable!

WEFAX transmissions are on 1691.0MHz (with an additional transmission available from METEOSAT on 1694.5MHz), so an s.h.f. antenna is required. The recommended types are either a Yagi (with perhaps 45-elements), or a 1m dish. The dish does not require accurate surface construction, even chicken mesh wire will suffice.

Fig. 12: Lawrence Harris with a WEFAX dish.

A small resonant dipole or tuned cavity (such as a coffee tin!) can be adjusted to collect the reflected signal from the focus of the dish. A low-noise pre-amp is essential to provide a suitable signal for decoding.

If you already have a properly designed weather satellite receiver, then the addition of a down-converter (1691 to 137.50MHz) will enable the resulting 137.50MHz signal to be fed to the receiver. The remaining decoding system will then work for your new telemetry.

Alternatively, a 1691.0/1694.5MHz receiver can be bought for independent use. The output from this will be the extracted 2.4kHz image data for processing by METEOSAT software. ***SWM***

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Data Interface for receiving CW/Baudot/ASCII/Amtor/ARQ/FEC/Sitor A/B/Navtex, Weather Fax, and Slowscan TV.
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Including:- interface and software connects to RS-232/ 3.5mm lead connects to receiver (no external power needed).

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A brilliant new compact indoor antenna that covers 0-1650MHz and is just 20" tall (collapsed). Supplied with coax and BNC plug fitted.

ONLY **£49.95** P&P £5

Comments from John Griffiths

I have to say that I'm not a fan of indoor antennas like this as earlier desk mounted antennas tended to look like a mad scientist invention. However, I was suprised by the quality of constuction of this piece of equipment and it appears to be up to the job it is designed to do. Without getting technical, the Apollo 2000 claims to be able to cover 0-1650MHz. I used it between 108-400MHz approx and was surprised by what it was able to do. It produced clean copy and there was good reproduction with very little breakthrough.

NEW Q-TEK D.C. 2000

A high performance wideband antenna offering superb performance from 25-2000MHz. Transmit range:- 6m, 2m, 70cm, 32cm & 23cm (power handling 200W). Fitted with low loss 'N' type connector. Supplied with mounting brackets.

OUR PRICE **£49.95** P&P £8.50

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 - my usual haunt - into all manner of areas that previously have been less than good here due to my location!

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Prof quality base antenna for AIR. (Civil & military). Due to popular demand we have now introduced a SO-239 version of the highly popular AIR-44N (1.7m long).

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21cm flexible whip that is ideal as replacement

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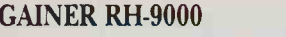
SUPER-GAINER RH-9000



40cm flexible model for the ultimate in gain.

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ONLY **£12.95** P&P £1

Comments from John Griffiths

I mounted this on my AR-2000 and was well pleased with the results on HF. Verdict? A clear winner and well worth the reasonable outlay.

SCANMASTER SP-55

Boost reception of your scanner with this pre-amp. 25-1500MHz, variable gain, band pass filters.

RRP **£59.95** P&P £3.50

NEW Q-TEK HF MINITUNE

Superb quality short wave ATU. Ideal for scanners. Out performs any other tuner of its size. 100kHz-30MHz. BNC input/output. Connect to a long wire and you'll notice the difference.

ONLY **£49.95** P&P £3.50

Comments from John Griffiths

Results were able to be looked at in terms of a cheap, low cost ATU and I can report that it is certainly good! At under £50, it must be the cheapest on the market and would suit an enthusiast looking at putting an ATU on a capable scanner.

POLICE STYLE HOLSTER "HHC-2"

Matches all handhelds can be worn on the belt or attached to the quick release body holster.

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Deluxe over the ear earpiece.

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A fully adjustable desk top stand for use with all handhelds. Fitted coaxial fly (FAI) with BNC & SO239 connectors

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Superb quality wideband receiving antenna. Covers 100kHz-2GHz (all mode). ★ Size only 290 wide x 430 high x 45mm deep. ★ Can be mounted like a picture frame on a wall ★ Can be loft mounted ★ Mounted externally like an alarm box ★ 2 x SO239 sockets.

For HF:- this unit utilises 6 independent HF "inductively" shortened verticals and has a separate wire connection for using the internal MLB (Magnetic Balun).

For VHF/UHF:- that's a semi-secret, although a clever mixture of fan dipole arrays and inductively fed elements help maximise its performance:- It's the most compact all round aerial that works very well!

Ideal indoor or out.

£99.95 + £6 P&P.

Comments from John Griffiths

In rounding up, the intruder performed better than I expected and with little fuss in mounting and connecting up. It appears rugged enough to live out of doors and will also fit nicely on the wall - perhaps an outside wall being the ideal though I have to admit having no problems with my inside one. I found it a pleasing addition to my set-up - with cable correctly mounted and run - it should look professional and very much a part of the kit in the shack. I would suggest that this is the antenna many of us have long been looking for and therefore have no hesitation at all in saying it is definitly the business.

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No memory effects. 1.5V cells.
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NO QUIBBLE WARRANTY

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Covers 0.3-30MHz with adjustable sensitivity. Simply connect to a receiver and away you go. New low price **£69.95** P&P £4
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Short wave magnetic long wire adaptor for any short wave receiver. Simply screw onto receiver & connect the wire via supplied screw terminal. (It's brilliant).

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Deluxe SW ATU 0-30MHz. SO239 fittings.
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(Probably the best ATU around)

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(10MHz-3GHz) includes nicads/charger and antenna.
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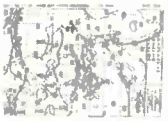
Weather station picture & fax reception kit includes:
a) A 2 element crossed dipole for receiving weather satellite pictures live from orbit
b) A long wire HF antenna for receiving weather fax pictures
c) Free software for your PC. No interface needed (uses your PC's sound card)
d) Requires scanner or receiver



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The ultimate in high quality long wire antenna kits. Complete ready to go wire antenna that should last forever – don't forget you get what you pay for! (0-30MHz) length - adjustable up to 150ft.
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(All parts - high quality and replaceable)

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Half size 51ft. ONLY **£34.95** *Carriage £6.00.*

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Full size	102ft	£24.00 P&P £6
Half size	51ft	£21.00 P&P £6

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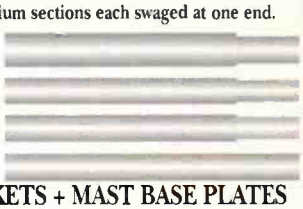
SECTIONAL MASTS *Carriage £8.50*

4 x 5 foot aluminium sections each swaged at one end.

1¼" dia	£19.95
1½" dia	£29.95
1¾" dia	£36.95
2" dia	£45.95



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2"	Mast base plate	£12.00 P&P £5
6"	Stand off	£6.95 P&P £5
9"	Stand off	£8.95 P&P £5
12"	T&K Brackets	£12.00 P&P £8
18"	T&K Brackets	£18.00 P&P £8
24"	T&K Brackets	£20.00 P&P £8

The RIG Resident

Back at the beginning of May, Lawrence Harris had a chance to be involved in a weekend of weather satellite talk. Read on to see what he thought of the RIG Residential Conference.

Residential conferences provide an excellent opportunity to meet with like-minded people and this one offered time to spend almost two days talking weather satellites. It was therefore with a sense of anticipation that I entered the Hilton National Hotel in Newport on Friday evening 1st May at the start of the UK Remote Imaging Group's (RIG) second such conference in five years.

The first name badge that I recognised was that of Alan Jarvis, a resident of Cardiff, and regular correspondent to this column. Alan built a 1691MHz Yagi and then drove to the west coast of Wales to collect images from *GOES-8* (which rises barely a few degrees above the horizon).

With so many famous names in the satellite field (I'll be doing some substantial name dropping!), I felt a trifle overwhelmed. Fortunately, conference organiser Dave Cawley made me feel very much at ease by introducing me to some of those attending. During the course of the weekend my notebook was rapidly consumed by prolific note-taking - apart from those sessions in which the lights were extinguished for slide presentations!

The conference was well supported, with exhibition displays by the RIG committee, individual RIG members, Timestep, the Remote Sensing Society and Werkgroep Kunstmanen - the Dutch equivalent of RIG - that had by far the largest display - see **Fig. 7**. An additional table carrying RIG-selected 'shareware' together with a computer for demonstrating programs, was manned by Les Hamilton, whom I was delighted to finally meet - having corresponded by E-mail on several occasions!

The introduction by organiser Dave Cawley referred to some minor changes in the schedule, and then summarised the sessions ahead. The first speaker was Frank Bell (the current Chairman of RIG) who gave his presentation.

Fig. 1: One of Les Hamilton's software demonstrations.

Frank Bell

Frank is head of science at a school in Guildford and has a long record in satellite monitoring. His school station made the first contact with Helen Sharman, the British astronaut, while she was on *MIR*. Frank is extensively involved with introducing satellite-based activities to his school within the framework of the curriculum.

During the STS-56 SAREX (Shuttle amateur radio experiment) mission, his group transmitted a picture of themselves to the Shuttle, via SSTV. Frank has consequently helped to raise the profile of the school within the local and national media, partly to encourage the school governors to appreciate the possibilities and provide more funding.

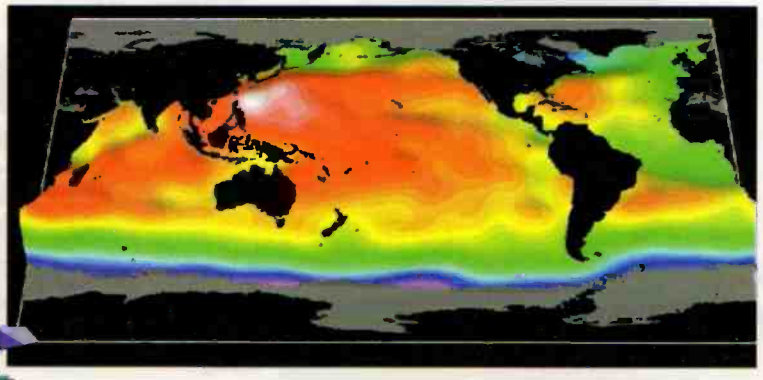
Les Hamilton

Following these first two sessions I had the opportunity to chat with those attending and observe activities. The exhibition area was large and sitting at a computer was Les Hamilton facing a crowd of onlookers - so I investigated.

As a service for RIG members, Les maintains an extensive collection of software relevant to image processing and general remote imaging. Each quarterly *RIG Magazine* includes his list of recent software releases. On this occasion Les was demonstrating the use of current software, so several members who had experienced problems setting up the parameters of *WXSAT* (one of the programs which use a sound-card to decode WXSAT signals from the receiver) were able to discuss methods of optimising the settings.

Although not a formal 'speaker' at the conference,

Fig. 2: TOPEX satellite picture showing 1997 *El Nino* data, courtesy NASA.



tial Conference

Les's impromptu talks within the exhibition centre were well received and he, Alan Jarvis and I spent a considerable time discussing the ins-and-outs of image processing and reception.

The RIG stand included a crossed-dipole antenna and several microwave components made by Sam Elsdon, a conference speaker. Also on display were a few books and several early copies of *Weather Satellite Report* - an American publication.

Fig. 3: *SWM* columnist (me!) preparing to address RIG conference (photo from Arne van Belle).

Carl Davies

I normally rise early on Saturdays to deal with *SWM* mail (OK, and I listen to early morning radio) but this particular morning's early start was to hear about the latest research into the phenomenon known as *El Nino*, given by Carl Davies. Following graduation with a maths degree in 1993, Carl developed a keen interest in environmental sciences and entered a project at the James Rennell Centre for Ocean Circulation in Southampton.

Following work with thermal image processing and surface wave studies, he progressed to a Master's degree. He is now in the second year of a Ph.D project on oceanographic studies at University College London.

Carl explained that the effect known as *El Nino* was noticed in the 16th century, but it was not until the first measurements were made in 1947 that studies of the problem finally got underway. Carl showed several diagrams of 'normal' (non-El Nino) weather circulation patterns, long identified as causing normal weather cycles in various parts of the world. Carl said that although the actual cause of *El Nino* was not known, its existence was now quickly identified by satellite observations.

Commenting that it was true that *El Nino* caused dramatic local effects, Carl said that it is now believed to self-destruct because of its very nature. In order to study the process, an extensive global monitoring system had been set up, essentially USA-funded, and this is making measurements of temperature and pressure of the oceans via buoys, these transmitted their data to satellites for onward collection.

The TOPEX/POSEIDON satellite has an orbit that provides a 10-day repeat cycle. It monitors sea-surface roughness to 20mm accuracy in the sea - satellite distance, and provides temperature and colour measurements - essential to *El Nino* studies. *El Nino* is associated with a pool of essentially warm - and therefore 'expanded' water - and causes sea-surface height anomalies.

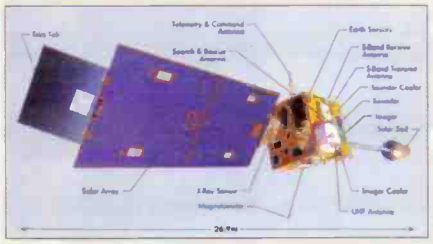


Fig. 4: GOES spacecraft.

A typical anomaly of four degrees Celsius can be monitored. Carl showed a picture recorded on 21 August 1997 during which *El Nino* was responsible for a large percentage of the earth's sea surface temperature anomaly. Carl summarised his studies by emphasising the need for continued satellite monitoring which was aiding predictions and showing how the oceans responded to the *El Nino* effect.

For more information visit NASA's El Nino web site: **http://topex-www.jpl.nasa.gov/science/science.html**

Fig. 5: Timestep stand.

Short Wave Magazine

As part of my own presentation I described a few early experiences during the days of thermal vacuum testing of early UK-series scientific satellites, and mentioned friends of that time - at least one of whom (Pierre) is still an active satellite observer.

I summarised the years following my return to satellite monitoring as an amateur, and the information provided to an ever-growing band of readers of the columns. Reporting on the results of my contacts with UK suppliers of WXSAT equipment, I mentioned that two companies had ceased trading and two others failed to respond to repeated requests for product information.

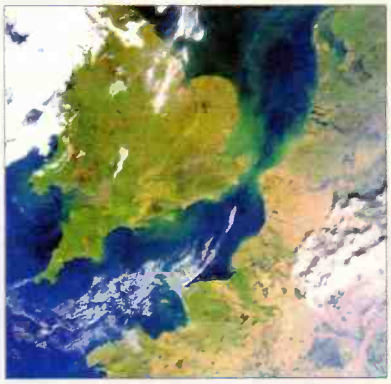


Fig. 6: Picture from SEASTAR received with Timestep h.r.p.t. system, courtesy Alex Fox of Orbimage.

Steve Padar

Steve's interest in weather satellites started in 1984 when he obtained 'crude images' using very basic equipment. Graduating to a Volker Wraase frame store, and then to a computer, Steve currently monitors a.p.t., WEFAX, EMWIN, h.r.p.t., GVAR and SEASTAR from his home overlooking the Gulf of Mexico.

The American GOES satellite provides a wealth of imaging and textual data and Steve came to the conference from America to describe its main output - GVAR and EMWIN. He gave a general description of each system, pointing out that *GOES-8* data is freely available on the web, even providing information on tornadoes, though noting that this was not yet in a form that could provide timely warnings.

He commented that the telemetry was non-encrypted, and that there was even free software to decode the imagery - but obviously one had to assemble suitable hardware to receive the signals.

Fig. 7: Dutch display by Werkgroep Kunstmanen.

NOAA's non-encryption philosophy was that the signals were 'invading' your space so you had the right to use them. There was a considerable (positive) audience reaction to this comment! *(Well, it is a **very** interesting point of view. One the UK government should think about. - **Ed.**)*

Steve's second talk included an extensive display of images received at his home, showing North America and nearby regions, and including almost every type of weather feature seen by satellite monitoring.

Geoff Perry MBE

I had the pleasure of having a brief chat with Geoff prior to his talk, and mentioned that I had long admired his record (and that of his associates) of signal analysis and original work on the Russian satellite scene. His interest in 'space' apparently began in 1944 when a V2 (rocket) fell a few miles from his home.

He was teaching at (what was then called) Kettering Grammar School in 1957 when the first satellites were launched. He observed and photographed them, and in 1960, he and fellow teacher Derek Slater G3FOZ succeeded in tuning in to the newly launched *SPUTNIK-4*.

Geoff continued to monitor COSMOS satellites during the next 35 years and his 'Kettering Group' published a number of articles on aspects of the Soviet space programme - revealing information which was not otherwise available from publicly released data.

During his presentation he spoke about project 'Lomonosov', the production of a star catalogue in 1989 (before the Hubble Space Telescope) and referred to Zerkalo, Nord and ARKON-1. For future interest he suggested looking out for OBZOR, a satellite likely to have the orbital parameters: Inclination of 83°, a 650km high circular orbit, orbital period 97.8mins, 43m resolution from a sensor of 512 (4 by 128 matrix) in near-infra-red, 6-channels and a 150km swath width, transmitting telemetry in the 137MHz band.

And So To Lunch

During one of the breaks, Alan Jarvis kindly took Les and me for a drive around the locality to see the sites. For those likely to travel in this region, be aware that there is a toll bridge! Les and I were puzzled to see cars being 'escorted' away from the toll area and over to the opposite side of the road - until Alan explained that motorists without the necessary cash were refused entry (!) and were being escorted away to prevent access.

A chance remark by Alan led me to enquire about his former work and it seems that following 40-years' unblemished career within the Civil Service, Alan was awarded an MBE. Alan's home-made Yagi antenna was on display at the exhibition - one of a number of home-brew pieces of hardware.

Dave Cawley

As well as conference organiser, Dave is the manager of Timestep Weather Satellite Systems - the only UK commercial company of its type present at the conference. His interest in radio was sparked (!) by *Practical Wireless*, and after living in the west country he moved east to work at Pye (now Philips).

He expanded his company's work in weather satellites in 1984, specialising in hardware for the amateur market. High resolution equipment was not available for the amateur up to 1988, but then a DOS-based system was produced by the American, John du Bois. Dave obtained the designs by agreement with John and subsequently produced the first British commercial amateur h.r.p.t. system.

Dave showed a selection of images from each channel of a typical NOAA WXSAT image and explained how the content varies according to the sensor monitored. Specialist software was used to enhance the detail that was present - but not always obvious - in each image. The hardware currently includes a 900mm dish which, when used in prime focus mode, could be driven by computer to accurately track the satellite.

Sam Elsdon

Sam's interest in electronics led him to the RAF and, in 1983, to a satellite ground station. Discovering and joining RIG in 1985, he has been working on 1.7GHz components. Sam explained some of the basic principles of electronics and developed the theme of working with miniature components. He showed his 'opti-visor' and how it made such work more feasible.

Sam explained how the early production of p.c.b.

was developed and the various means to produce such components in the home. The preparation of an etch mask involving measurement and stencil drawing, the use of tracing with transparencies and rub-down transfers, and his home-made light-box. All these processes had their drawbacks but Sam showed his expertise in mastering them in order to produce a final, working product.

Sam's wise advice to people trying these techniques for the first time was to experiment with sub-miniature components before actual project construction. He reminded the audience of the importance of taking precautions against static discharge, and recommended that p.c.b.s should be cleaned with isopropyl alcohol - rather than propriety products.

Arne van Belle

Ruud Jansen and Bram Dorreman founded the Dutch activity group 'Kunstmanen' - their equivalent of RIG - in 1973. The name 'Kunstmanen' means 'artificial (man-made) moons'. Their group consists of over 400 members, most of whom receive polar or geo-stationary weather satellites. Many members build and operate home-made frame-stores.

Arne van Belle is a member and addressed the conference on behalf of the group. His hobby is the designing and building of mechanical and electronic devices. Joining RIG in 1992, since March, he has co-ordinated Kunstmanen's radio observations.

Most members are amateur astronomers who visually observe polar satellites. Radio reception was not easy in the early days but surplus and home-made (valve) receivers were used to monitor ESSA and NOAA satellites. Old TV sets were modified to build a picture for screen photography before the glow disappeared.

A drum type imager was developed, and later on, the very successful electrostatic paper and liquid toner was used. Some of their members still use such systems. A photographic drum with a blue l.e.d. in a portable, dark housing was developed by one member and - Arne says - still outperforms all printing systems.

The group promotes the visual and radio observation of satellites. They measure flash periods using telescopes or binoculars. Meetings are held in Utrecht, Netherlands, five times a year and members chat, exchange articles and software, and browse the library.

Test-equipment is available for receiver and converter alignment and live METEOSAT and polar satellite reception is demonstrated. Jaap Rusticus brings his portable Yagi - which Arne says seems to get shorter by each meeting, yet still receives images speckle free!

The *De Kunstmaan* journal is published six times a year, carrying descriptions of the meetings, articles on building antennas, LNAs, converters, receivers and decoders.

Arne built an experimental h.r.p.t. and PDUS receiver, and antenna. Many members are also building or buying h.r.p.t. equipment, but because of the expensive pound (sterling), most cannot afford to buy a complete British system.

Holland does not experience pager interference in the 137MHz band, but has interference from the state owned video-link on 1.708GHz. This is a point-to-point high powered, wide band TV signal used by the European Broadcast Union to relay TV signals from Moscow to Brussels. In many areas, reception of *NOAA-14* h.r.p.t. on 1.707GHz is almost impossible!

The crossed dipole and quadrifilar helix antenna (QFH, as featured recently in 'Info') are popular for a.p.t., some use a crossed Yagi on a rotor. All sorts of receivers are used - Timestep, Dartcom, DSH, and several home-built designs. Ruud Jansen made a very small portable receiver for holiday use.

Many are also RIG members in order to receive the *RIG Journal*. The group has a home-built h.r.p.t. and PDUS receiver design working, but because knowledge and test equipment are essential, construction is only suitable for the more experienced members.

JVFAX is very popular and several decoders have been described in *De Kunstmaan*. A Dutch a.p.t.-decoding program called *DIGISAT* is widely used, as is the *WXSAT* program.

Member Chris van den Berg regularly reports on the lives of the cosmonauts aboard the *MIR*, and on other Russian missions. He receives all the communications and has a thorough knowledge of the Russian language.

Fig. 8: The Journal produced by the Dutch group.

Members are aware of the need for 'Year 2000'- compliant tracking software. Plans are underway to develop new hardware for LRPT reception. Arne's fellow members would like to see all the weather amateurs around the world united to try to acquire the right to decrypt scrambled satellite imagery for non-commercial purposes!

Arne hopes to put the knowledge and experience available in both groups together to achieve improvements to hardware.

My thanks to Arne for providing me with both text and images to supplement this feature.

Fig. 9: Northern hemisphere water vapour GOES image.

Martin Harris

Martin is a Director of Oxford Scientific Services Ltd. which provides environmental consultancy services to a variety of clients - including participants in balloon races! His interest in weather satellites began when they were invented while he was a student at Oxford University. His talk was titled 'Ballooning around the world - use of weather satellite images in global forecasting', and he is a consultant to the Virgin Global Challenger Balloon team.

Martin summarised the needs of every balloon crew as including the requirement to remain airborne for 10-20 days, and to be able to manoeuvre vertically in order to optimise both speed and direction of flight. He explained that one can overfly countries only after obtaining full Air Traffic Control clearance.

Sadly, at least one group had not sought ATC approval and had been shot down. The daily essential of maintaining continuous telecommunications with the home base was emphasised, as was the need for taking full provisions of water, food, oxygen, pressure maintenance products and hygiene essentials. The possibility of landing in hostile territory such as deserts or the ocean required the crew to have contingency plans for survival.

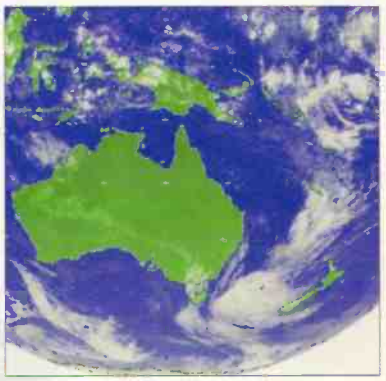


Fig. 10: GMS (south), 19 May 1200UTC, courtesy JMA.

The meteorological hazards of balloon flight were

Continued on Page 44

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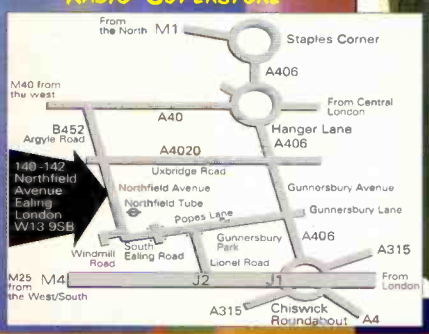

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Right back in stock after months of sell out, the FRG-100 really is an ideal receiver for those who want to start in short-wave listening but don't want to throw your money away on something cheap and nasty. (Believe me, there are plenty of cheap and nasty receivers advertised!).

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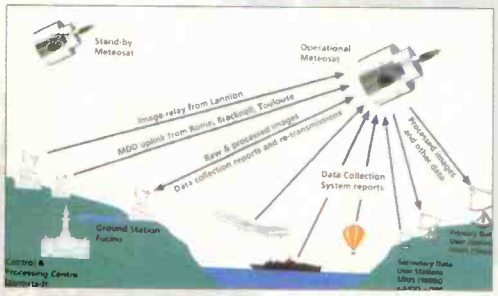

Fig. 11: METEOSAT communications channels.

considerable. The precipitation of just 1mm of ice accumulating on the balloon or cabin could add some 8tonnes of mass. Severe air turbulence and lightning strikes, rain, snow and hail on the balloon envelope, and the possible arrival of the balloon in a region of stagnant air (which could hold the flight up for days) were real hazards.

Martin explained the priorities as viewed by expedition planners. The safety of the crew was paramount, and their use of the very latest forecast data was helped by access to the Met Office's 6-day forecast computer program.

Extensive use was made of many METEOSAT WEFAX images, including several animation sequences. The European D2 (infra-red), $C0_2$ (visible-light) and ETOT (near-infra-red) formats, together with relays from *GOES-8* and GMS were essential for the project. Animation and monitoring of these latter images provided extensive global coverage of weather systems.

Launch and landing operations were greatly aided by access to h.r.p.t. (high resolution) images from *NOAA-12* and *NOAA-14*. The GOMS WXSAT provided infra-red images that helped identify important circulation systems, and the animation of GMS images enabled the tracking of fronts and identification of cirrus clouds. *GOES-9* helped the monitoring of frontal lows, and *GOES-8* provided full coverage of the air-flow over the USA.

Views of the balloon and its hi-tec cabin interior were shown by Martin, who gave a lucid and dramatic account of the balloon's travels during the recent trip. He summed up his talk by saying how essential it was to train pilots in meteorology in case the telecommunications facility was lost.

Figure 9 and **10** illustrate the types of image data used to identify weather patterns during flight operations.

Ruud Jansen

The Dutch group Kunstmanen, described earlier, includes member Ruud Jansen who gave an impromptu talk at the Dutch exhibit, near the end of the sessions. He described how he had started in 1950 and apparently managed to hear the original transmission from *SPUTNIK-1* in 1957 with home-built hardware.

In 1969 Ruud built his first WXSAT receiving system based on an electrostatic drum and a framestore for picture production. He also built a 137MHz pre-amp - a considerable achievement considering the year!

A keen amateur astronomer and writer, he has built many antennas and regularly seeks permission from his wife to take the portable version on holiday! He told about trips to Australia, Vietnam and Gambia where he was able to show that the inclement conditions did not prevent the receiver from working.

His power sources during these trips were solar cells and NiCad batteries. Permission did not include the computer - so image processing has to be completed on return!

Gordon Bridge - EUMETSAT

The final speaker of the weekend was Gordon Bridge, whom many of us have know of his role as the Head of User Services. His career started with the Meteorological Research Flight in Farnborough and progressed to forecasting, then to sounding rocket experiments, the TIROS project, and finally to EUMETSAT.

Gordon described the METEOSAT programme to build a European WXSAT, and the formation of EUMETSAT. In the late 1970s computers were being built for the operations centre and 1Mb memory was delivered by a truck!

The mainframe computers were manufactured by Britain's ICL, and these machines had to 'communicate' with hardware from other countries, necessitating engineering feats to achieve compatibility. Consequently, when everything worked and the first image from *METEOSAT-1* was received, this was a great relief to the operations team. *METEOSAT-1* lasted for two years (and one day), leading to a modification to *METEOSAT-2* to eliminate an unexpected design problem.

A number of unexpected technical problems have affected the satellites from time-to-time. When *GOES-4* was moved to 43°W it encountered interference problems and had to be drifted back to 40°W. The International Telecommunications Union is currently investigating this interference.

An interesting result was obtained during the LASSO experiment in which METEOSAT ranging (the measurement of the exact distance to METEOSAT) was determined to an accuracy of better than 100mm! Some METEOSATs have experienced image problems - the well-known 'fish' problem of *METEOSAT-4*, and the rotating lens problem on *METEOSAT-5*, caused by minute movements of a lens held in a crimped support. Software 'fixes' finally corrected the different problems that arose with each satellite. METEOSATs now have a design life of five years.

METEOSAT-7 recently completed successful commissioning and is performing well. Gordon spoke about the various international projects in which METEOSATs are involved, and summarised the future METOP - the polar satellite program. When asked about the sale of MKUs (decryption units required to unscramble METEOSAT primary data images) Gordon revealed that there were 400 units operating in 1996 and over 550 in 1997 - much to the surprise of the audience.

Summarising, Gordon noted that EUMETSAT has 17 member states, including Turkey and Greece, and is now embracing former eastern bloc countries.

The conference ended with Dave Cawley thanking all the speakers, and was followed by the unusually long RIG AGM during which Dave was elected to the committee. By the end of the conference I felt that I had witnessed a superb weekend of satellite chat and I am sure my feelings were echoed by everyone else. ***SWM***

Weather Satellite Image Transmissions - The Move To Digital Data

Lawrence Harris thinks it's good that we are soon due to wave goodbye to a.p.t. and WEFAX. Here he explains.

The world of low resolution analogue weather satellite pictures - otherwise known as a.p.t. and WEFAX - is scheduled to end during the next few years, and I believe this is good news! It seems amazing to realise how little the WXSAT transmission format has changed since it was first introduced. A little historical perspective sets the scene.

The Start Of APT & WEFAX

The first television picture 'from space' was from the American satellite *TIROS-1* on 1 April 1960 - see **Fig. 1**. Three years later, the first 'weather satellite' transmission came from *TIROS-8* in December 1963. It carried a vidicon TV camera for 'Automatic Picture Transmission' (a.p.t.), effectively starting the direct broadcast service.

The system involved the direct transmission of an analogue signal in real-time, showing cloud pictures covering a 1600 to 3200km radius. These signals could be received by suitably equipped ground stations around the world. The a.p.t. service has remained available since 1963, with new satellites being launched every few years. In December 1971, the meteorological satellites of the former USSR started their a.p.t. service.

The next change occurred when the analogue image transmission evolved into a (higher resolution) digital data transmission in 1977 with the *ITOS-D* satellite *NOAA-2*. Digital transmissions were consolidated as High Resolution Picture Transmission (h.r.p.t.) from the Advanced Very High Resolution Radiometer (AVHRR) when in 1978, the *TIROS-N* series satellites were launched.

This service has been provided continuously ever since, and there are now more than 2700 a.p.t. user stations world-wide. The image format has remained the same.

The use of geostationary satellites for weather monitoring followed a few years after the start of the polar satellites' a.p.t. service. In 1974, the geostationary *SMS-1* satellite started the Weather Facsimile (WEFAX) service - therefore becoming the first geostationary meteorological satellite. Because it was practical and efficient, WEFAX used an analogue signal compatible with the a.p.t. signal of the polar orbiting satellites - meaning that the same decoding equipment could be used for both a.p.t. and WEFAX.

For beginners unfamiliar with this terminology, the process involves the telescope (radiometer) carried by a WXSAT, producing an image line (like a television picture line) that shows the brightness variations of the scene below. These variations are impressed (the actual term is modulated) on to a sine wave tone of 2.4kHz (the process is called amplitude modulation - a.m.).

The resulting signal is then used to frequency modulate the main r.f. carrier (in the 137-138MHz band, or the 1675-1698MHz band). The final signal - whether from a polar orbiter or a geostationary WXSAT - can be decoded by the same equipment (though requiring an additional down-converter for WEFAX decoding).

High Resolution Data

High resolution digital image data - that comes from the satellite's Visible and Infrared Spin-Scan Radiometer (VISSR) - has been available since the first *SMS-1* transmissions. The 'stretched'- data (S-VISSR), is corrected for spacecraft imaging characteristics, and was made available for all users.

In 1975, the new GOES satellites replaced SMS. GOES geostationary satellites introduced multi-spectral imaging - that is, data from three separate channels was obtained. The current GOES WXSATs use a new format called GOES Variable Format (GVAR).

METEOSAT-1 started high resolution digital image transmissions and WEFAX services in 1977. The Japanese *GMS-1* satellites have also provided stretched-VISSR and WEFAX services since 1977. The Chinese *FY-1* satellites provided h.r.p.t. and a.p.t. services in 1988 and between 1990-1991.

Fig. 1: Early TIROS picture.

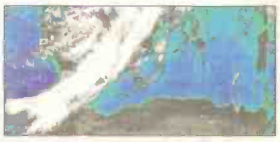

Fig. 2: Early NIMBUS picture.

The New Formats

The existing high resolution digital services will be continued with High Resolution Picture Transmission (h.r.p.t.) but will be referred to as Advanced High Rate Picture Transmission (AHRPT) to distinguish from the present h.r.p.t. The geostationary equivalent will be called High Rate Information Transmission (HRIT) by EUMETSAT, though the Japanese will call their high resolution 'HiRID'.

The WEFAX digital equivalent will be known as Low Rate Information Transmission (LRIT); the a.p.t. equivalent will be called Low Rate Picture Transmission (LRPT) - see **Table 1**. The final specification for LRIT and LRPT has been tentatively approved, with final approval expected in October.

The updating of information recently occurred following the July meeting of the Coordination Group for Meteorological Satellites in Nikko, Japan, and subsequent notification of the necessary activities will occur when available. A new technical document should be available prior to the commencement of the new digital service. Extensive use of the WMO Satellite Activities Home Page on Internet will be used to facilitate notification.

Fig. 3: METEOSAT Primary Ground Station in Fucino, Italy, (courtesy EUMETSAT).

WMO site: **http://www.wmo.ch** select *satellite* then select *apt/wefax transition*. You can register your satellite receiving station via internet at the WMO site, or search the online database to see where the other 8500 stations are located. Technical specifications for the Japanese l.r.i.t. and HiRID are available on the site and soon EUMETSAT's specs will be added.

The table for LRIT conversion indicates that in WMO Regions I (Africa) and VI (Europe) there will be a three-year overlap starting in December 2000. WMO Regions II (Asia) and V (Southwest Pacific) will have a three-year overlap starting in March 2000. WMO Regions III and IV (South, Central and North America including the Caribbean) have not yet identified a transition date.

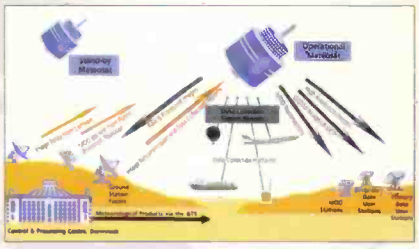

Fig. 4: METEOSAT data flow - ground stations to users.

An analysis of **Table 1** (LRPT transition) shows that the first satellite to use the new digital format will be *METOP-1*, a

Table 1: Specifications for the digital replacements for a.p.t. and WEFAX.

LRIT (geostationary)

Channel Selection: five channels in the following Priority order:
Infrared window channel 11.0µm
Visible channel 0.6µm
Water vapour channel 6.8µm
Infrared channel 3.7µm
Infrared split window channel 12.0µm

Horizontal Resolution:
Full i.r. horizontal resolution

Image Frequency:
Half-hourly plus at least 15 images every three hours from other polar and/or geostationary satellites

Dynamic Range:
Eight bits (256 grades)

Sounders:
Infrared sounder
Microwave temperature sounder
Microwave humidity sounder
Ozone sounder
GPS sounder

Retransmission Of Other Satellite Data:
Low resolution imager or sounder data from other polar or geostationary meteorological satellites
Products from meteorological satellites
Topical cyclone location and intensity
Volcanic ash detection
Cloud type analysis
Sea surface temperature

Numerical Prediction Products:
Height
Temperature
Humidity
Wind

Meteorological Observation:
Surface weather (including ship) reports
Upper-air sounding (including ship) reports
Aircraft reports
Data collection platform reports

Satellite Administrative Message:
Observation schedule
Navigation information
Calibration information
Satellite performance information
Space environment monitoring data

LRPT (polar)

Channel Selection: five channels in the following priority order:
Infrared window channel 11.0µm
Visible channel 0.6µm
Near infrared channel 0.8µm
Infrared channel 3.7µm
Infrared split window channel 12.0µm

Horizontal Resolution:
Smoother horizontal resolution image with 4km or better

Image Frequency:
Two paths a day per satellite (i.e. 12-hourly intervals)

Dynamic Range:
Eight bits (256 grades)

Sounders:
Infrared sounder
Microwave temperature sounder
Microwave humidity sounder
Ozone sounder
GPS sounder

Other Instrument Data:
Local electric fields
Space environment monitoring
Data collection system
Search & rescue

Satellite Administrative Message:
Orbital parameters
Telemetry
Spacecraft ephemeris
Attitude and timing data
Other administrative message

Table 2: Satellites In Geostationary Orbit.

Operator	Satellite	Launch (M/Y)	Service	Start	Stop
EUMETSAT	*Meteosat 5*	03/1991	WEFAX	03/91	-
	Meteosat 6	11/1993	WEFAX	11/93	-
	Meteosat 7	09/1997	WEFAX	07/97	12/2003
	MSG 1	10/2000	LRIT	12/00	2003
	MSG 2	2002	LRIT	2003	2008
	MSG 3	2007	LRIT	2008	2013
INDIA	*INSAT I-d*	06/1990	None		
	INSAT II-a	07/1992	None		
	INSAT II-b	07/1993	None		
	INSAT II-e		None		
JAPAN	*GMS-4*	09/1989	WEFAX	12/89	06/1995
	GMS-5	03/1995	WEFAX	06/95	-
	MTSAT-1	08/1999	WEFAX	03/00	03/2003
		LRIT	03/00	-	
USA	*GOES-8*	04/1994	WEFAX	11/94	-
	GOES-9	05/1995	WEFAX	01/96	-
	GOES-K	04/1997	WEFAX	06/97	-
	GOES-L	07/2002	WEFAX	09/02	-
	GOES-M	08/2000	WEFAX	10/00	-
	GOES-N	2002	WEFAX/LRIT	-	-
	GOES-O	2005	WEFAX/LRIT	-	-
RUSSIAN FED.	*Elektro-1*	11/1994	WEFAX	-	-
	Elektro-2		WEFAX	-	-
	Elektro-3	2002	LRIT	2002	-
CHINA	*FY-2*	?	WEFAX	-	-

Table 3: Satellites In Polar Orbit.

Operator	Satellite	Launch (M/Y)	Service	Start	Stop
EUMETSAT	*Metop-1*	2002	LRPT	2002	-
	Metop-2	2007	LRPT	2002	-
	Metop-3	2012	LRPT	2012	-
USA	*NOAA-9*	12/1984	APT	12/84	08/95
	NOAA-12	05/1991	APT	05/91	-
	NOAA-14	12/1994	APT	12/94	-
	NOAA-K	08/1997	APT	08/97	-
	NOAA-L	12/1999	APT	12/99	-
	NOAA-M	04/2001	APT	04/01	-
	NOAA-N	12/2003	APT	12/03	-
	NOAA-N'	07/2007	APT	07/07	-
	NPOESS-1	07/2009	LRPT	07/09	-
	NPOESS-2	10/2010	LRPT	10/10	-
CHINA	*FY-1 C*		None		
	FY-1 D		None		
RUSSIAN FED.	*Meteor 2-21*	08/1993	APT	08/93	
	Meteor 3-5	08/1991	APT	08/91	
	Resourse-01	?	APT	-	
	N4	?	-	-	
	Meteor 3M-1	?	APT	-	
	Meteor 3M-2	2002	LRPT	2002	

'morning' satellite to be operated by EUMETSAT in 2002. The 'afternoon' satellite will be (the American) *NPOESS-1* that will continue LRPT in 2009. Also scheduled for 2002 is the launch of the Russian *METEOR 3M-2* that will transmit LRPT.

Because the hardware required for reception of each transmission format is different, users wanting to receive both a.p.t. and LRPT telemetry will have to use separate systems. It will be necessary to maintain a dual capability during the period 2002-2009 if it is deemed necessary to have information from both a.m. and p.m. satellites. It can also be seen that the inclusive transition period for all WMO Regions will cover the period from 2000 until 2009 or more.

Data Compression

The aim for the digital LRPT imagery service is the provision of higher quality imagery than current a.p.t. Reducing spatial resolution to 1km and increasing the number of channels within the data bandwidth requires an imaging data compression technique. One is proposed that will reduce the LRPT raw data rate by a factor of eight.

One concern of a.p.t. users is the availability of software and hardware to decompress imagery in realtime at the LRPT receiving station. EUMETSAT and NOAA are considering supplying the necessary decompression software to all registered direct broadcast users via electronic or regular mail.

Frequencies?

NOAA frequency allocation managers have suggested that the NOAA and EUMETSAT designers of the new LRPT link build a system with carrier frequencies of 137.1 and 137.9125MHz. These new frequencies allow enough bandwidth separation (150kHz) without interference from Orbcom or any other Mobile Satellite Service.

My thanks to **Dr. Donald E. Hinsman**, Senior Scientific Officer at the Satellite Activities Office of the World Meteorological Organization in Switzerland for providing the lists of satellite operations for use in this article, and for valuable help during proof reading. Some frequencies and other data were provided by **H. James Silva** of NOAA/NESDIS.

SWM

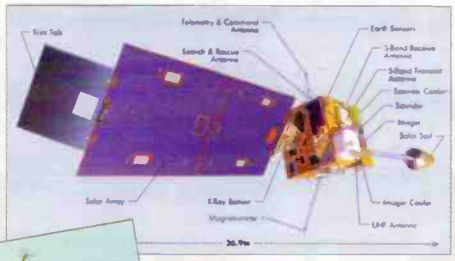

Fig. 5: GOES spacecraft.

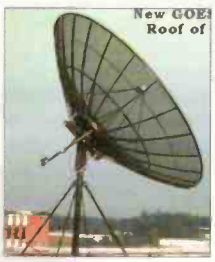

Fig. 6: GOES-8 antenna.

Fig. 7: VHF antenna.

Fig. 8.

Fig. 9: The current METEOSAT satellite.

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Info in Orbit

METEOR 3-5 spent summer days in the northern hemisphere travelling north-bound in full sun during the morning, then travelling southbound into darkness during the late afternoon. The slow movement (precession) of its orbital plane brings all passes earlier as the days progress, so the morning, north-bound passes slowly move towards the morning terminator.

By mid-October, the morning passes occur as *METEOR 3-5* travels north-bound around 0500UTC in darkness, and therefore not transmitting. Afternoon south-bound passes, see **Fig. 1**, bring *METEOR 3-5* over Britain around 1400UTC, and therefore in sunlight. This WXSAT should then remain transmitting for several weeks during these south-bound passes.

The picture quality of METEOR images seems to have deteriorated again. Jitter, the effect of image lines of slightly differing lengths, became noticeable on my images in early September. For those using the *WXSAT* program, (see also the later item), **Les Hamilton**, a committee member of the Remote Imaging Group, points out (in issue 50 of the *RIG Journal*) that changing the parameter *'burst frequency'* from 250 to 1000 can improve this, though he adds that it is necessary to use manual synchronisation when this parameter is set.

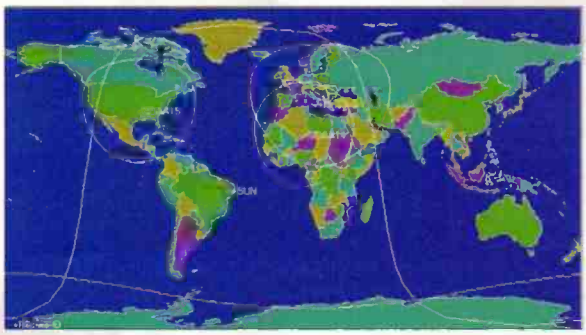

Fig. 1: *METEOR 3-5* footprint for a typical pass in mid-October.

The status of the NOAA WXSATs remained nominal during late summer. The evening passes of *NOAA-12* show the switch from visible-light images to near-infra-red occurring earlier each week as the seasonal reduction in evening light levels progresses.

NOAA-15 morning images are consistently superb, providing dramatic sun-glint (reflections) on many passes. The light levels seen by *NOAA-14* early afternoon passes slowly reduce as autumn progresses.

Fig. 2: *METEOR 3-5* 10 September 0920UTC.

RESURS Operations

As at mid-September, my last image from the *RESURS-01* No. 4 earth resources satellite was on 11 August at 1953UTC on 137.40MHz. **Paula Böhm**, Marketing Assistant at the Swedish Space Corporation (SSC), Satellitbild, Solna office kindly provided me with two tables showing the equipment and orbital characteristics of both *RESURS 01-3* and *-4* series satellites, which are reproduced here, see **Table 1** and **Table 2**.

Paula confirmed that there have "been difficulties with the transmissions since 11 August. The back-up system has been tested, but so far without positive results". For those with access to the Internet, the following site addresses may provide the latest status:

http://www.ssc.se/sb/resurs/r4-news.html
http://www.ssc.se/sb
http://www.spacepix.com

Table 1 confirms the orbital characteristics of the satellites and the various downlinks available for a.p.t. (image) transmissions as 137.30, 137.40 and 137.85MHz. **Table 2** shows the exact spectral band coverage of both the number 3 and 4 satellites in the series, and the pixel size at ground level that results

Fig. 3: *NOAA-15* hurricane *Bonnie* image of 25 August from Hank Brandli.

Table 1: *RESURS* Satellite Characteristics

Name	RESURS-01 No. 3	RESURS-01 No. 4
Orbit	sun-synchronous, circular	sun-synchronous, circular
Average altitude	678km	832km
Inclination	98.04°	98.8°
Eccentricity	0.00128	0.00112
Argument of perigee	67.3°	64.8°
Orbit period	98.04 minutes	101.3 minutes
Cycle	16 days	14 days
Local time of equatorial crossing	2134.15.8	22.3.12.6
Longitude difference between the satellite ascension node and the sun right ascension	143.5°	152°
Satellite mass	1950kg	2444kg
Scientific payload	550kg	ea 1000kg
Attitude control	orbital, triaxial, active	orbital, triaxial, active
Data transfer rate	7.68 Mbits/s	15.36 Mbits/s 61.44 Mbit/s
Down-link frequency	8.192GHz	8.192GHz 137.3 (137.4; 137.85) MHz for a.p.t.
Launch Date	4 November 1994	10 July 1998

Table 2: *RESURS* Instrument Parameters.

MSU-SK Instrument	RESURS-01 No. 3	RESURS-01 No. 4
Imaging mechanism	conical scan	conical scan
Viewing angle	39°	39°
Spectral bands	pixel size:	pixel size:
0.5-0.6µm (Green)	160m	130 x 165m
0.6-0.7µm (Red)	160m	130 x 165m
0.7-0.8µm (NiR)	160m	130 x 165m
0.8-1.0µm (NiR)	160m	130 x 165m
3.5-4.1µm (MiR)	N/A	330 x 525m
10.4-12.6µm (Thermal)	600m	330 x 525m
MiR range & accuracy	N/A	Range: 240-530K Accuracy: 1.0K at 300K
TiR range & accuracy	Range: 240-320K Accuracy: 0.3K at 300K	Range: 240-320K Accuracy: 0.3K at 300K
Swath width	600km	714km
Revisit to same orbit	16 days	14 days
Potential coverage of same area	4 days (at Equator)	3-4 days (at Equator)
Radiometric accuracy	1%	1%
Signal/noise ratio	80	150
Noise equivalent temp.	0.3K	0.3K
Downlink limitations	4 out of 5 bands maybe down-linked simultaneously	N/A
Mass	61kg	70kg

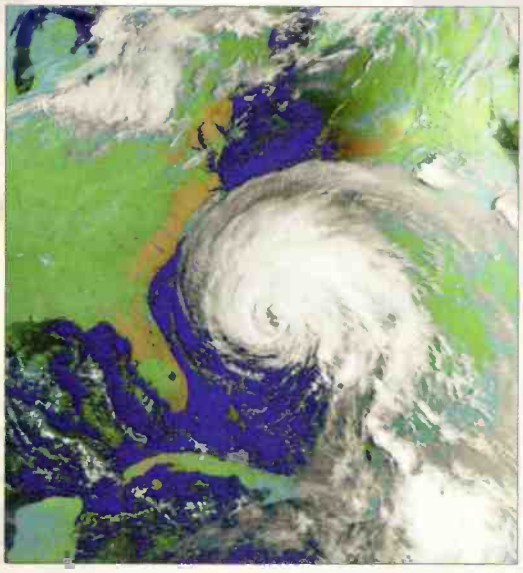

Fig. 4: Hurricane Bonnie image from *NOAA-15* on 25 August at 1246UTC from Milan Konecny.

from the scan. The spectral bands include green, red, near- (and mid) infra-red and thermal.

The 1998 Hurricane Season

By mid-August, America was once more deep into the hurricane season, so during some calm weather (in Plymouth) I assembled my Yagi in the yard and pointed it westwards, then optimised it for *GOES-8* WEFAX. As with *METEOSAT-7*, GOES-8 WEFAX is transmitted on 1691.0MHz.

After rotating the axis of the Yagi for optimum reception, I adjusted the software input level from the 'GOES' receiver, the level from *GOES-8* is somewhat weaker than from *METEOSAT-7*. Picture synchronisation was fine and several good pictures were received.

"My Bonnie Lies Over The Ocean"

My main aim was to get a sequence of pictures of hurricane *Bonnie* as it moved northwards along the east coast of America. A few days later, I received an E-mailed picture from **Hank Brandli**, an American meteorologist who has been associated with the DMSP (America's Defence Meteorological Satellite Programme), and who is able to receive DMSP satellite data direct from the satellites. Hank also sent me images from *GOES-8* and *NOAA-15* showing the hurricane in all its notoriety.

Figure 4 also comes from across the pond, where **Milan Konecny** somehow manages to find time to feed his real-time pictures from the WXSATs on to his web page: **http://ourworld.compuserve.com/homepages/Milan_Konecny/weather.htm**

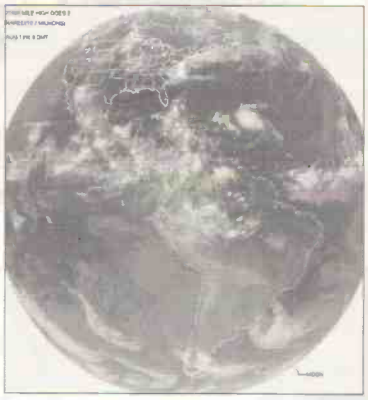

Fig. 5: *GOES-8* hurricane *Bonnie* image of 27 August from Hank Brandli.

Hank's picture from *GOES-8* shows hurricanes *Bonnie*, *Daniel* and *Howard* spread across the globe from the Pacific to the Atlantic ocean. Hank's final picture, see **Fig. 6**, shows hurricane *Earl*, as seen by a DMSP satellite in the visible-light channel at 0200UTC!

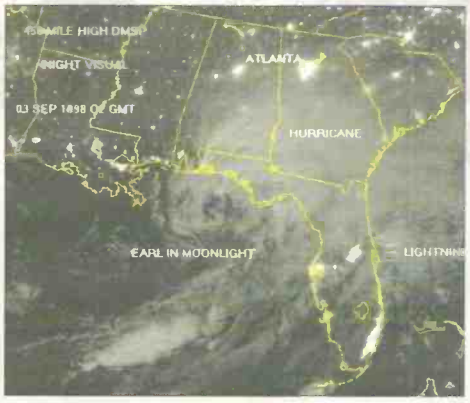

Fig. 6: DMSP image of hurricane Earl by moonlight, courtesy US Air Force.

"Oh Bring Back My Bonnie To Me"

After a week or so delivering severe weather to the east coast of America, *Bonnie*'s path brought it across the Atlantic, by which time it had, fortunately, weakened considerably. It remained just off the coast of Cornwall for a day or so in early September, then slowly crossed Britain, bringing no more than gusty winds to the south-west.

The last picture in this 'hurricane' mini-special is hurricane *Howard* from 23 August, provided by a NOAA web server.

Calmer weather has been reflected in the images sent in by other 'Info' readers. **Kurt Feller**, of Lachen in Switzerland, sent one picture from *NOAA-15*, and one from *METEOR 3-5*, received using the 'Easy Fax' interface, a unit that I have not heard about before now.

Kurt's receiver is a UK Technik, and he uses the *JVFAX* version 7.0 program for decoding. I notice from my records that there was one further release of *JVFAX* (version 7.1) issued about three years ago.

Fig. 7: *Bonnie* after crossing the Atlantic - 6 September *METEOSAT-7* C02 format.

WXSAT - Hints & Tips

Christian Bock's program *WXSAT* is popular amongst those who use sound-cards for decoding a.p.t. signals with their computers. The program is freeware

Continued on Page 51...

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and runs under the *Windows* operating system. It uses a sound-card to decode both types (a.p.t. and WEFAX) of WXSAT pictures.

The audio feed from a WXSAT receiver is fed to the *auxiliary* input of the sound-card. A *microphone* input can be used, but this is usually too sensitive an input and may require a potentiometer or alternative software adjustment to lower the level.

The card is set by the software to sample the signal and the program produces the resulting image. I have used this program quite frequently in the past, though I have not made significant modifications to the settings.

Without providing an extensive description, I must point out that it is essential to ensure that the incoming signal level does not activate the card's a.g.c., or significant signal distortion will be introduced by the card. Some information on setting up the system is given in the accompanying *help* file.

It is important to appreciate that the main processor does all the work of high speed sound data analysis, so it is highly advisable to disable most background programs during real-time image generation. No screen-savers, no virus-checking, and no hard-drive optimisation - amongst other possibilities!

A writer from Fakenham asked how the program can be set to allow different grayscale levels for the same satellite group under different conditions. This, and several other adjustments, are easily performed. The first query may refer to the fact that lighting conditions for *NOAA-12*'s morning passes are considerably different to those of *NOAA-15*, so settings for one may result in the other being over-enhanced.

The program offers 12 satellite configurations, including seven NOAA options, and a mix of METEOR, METEOSAT, SICH and FAX. The top-left parameter shows the current setting for the next pass. If you do not use the software for METEOSAT or FAX, then both these sets can be re-used.

The file 'wxsat.dat' (which is created when the program is first installed) contains the default settings data for each option. This data can be edited using a normal text editor, such as *textpad* as required.

The *help* file is a large tome that not only provides a considerable amount of information on basic WXSAT settings, but also explains how settings can be changed to achieve specific effects, such as the automatic colouring of images in real-time.

To quickly increase image brightness and contrast, a pass (or part of a pass) has to be taken using the *'calibration on'* setting, as detailed in the *help* file. The *BasicAmp* parameter is then optimised by reference to the histogram facility.

Two different settings will probably be required, one for each NOAA. Using the text editor, one of the unused satellite options, e.g., FAX can be replaced by a specific NOAA satellite, replacing all ten lines in the 'wxsat.dat/' entry with the new data.

Another method of adding more satellite options involves setting up a second version of *WXSAT* in a separate directory. Having installed the program normally, the main directory created is called 'wxsat/'. This has two subdirectories, 'bmp/' (for bitmap images), and 'wav/' (for wav sound files).

The software has the ability to create both .bmp and .wav files while unattended or while you monitor. This directory structure can be copied, and the new directory named '*wxsat2/*'. This is essential because the data file wxsat.dat must be in a unique directory.

This new version can then be set up with entirely different parameters, for example, the first directory could be for all north-bound satellite passes, and the second for south-bound. Personally, I simply change the settings before each pass, but the correspondent who wrote asking for advice did not wish to keep changing parameters, this is an easy way to avoid doing so.

Frequencies

NOAA-14 transmits a.p.t. on 137.62MHz.
NOAA-12 and *NOAA-15* transmit a.p.t. on 137.50MHz.
NOAAs transmit beacon data on 137.77 or 136.77MHz.
METEOR 3-5 use 137.85MHz.
OKEAN-4 and *SICH-1* use 137.40MHz.
RESURS 01#4 may transmit a.p.t. on 137.30, 137.40 or 137.85MHz.
METEOSAT-6 (geostationary) uses 1691 and 1694.5MHz for WEFAX.
GOES-8 (western horizon) uses 1691MHz for WEFAX.
MIR (Russian space station) uses 143.625MHz for voice.

Shuttle Launch Schedule

STS-95 Discovery is scheduled for launch on 29 October into a 51.60° inclination orbit. *STS-88 Endeavour* is scheduled for launch on 3 December into a 51.60° inclination orbit for the first Space Station Assembly flight ISS-1, carrying Node 1, PMA1/2 (pressurised mating adapter).

A comprehensive listing of all Shuttle flights and payloads, together with associated information is available from me as the *Shuttle Pack*. Please include a £1 and stamped s.a.e. for the A4 booklet.

International Space Station (ISS)

The de-orbiting of *MIR* is scheduled for summer 1999, during which time construction starts on the ISS. I plan to provide some information on the project as it proceeds, if 'Info' readers confirm that this is of interest. My postbag indicates a strong interest in *MIR*, Shuttle and ISS operations.

Kepler Elements - WXSATs, *MIR* & Shuttle

1) If you want a computer disk file containing recent elements for the WXSATs, AMSATS and others of general interest, together with a large file holding elements for thousands of satellites, please enclose 50p with a PC-formatted disk and stamped envelope. A print-out is included that identifies NASA catalogue numbers for the WXSATs. The disk file is ideal for automatic updating of tracking software.

2) I also send monthly Kepler print-outs to many people. To join the list please send a 'subscription' of £1 (secured, plus four self-addressed, stamped envelopes) for four editions. Transmission frequencies are given for the operating satellites. This data originates from NASA.

Fig. 8: Hurricane *Howard* 23 August 2222UTC.

Fig. 9: *NOAA-15* 23 July from Kurt Feller.

Fig. 10: *METEOR 3-5* from Kurt Feller.

RIGsat RX2 WXSAT

Probably the most important item of specialist hardware required by the WXSAT enthusiast is a WXSAT receiver. Lawrence Harris evaluates the RIG offering in kit form.

When you develop an interest in a hobby, it is almost always worthwhile joining a local club. Club members are often able to provide valuable advice, invariably free, and will almost certainly save you a lot of money when you come to buy products to further your interest in the hobby.

Sometimes a hobby is so specialised that a national club or society is more appropriate. This is the case with the Remote Imaging Group, a club for people interested in the monitoring of weather satellites, primarily for people in Britain, but it also has a large number of members outside the UK.

RIG membership brings with it a number of privileges, including access to some of the hardware required for the successful reception of weather satellites - at discounted prices. This review is of the RIGsat RX2 WXSAT receiver that is supplied in kit form.

Fig. 2: RIG receiver - the completed unit.

Receiver Kit - What You Get

The kit includes virtually everything that is required for assembly: p.c.b. and associated mounted parts, 7-segment display, volume control, knob and switch, loudspeaker, metal mounting spacers and screws, ribbon and coaxial cable and coax, a coil adjustment tool and the power connector.

Also provided with the review model was a three page set of schematics showing the layout and receiver circuitry - see **Fig. 1**. Parts not included with kit: connectors for the antenna and output, a signal strength meter, case and power supply (15-20V at 120mA).

Building Advice

A set of helpful guidelines are given for soldering and general construction, including initial component identification (helps to avoid the need to subsequently remove wrongly positioned items!) and cautions against static charge damage to sensitive components. I once soldered the components of a framestore, and learned the hard way of the importance of checks and double-checks before soldering.

The logical layout for the completed unit would seem to be one that has the signal strength meter, channel identification, push-button switch, toggle and speaker volume control on the front panel - see **Fig. 2**.

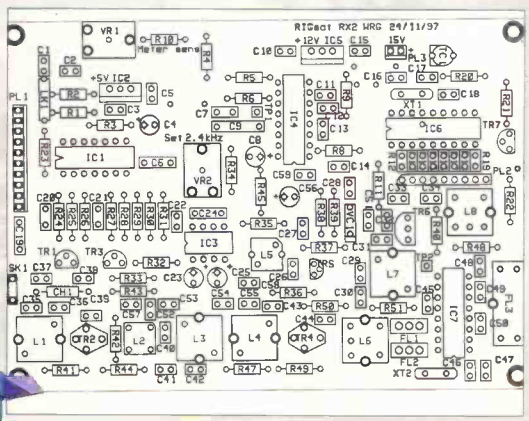


Fig. 1: Receiver p.c.b. layout.

On the rear panel one can mount the input BNC antenna connector, power supply input and audio output feed.

The instructions are well written and unlikely to leave anyone unable to identify the correct procedures for completion of the project. You will need a resistor colour code table.

Circuitry

The notes provide a comprehensive description of the components and circuits used. The receiver design can be divided into the r.f. (radio frequency), i.f. (intermediate frequency), and a.f. (audio frequency) circuits.

Within the r.f. circuit, the antenna signal is coupled by a tuned circuit to a MOSFET amplifier. There is an option to feed d.c. to supply a pre-amplifier or down-converter if required. Loosely coupled tuned circuits provide some selective band-pass filtering, and there is a high level of discrimination against out-of-band signals, together with a low response to image (unwanted) signals.

The i.f. circuitry attenuates close-in signals such as pager transmissions before they reach the mixer in the i.f. chip. The i.f.filter has a bandwidth of 110kHz and the resulting signal, after conversion, passes through a high performance ceramic filter with 6dB bandwidth of about 38kHz.

A knowledge of WXSAT signal characteristics would initially suggest that this is a little narrow - allowing for Doppler shift and other variations - the more usual being 45kHz. However, as long as the receiver is properly aligned, the real test is whether or not there is

Receiver Review

any perceptible effect on the image. Tap-off points within this section provide a 'received signal strength indication' output for an optional 'S'-meter.

The last stage involves the 2.4kHz component (audio frequency section). Following demodulation, the signal is low-pass filtered and amplified, giving a fairly standard 1V r.m.s. level output for image decoding. Part of the signal is analysed by a phase-locked loop tone detector so that when a 2.4kHz tone is detected, channel scanning ceases.

Alignment

Such is the care taken with the receiver design that it is not essential to have a variety of test equipment (normally associated with final receiver alignment) for this job. Using a voltmeter (preferably digital) the instructions take you through a sequence using test points on the p.c.b. that should ensure the receiver is in working order to a first degree.

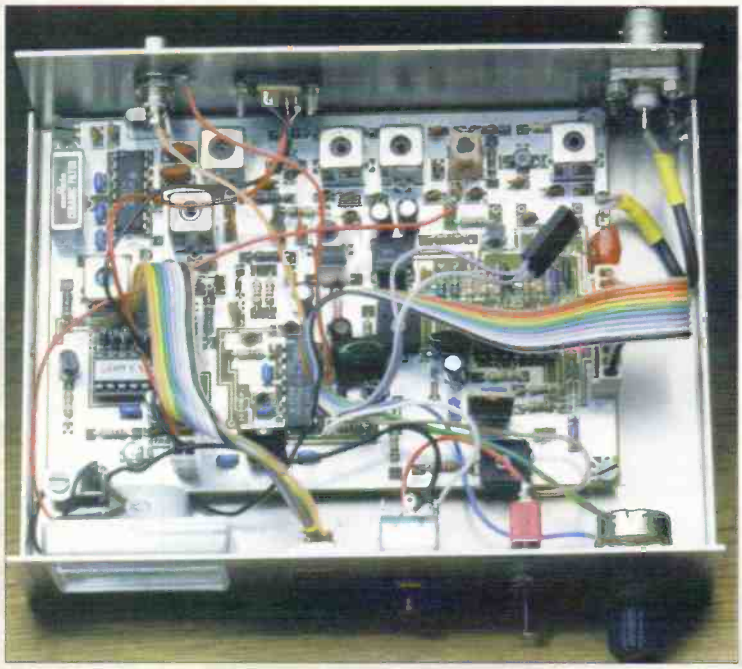
Using the notes, the frequency can be set to 137.970MHz, a pager frequency experienced over almost all the UK. This acts as a reference signal (!) and, by carefully following the instructions given in the paragraph, the coils are gradually tuned to the optimum values required for effective reception.

Final alignment requires the use of an actual satellite signal. When the receiver is tuned to the 'live' signal, measurements at a second test point should confirm significant alignment has been achieved.

A further alignment process (setting the tone decoder to 2.4kHz for the sub-carrier) should also be carried out in the presence of a 'live' (preferably NOAA) signal. The final alignment - also 'live' - involves minor coil adjustment for optimising the 'S'-meter signal. The receiver should by then be optimised.

There is a section on troubleshooting, in case all appears lost. Noting the comprehensive nature of the construction details, I am sure that this paragraph will not need detailed study!

Fig. 3: Internal view of the RIG receiver.



Receiver Operation

The normal operation of any WXSAT receiver is that it should scan selected frequencies and lock on any signal that it detects. In practice we want it to do more than this.

Interference on a WXSAT frequency is not rare, so rather than have the receiver lock on to such interference (e.g., on 137.85MHz), a first line of defence against an unwanted 'lock' should be the ability to check whether the signal/noise has a.p.t. characteristics - that is, whether it includes a 2.4kHz sub-carrier.

At plug-in or switch-on, there is a loud beep and the receiver starts to sequentially scan the five channels - 137.30, 137.40, 137.50, 137.62 and 137.85MHz. Each is monitored for four seconds before scanning continues.

If a valid signal is detected (that is, one carrying a 2.4kHz sub-carrier) scanning stops and there is an 'alert' beep. If you plan to leave the receiver on

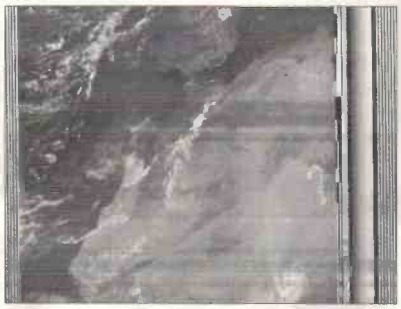


Fig. 4: *METEOR 3-5* 26 July 1342UTC North Africa. This is the first part of a long METEOR pass and shows the clean signal received on this occasion from *METEOR 3-5* as it rose above the south-western horizon.

Fig. 5: *METEOR 3-5* 5 August 1100UTC. This shows the larger portion of a METEOR pass passing north-bound from north-Africa into Europe.

Fig. 6: *NOAA-12* complete view of infra-red and visible image 2 August 1907UTC. This evening (north-bound) image from *NOAA-12* shows the two, side-by-side infra-red images. Within a few minutes of the start of the pass, the near infra-red channel switches to visible-light as it enters northern summer twilight.

during the night (for automatic data collection) you may wish to incorporate a switch to disconnect the speaker - rather than risk having the loud beep disturb the household.

The receiver holds lock until the signal disappears for at least 15 seconds, after which it continues scanning the following channels. This seems to be an important feature because many antennas - including mine - have reception nulls, or at least minima, which means that the receiver may lose the signal at some stage(s) during the pass, particularly at low elevations.

As well as the normal 'scanning' mode, one can change to 'manual' by briefly pressing the push button (causing a beep), then selecting any channel, by subsequent presses, to increment the channel. A further long press reverts to normal 'scanning' mode.

If the button is held in when the unit is switched on, the 137.97MHz pager frequency is selected and can be monitored for checking. Switching off, then on, restores normal operation.

Results

The unit was provided for me in a completed, fully aligned condition, by Ray Godden, the RIG projects committee member. With three NOAA WXSATs and at least one METEOR satellite available during the day, there are plenty of opportunities to test any receiver.

I connected my roof-mounted, crossed dipole to the receiver's BNC-type antenna connector, and fed the output to the soundcard in the computer. The *WXSAT* program can take the signal from a soundcard and decode it to produce a WXSAT picture.

Not having used the *WXSAT* software for several months, I had to spend a little time re-familiarising myself with its operation. The program can be optimised for the audio signals from a WXSAT receiver so I adjusted the soundcard input level (running under *Windows 95*) to near maximum to enable a full range of subsequent adjustments to be available within the software parameters for each satellite. By then adjusting the parameters during the first few minutes of a pass, the input signal from each satellite was optimised.

The results were excellent. I set-up the software on my 'backup' computer to enable me to continue working while watching the antenna, receiver, software combination produce images for each satellite - every hour or so. I collected images from *NOAA-15, -12* and *-14*, as well as from *METEOR 3-5*, and even one from *RESURS-O 1#4* which had just entered its testing phase. I used a satellite tracking program to show the exact location of each satellite's footprint when the antenna/receiver first detected or lost the signal.

Fig. 7: *NOAA-15* 6 August 0800UTC. Another excellent pass from *NOAA-15*. It follows *NOAA-12* as a 'morning' satellite, by which time the sun is higher, so the images are brighter.

As anticipated, signals were received almost as soon as the satellites came above my horizon - except for those over in the far east where my antenna is significantly obstructed by houses and the hill on which I live. I saved a selection of full-length images to illustrate the results from the combination of equipment.

I was surprised to see the extent of Africa, even though the most southerly part was fairly noisy. Careful checking showed that this area should not be observable from either the NOAAs or the METEORS because it is scanned while the satellites are below my theoretical horizon!

Fig. 8: *RESURS-O 1#4* 6 August 1020UTC. An image from *RESURS 1#4* during its testing phase on 6 August.

Using Kepler elements from the OIG (Orbital Services Group) web site that were only hours old, I checked the satellite's positions at the time of this anomalous reception and confirmed that I was receiving the satellite signal while (in the case of *METEOR 3-5*) it was nearly two degrees below the horizon.

In fact, my horizon at that southerly landmark is the sea level. On the northern side I was able to monitor Greenland to its northern coast - but only just! Some of the resulting pictures are shown here.

I was very pleased with all the images and the performance of the receiver. Using other receivers, noise bands were confirmed as largely being due to nulls within the antenna reception pattern.

If you are not already a member of RIG, there can be no better reason for joining! My grateful thanks to Ray Godden for providing the receiver with the hard work already done!

Price & Availability

The unit is available for purchase by RIG members only and must be ordered through them at the following address: **RIG-RX2, PO Box 142, Rickmansworth, Herts. WD3 4RQ.** Price for UK first-class post £49.50. Check first for possible delays in despatch. ***SWM***

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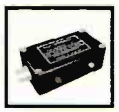

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Timestep PROscan Weather Satellite Receiver

Lawrence dishes up a second helping of 'WXSAT Receiver Review'. Now it's the turn of Timestep's PROscan receiver to be under his scrutiny.

I have done my fair share of receiver building in the past - and enjoyed doing so. My very first project was a simple super-heterodyne model, constructed for listening to a.m. radio. This was back in the early sixties when the cost of such kits was relatively expensive, but cheaper than buying a commercial radio.

Unfortunately, without proper tuition, my soldering skills remained minimal for several years, consequently I have always tended to opt for fully completed, aligned units. Some twelve years ago I bought my first weather satellite receiver kit, having ensured that the actual p.c.b. was already populated - that is, the hard bit was already done!

Completing the unit required the fitting of controls, and housing it all in a metal casing. That receiver still works satisfactorily, but because of the necessity for me to become even more deeply involved in WXSAT monitoring, I decided I had to check out more computer-functional receivers. Timestep's PROscan receiver is positioned towards the top of the market for such products and is supplied 'ready-to-use'.

The receiver is purpose designed to operate both independently - as a stand-alone receiver for mix-and-match purposes with other decoder units - and to connect to the Timestep PROsat decoding system. I have used and tested it extensively under both conditions.

Some months ago I reviewed the PROsat for Windows package for which the receiver was designed, and I have tested it extensively with this package. I have also used it as a separate receiver to provide a.p.t. for decoding with other systems.

Appearance

The receiver comes in the form of a cream-coloured unit 200mm (wide) by 70mm (height) by 140mm depth - see **Fig. 1**. On the front panel are eight l.e.d.s - one for each WXSAT frequency, plus two spare. They are labelled 'A, B, 30, 40, 50, 62, 80, 85', representing the 137MHz band frequencies used (or previously used) by WXSATs. Three push-in toggle switches and a volume control complete the face.

On the back are sockets for two computer interface DIN connectors, an antenna input 'F'-type connector, an external source power supply input and connector for an external speaker. The use of each control is described under 'operation'.

Frequency selection is based on the NOAA satellites (137.50 and 137.62MHz), *METEOR 3-5* (137.85MHz), *OKEAN* and *SICH* (occasional transmissions on 137.40MHz), the polar orbiter *FENGYUN* (137.80MHz during its brief lifetime) and *RESURS-O 1#4* (which has used 137.30 and 137.40MHz).

Fig. 1: Front panel of the receiver.

Design & Filtering

One of the most important features (well, in my view anyway) of any WXSAT receiver is the filtering. In Britain we now share the 137MHz band with two other utility services - satellite and terrestrial communications.

The *ORBCOMM* series of satellites already transmit (or are about to transmit) on a series of frequencies right in the middle of the 137MHz band. Add to that the pager service that has been using powerful transmitters in this band for some

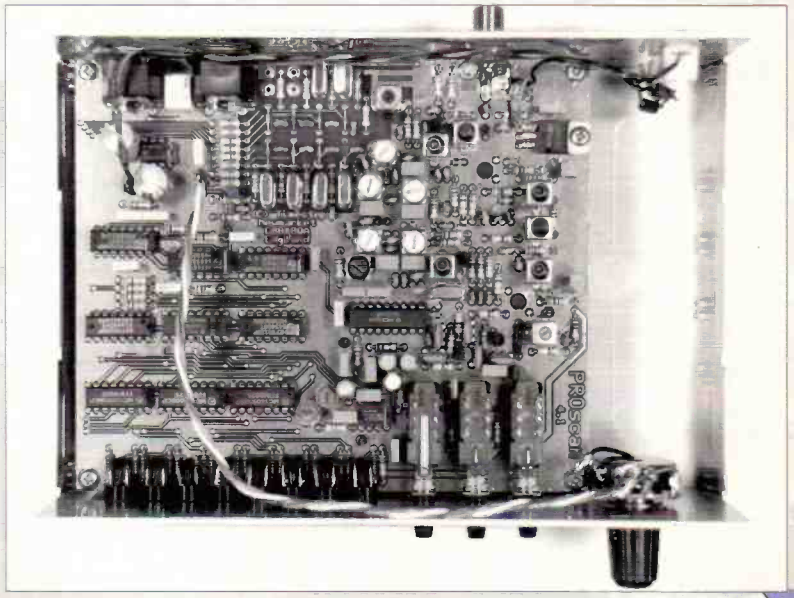


Fig. 2: internal circuitry.

Fig. 3: *NOAA-14* 6 August 1345UTC.

Fig. 4: Greenland *METEOR 3-5* 2 August 1530UTC.

Fig. 5: *NOAA-15* Greece, 4 August.

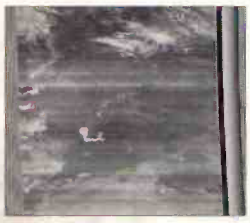


Fig. 6: *RESURS-O 1#4* 11 August 1004UTC.

years - and you can appreciate the need for extremely effective filtering.

The PROscan receiver incorporates seven coils in the r.f. (radio frequency) stage, and 11 i.f. (intermediate frequency) stages as part of the overall design to minimise such interference.

The receiver does not have a built-in speaker, but one was provided with the unit. When connected to the output on the rear of the box, the front mounted volume control can be used to adjust the listening level of the audio signal.

Independent Or Combined Operation

The operation of the receiver depends on the manner in which you have connected it - whether as a stand-alone receiver or as part of the PROsat equipment. As a separate receiver it can provide an output for any decoder interface, and has accessible, built-in facilities for computer control.

Within the Timestep system application access to these facilities is already included in the various types of software (DOS and Windows) and can therefore be used immediately. This review deals with both applications.

Independent Operation

It is possible to pick-up signals from the weather satellites using a rudimentary, general purpose receiver fed by an entirely unsuitable (for example 2m) external dipole antenna. Word-of-mouth suggestions may lead you to try decoding the (audio) output signal from the utility receiver using a sound-card and decoding program - and with a lot of effort, you may be able to get an image of sorts. Such images have little in comparison with that from a proper WXSAT receiving system, but at least you can see the principles of WXSAT decoding.

It is here that the true reason for buying a purpose-designed WXSAT receiver becomes apparent. Their design is specifically for such reception and no amount of modification is likely to produce the same result from a general purpose receiver.

In its independent mode, you will still need to provide a quality signal, and this should come from a WXSAT antenna, of which there are a number of models available. The input for the WXSAT signal is on the back panel of the PROscan receiver, and, unusually, is an 'F'-type connector.

Timestep provide their antennas with such connectors - hence the style. If you have already got a proper antenna feed set up, chances are that it is terminated by a u.h.f., BNC or 'N-type' plug. Mine carries a u.h.f. plug, so I needed a converter to provide an 'F'-type connector for fitting to the receiver.

Such converters are available from some local electrical stores, or by post from one of the national electrical catalogue shops. Timestep provided me with a selection of converters for this input.

For independent use, there is a standard 3.5mm jack d.c. power-in socket on the back panel that can take 12-14V d.c. and I used this for the tests. Alternatively, power is available directly through the computer connecting cables, when used with the Timestep equipment.

Decoded Output

The decoded WXSAT signal is taken from the receiver for software processing into a picture. Information sheets included with the receiver show that the data is available from the computer output connector on the rear panel.

A standard DIN socket, or a ready-made cable can be bought, and the feed (from pin 5) taken to the computer for processing. For testing in 'independent' mode, I used a soundcard and *WXSAT* to decode this signal. This leaves the speaker output free for normal audio listening. I also tried decoding the speaker signal and found this was perfect - however, the DIN feed is the one for normal use!

Computer Control Connections

You can buy the receiver as the final component in your system without having Timestep's proprietary hardware and software. If so, there is another option available. The control DIN connector on the rear panel can be used to program the channel settings.

Details of the method required are summarised on the instruction sheet. By changing the voltages applied to various DIN pins on the control connector, the front panel channels (A to 137.85MHz) can be selected.

Push-Button Operation

Using the receiver is very straightforward - whether within the Timestep system or stand-alone. When powered up and fed by an antenna, the receiver sequentially scans each frequency rapidly.

If a signal is detected, the receiver pauses to analyse it. If the signal contains a 2.4kHz sub-carrier (that is, an a.p.t. signal) the receiver locks and demodulated data is output via the connectors described. If the signal is interference, or other non-a.p.t. telemetry, scanning continues.

There is one potential problem here. While the satellite is at a low elevation, or if it passes through an antenna 'null', the signal may reduce to a level where lock is lost. If this happens, scanning resumes immediately.

This can mean that a gap in the signal may result near the start or end of the pass. My preference would be for a few seconds 'grace' before scanning resumes.

Manual & Auto Mode

The three push buttons - select, scan and mute - permit flexibility of operation. With the 'scan' button out, scanning stops, frequencies can be selected manually with select and left for the duration of a pass.

Select operates in two ways: in 'auto-scan' mode it marks a channel to be ignored (not scanned). In manual mode, the channels are incremented for each press. Finally, mute is normally left out while scanning. In the 'in' position, it disables the mute circuitry and stops the scanning.

When used in conjunction with the PROsat hardware and software (which I reviewed some months ago), the control features built in to the receiver are available. The receiver can be programmed to stop on any selected frequency for

the duration of a pass, or alternatively left manually on a selected frequency.

Results

The results were largely predictable! The receiver heard every satellite that was transmitting a.p.t. and locked at the start of each pass - subject only to the limitations of my local horizon and known antenna nulls.

Figure 3 shows western Europe seen by *NOAA-14* on 6 August during its main pass at 1345UTC. The clear skies over much of the continent led to high temperatures, especially in Greece. **Figure 5** shows the sunglint around Greece seen by *NOAA-15* on 4 August.

Noise levels were normal, using a crossed-dipole antenna with one set of reflectors, images from all the WXSATS - *NOAAs-12, 14* and *15, METEOR 3-5* and *RESURS-O 1#4* - were received without problems. The receiver's pricing reflects the facilities and design effort that has gone into it.

Without doubt, it works very efficiently within the PROsat system itself, where the software can control virtually every aspect of its operation. In stand-alone mode I found it very useful, simply letting it run for hours in conjunction with the soundcard decoding program - every operational satellite being reliably recorded.

A few bands of noise experienced on some images were attributable to antenna 'nulls' and some mains interference. I need to check my mains power routes within this 'shack'!

My only preference would be for an increase in the time following the receiver's loss of lock during periods of weak signal. Overall, the receiver is a very versatile unit and capable of being used within a serious programme of WXSAT monitoring.

SWM

Price & Availability

The PROscan receiver is priced at £225 for members of the UK's Remote Imaging Group. For any purchase enquiry contact **Timestep** at **PO Box 2001, Newmarket CB8 8XB, Tel: (01440) 820040, FAX: (01440) 820281** or E-mail **sales@time-step.com**

Scan Delay - Dave Cawley of Timestep offers the following comments:

"The scan delay time was designed to be adequate for most weather satellite users. Indeed it is variable and we could make it as long or as short as demanded, and for just an extra £5 we will do this.

We have had this receiver constantly in use for a long, long time, and we believe the time is spot on. With a crossed dipole antenna hidden in the trees, it stays locked here during a whole pass, or way distant METEORS over Egypt.

It is perhaps better to disable the scan altogether, and this can be achieved 'on the fly' by pressing in the mute button".

Readers' Pictures

Here, Lawrence presents a gallery of various submissions of WXSAT images from 'Info In Orbit' readers.

I receive a large number of pictures submitted by correspondents to 'Info', and sometimes wonder how the editorial team manages to squeeze in eight to ten pictures per edition! Some readers may have noticed that the column expanded an extra page some months back, in order to allow the pictures to be shown in a larger format.

Images finally selected each month are often those that help illustrate a particular topic. Many others are kept for several weeks - sometimes even months. When the Editor told me that the November edition was to be a 'WXSAT Special', my first idea was that this was an opportunity to include many of the pictures held 'pending'. Here are some of those images.

Fig. 1: NOAA image of 30 January from Gordon Train in Grenada.

Gordon Train has sent in several pictures, and on one occasion, sent many on a CD-ROM. One of those is shown in **Fig. 1**, taken during the time earlier this year when he was in Grenada. Gordon used a Cirkit MkI receiver (modified and tuned up) into a Toshiba 440CDX portable PC using *WXSAT 2.4*. The antenna was a cross-dipole made from coat hangers!

In early July, a heat-wave in Greece saw fires break out in Athens. They were rumoured to have been started deliberately. **Peter Schoen** of Helmbrechts in Germany was monitoring NOAA high resolution image transmissions and received **Fig. 2**, the channel 2 transmission on 4 July at 1544UTC showing smoke from the fires streaming out to the sea.

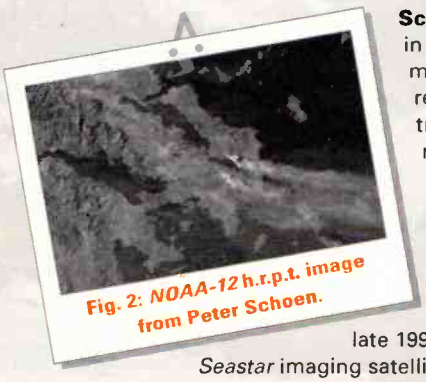


Fig. 2: *NOAA-12* h.r.p.t. image from Peter Schoen.

For a few weeks in late 1997, telemetry from the *Seastar* imaging satellite was left unencrypted to encourage organisations to buy a licence to enable routine decoding. People with h.r.p.t. hardware were able to make minor modifications to receive the telemetry, and Peter did so. By using Timestep's conversion program, he produced several SeaWiF images, including **Fig. 3**, an image showing the region to the north-west of Italy.

Fig. 4: *NOAA-14* Scotland h.r.p.t. image on 2 July from Roger Ray.

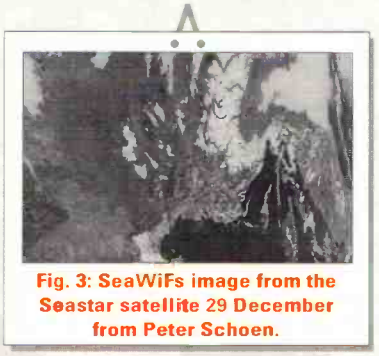


Fig. 3: SeaWiFs image from the Seastar satellite 29 December from Peter Schoen.

Roger Ray of Telford in Shropshire set up a German system to receive high resolution picture telemetry (h.r.p.t.) from the NOAA WXSATs. Roger's SSB/Orbit dish is mounted quite low, so this currently limits satellite coverage. A second computer continues his reception of a.p.t.!

Figures 4 and **5** show the different amount of detail (resolution) offered by a.p.t. and h.r.p.t. systems.

Fig. 5: *NOAA-14* UK a.p.t. image on 16 May from Roger Ray.

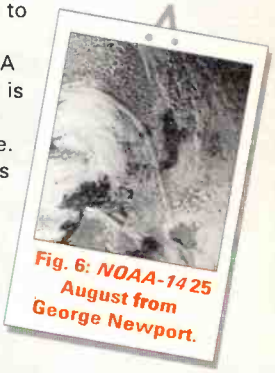


Fig. 6: *NOAA-14* 25 August from George Newport.

George Newport of Canterbury has often sent in high quality colour prints, obtained using the *WXSAT* software and adjusted in *PaintShop Pro*, then printed using an HP 850C printer. Like several 'Info' correspondents, George gave me the (welcome) problem of choosing between several excellent pictures, each of which could be used to illustrate topics in WXSAT reception.

Figures 6 and **7** show a large portion of two *NOAA-14* passes in August. The extent of the clear skies, which have been a feature of summer 1998 around the Mediterranean countries, can be seen.

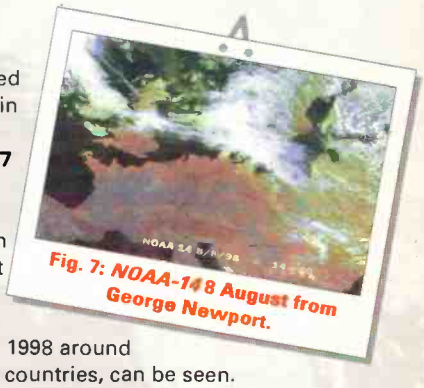


Fig. 7: *NOAA-14* 8 August from George Newport.

WEATHER SATELLITE SPECIAL WEATHER SATELLITE SPECIAL

Geoff Crabbe of Castlethorpe, Milton Keynes, was one of several 'Info' readers that I met during the RIG conference last May, and he sent **Fig. 8**, a *NOAA-14* winter image showing an unusual feature passing near the top of a cloud mass that is seen approaching the UK. The direction of travel is not obvious to me.

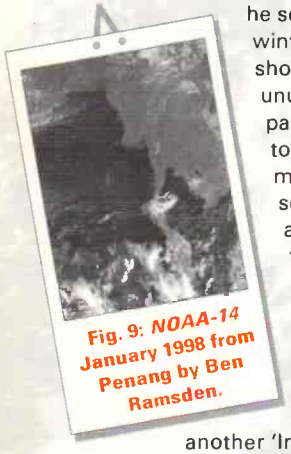


Fig. 9: *NOAA-14* January 1998 from Penang by Ben Ramsden.

Fig. 8: *NOAA-14* winter image from Geoff Crabbe, showing unusual feature.

Ben Ramsden is another 'Info' reader who has kindly provided WXSAT images obtained during visits to remote countries. While in Penang, Malaysia (west) during winter, he obtained this *NOAA-14* image, see **Fig. 9**.

Hank Brandli is a satellite meteorologist who was closely involved in the US Defence Meteorological Satellite Program (DMSP) in the early 1970s at Scott Air Force Base, Kennedy Space Centre. Hank has been receiving DSMP data for 22 years, and has sent me several images such as **Fig. 10**, a visible-light image taken at night! The lights of Paris, London and other major UK cities, as well as oil fields in the North Sea are revealed.

Fig. 10: DMSP image from Hank Brandli, courtesy USAF.

These images typically reveal sources of light such as cities and towns under clear skies. President Clinton has ordered the combining of the NOAA and DMSP (weather satellite) programs, and this will occur within a few years.

Finally, OK, its not a reader's image - its one from my early collection. *FENGYUN-2* was the second polar orbiting WXSAT launched by the Chinese. It's design was based on the NOAA WXSATs and transmitted images for some time before failing. **Figure 11** shows Spain and the Atlantic ocean, with a front approaching western France. ***SWM***

Fig. 11: *FENGYUN-2* image 5 September 1990.

■ PAUL ESSERY GW3KFE, NEWTOWN, PO BOX 4, POWYS SY16 1ZZ
■ E-MAIL: gw3kfe@pwpublishing.ltd.uk

Amateur Bands

A sad bit of news to start with this time. I heard of the death of Peter O'Dell G3MUM just too late for last month. Peter had been a radio amateur for many years. Speech difficulties and only the use of a toe to operate presented, in the 1950s, a challenge.

Peter's mother learned Morse in order to help him - hence the callsign and the nickname 'Twinkletoes'. Once on the air, his speech improved, and his Morse was good too. In the fullness of time his parents passed on and Peter found himself first in a Cheshire Home, latterly as GM3MUM, back on the air with help from REMAP on the engineering side. To those of us who knew of his disabilities he was an inspiration - if he can do it, we can!

The antenna systems here are now back in full operation. My XYL's son is UT7CT, and on a day of very poor conditions, an exchange of 59 reports on 14MHz seems quite passable.

The Mail

Richard Howard has been a short wave listener for some years and has recently discovered the amateur bands. Richard wrote with an s.a.e. from Northampton to ask about the times of the 3.650MHz GB2RS broadcasts. Try 0900, 0930 and 1800 local times on Sundays. For a full listing send an A4-size s.a.e. marked 'GB2RS list' to: **RSGB, Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.**

Now to the Morse-mode stuff as reported by **Ted Trowell** in the Isle of Sheppey. Ted tried 7MHz at 0500 for ZL2AFV and at 2100 for HF0POL in the Antarctic. 0600 on 10MHz was the scene for VK3AJ and VK3XU and 2000 for HF0POL again, 1A0KM, TK/S53R/P, SV8/HA0HW/P and SV9/I4UFH.

Up again and at 1500 OX3SA was noted with 1800 for JA5PL, 9K2ZZ and at 2100 JA2QXP, JA3KM and JA6GTA. More JAs around 1400 on 18MHz and at 1500 VQ9VK, JA2JMD, CU2/DL1HRE, 1A0KM, SO1DX/P for Wolin Is.

21MHz was the scene at 1500z for JE6TSP, LU7DIR, OD5PN, YB5QZ, 9V8YC, FR5BT, 4Z5AD and EP2MKO. At 2000 Ted recorded PY3DK, PY1ARS/4, LU9AY and YV4BMV. Mid-afternoon looks at 24MHz yielded PY2XB, 4Z5LF and VQ9VK.

Finally, 28MHz where at 1500 ZS1JX and PP2FN went into the log, followed at 1900 by OY3QN. On a rather different tack, Ted remarks that this year the apples are not so good, nor the tomatoes or beans. Perhaps where we have a day of rest the plants have a year of rest muses Ted. Though he doesn't say so I'll lay long odds his **weeds** are as prolific as ever!

John Collins wrote from Birmingham mentioning an S4 television documentary dealing with propagation, aurora, sunspots and whatever - sounds interesting. On a different tack, John listened to the Hurricane Net on 14.325 covering Georgia and N. Carolina at 2300, and again at midnight and 0100 with a very clear frequency and good signals.

The business of using headphones is referred to by **Michael Clarke** who E-mailed from Co Fermanagh, arising from September's piece. He says cheap headphones are often better than the hi-fi types, the reason being that they have a 'peaky' response which can aid copy of sideband or in particular c.w. signals.

Of course, one can argue that the cushioned comfort of the hi-fi 'cans' shut out any external noise more effectively! That being so, I suppose the best is to use comfortable hi-fi headphones and to modify their response to suit your own requirements.

For sideband reception, a serious top cut from around 2.5kHz upwards helps, and for c.w. one wants a sharply peaked response at around 800Hz - the precise frequency required is a function of the beat note used when the receiver's c.w. crystal filter switches in.

If there is only sideband filtration then one can, for c.w., adopt the old-timer's trick of using as low a beat note as possible. Using a beat note as low as 100Hz then another signal 100Hz higher is a full octave away at 200Hz on one side and zero-beat on the other. If your beat note is at 1kHz, then the other one is at 900 or 1100Hz which are *proportionally* much closer.

Our next letter is from **Ron Hastie** in Tedburn St Mary, Exeter, who notes that in his recent list of stations heard on 50MHz he said he was using a Super Scan Mark II active antenna which he attributed to Chris Lorek but which was in fact designed by Chris Barlow G8LVK.

Two letters from **Harry Richards** in Barton-on Humber. Harry found August 3 was particularly good on 14MHz around midnight, at 0030 4X4MU was dealing with a minor pile-up on his signals, and again the following night. WA2JVM was in contact with GI0IAJ and then EA3OT and W2ONV was also a very strong signal with his group including KC4PE on 14178kHz.

In his second letter, six days later, Harry notes that WA2JVM appeared to have turned into W2JVM. W2JVM, is not in issue according to the current *US Listings Call Book* so one assumes this was a case of mis-reading a gabbled callsign.

Now we come to the long list from **Paul Goodhall** in Oxford, which I've had to prune somewhat. Paul has been up to Scotland for holidays, which have set XYL Allison up so well that she has started to nag him again!

On 14MHz Paul noted CE7OXZ working AA1DX and Europeans, VK2CLB, EA7BA with VK5AEB, VK3AA, VK5AK, VK3ATG, VK7GK, AL7HA, AH7OK, VK3FFQ, AH7A, 8P6FN, VK2CD, 9K2/ZF6BD, VK5EE, VK7IK, VK3WZ, KN6BT, VK3WE, VK6AQM, VK3EW, VE5SM, VK6ADP, PR7RT, VE3ZDD, VK6JJ, K1UQV, VU2NGS, VK3CR, A61AQ, OD5/9K2MU, V21YA, ZL3RG, ZL2SQ, ZK1SKQ and many commoner callsigns.

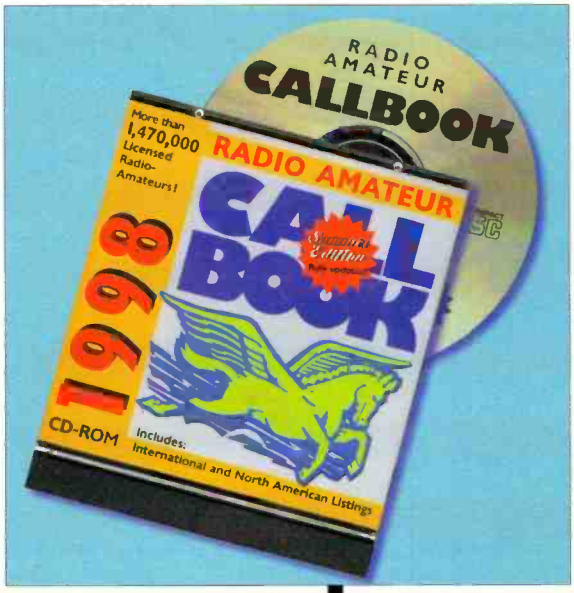
On Eighty, GM3VLB and the island-hopping crowd, where noticeably GM0HBF was having problems getting off Monach and GM3VLB/P was on Fidra. An interesting catch was WA2WVL working LU3LZW on this band. CO6BT and CO6BW in a net ZL2SQ, EA7JQ, J3OVP.

Turning to 7MHz, Paul found TI4CF, ZB2FE, CO6BT and CO6BW in a net ZL2SQ, EA7JQ, J3OVP, CO3JR, and then went up to 21MHz. Here the take included 9J2GA, 9M8RC, VKs assorted, 9V8WW, 9J2BO, W6ARX, HS0/G4UAV in Bangkok with a pile-up which included A45ZN, JA2PUP, 7J2YAF, ZL3VYT, and a gaggle of JAs.

Alan Bowen was our mystery contributor from last time and listens at the moment on a Yupiteru MVT-9000. So far though not even the manual has cleared up the mystery of the 'MHz' button at the bottom left. Anyone with sure knowledge can E-mail Alan at **Alsey@aol.com** - but my guess is that it simply shifts the receive frequency up or down by 1MHz.

Turning to the question of a transceiver versus 'separate', the DX operator using 'separates' would have *two* receivers and would be listening on the DX transmit frequency with whichever gave the best copy. Using a transceiver such as, for instance, my TS-440, it seems to the operator as if he had two receivers **but**, they are both the same of course.

Against that, when you are properly tuned into a station then a single-channel contact can proceed. With separates one must go through the netting routine before business can commence so most people prefer a transceiver.



The joint International & North American Callbook is available on CD-ROM from the *SWM* Book Store.

Forthcoming

It is understood that A41FK has applied for permission for a DXpedition to Yemen and Socotra. Maldive activity by a European group as 8Q7IQ(YLs) and 8Q7IO(OMs) between October 18 and November 5 is forecast.

Activity from Eritrea, possibly between November 3 and 18 is forecast, given that licensing can be organised. Rumour has it that the proposed expedition to Rodriguez will now be in January 1999.

Finale

That's my lot! Letters to reach me by the first of the month as usual, either at Box 4, Newtown Powys SY16 1ZZ, or E-mail to **gw3kfe@pwpublishing.ltd.uk**

■ GRAHAM TANNER, 64 ATTLEE ROAD, HAYES, MIDDLESEX UB4 9JE
■ E-MAIL: ssb.utils@pwpublishing.ltd.uk

SSB Utilities

Typical. As soon as I put something in print, it all changes. I guess that I'm not as lucky or clever as I thought I was! Looking back at the article about Reach callsigns ('Reaching Out', June 1998 issue, pages 42 to 48) there is a map of the USAF GHFS stations on page 44, and a list of their h.f. frequencies on the top of the next page. The map and frequency list both contain entries for MacDill GHFS which is on the Gulf Coast of central Florida, however, that particular station ceased operations during the summer.

The final transmissions from MacDill GHFS were on 30th June, when the radio operators at MacDill spoke to the operators at Andrews GHFS, and the transmissions went something like: "MacDill Global to Andrews"

(Andrews replies);

"MacDill Global requests permission to secure from the net";

(Andrews authenticates MacDill from the net);

"This is MacDill Global signing off permanently after 50 years of service on 0000 Zulu 1 July 1998".

The closure of the MacDill GHFS station is most probably just another part of the USAF conversion to the 'Scope Command' system. Scope Command uses remote transmit points all over the world which are controlled from a 'centralised dispatch'. This is similar to the way that the UK maritime MF frequencies are centrally controlled from a few sites.

Staying with the GHFS, I personally heard Hickam GHFS during mid-September on several consecutive days, usually between 0630 and 0715UTC. This is the first time that I have heard them directly, so now I have heard all the GHFS stations since the start of the year. It is also another good sign that propagation is on the increase and that this sun-spot cycle is starting to get going.

Hurricanes

The first letter this month is from **Richard Patterson** who has several questions. At the end of August he was listening to 11.175MHz and heard Andrews GHFS talking to an aircraft with the callsign 'Teal 06'. The aircraft was being connected to a radio station (possibly 'ABC Public Radio') and providing a live broadcast as they flew into a hurricane.

Richard wants to know a bit more about this. He has already done some of his own research into this, but asks if I can explain a bit more. He found the 'Teal' callsign in the *Callsign 98* book, but wants to know what a 'WC-130H' is.

Well Richard, the US Air Force has a squadron which is dedicated to the tracking of hurricanes and other extreme weather phenomena. They are the 53rd Weather Research Squadron and they are based at Keesler Air Force Base near Biloxi in the US state of Mississippi.

The squadron has a nick-name - they are known as the 'Hurricane Hunters', which pretty much explains what they do. They are involved in research into the internal working of hurricanes, and also tracking them so that their course can be plotted and predicted. This allows the relevant coastal agencies to plan evacuations and other emergency procedures. The aircraft flown by the Hurricane Hunters is a variant of the Lockheed C-130 Hercules - this particular variant is specially adapted for its weather research mission, and therefore carries the designation 'WC-130H'.

Whenever hurricanes are detected in the Atlantic, they are tracked by these aircraft, and they often fly into the 'eye' of the storm to measure all kinds of weather parameters. A few years ago, one enterprising radio station thought that it might be a good idea to try to arrange a live radio link-up to one of the aircraft as it flew into the storm. This was quite successful and over the years it has become quite a common event.

However, nowadays, there is hardly a single hurricane which does not result in a 'live' broadcast. Since these hurricanes are usually quite a long way from land, the link-up is made via h.f. radio, which means that almost anyone can listen-in to the action as it happens.

The broadcast heard by Richard was an aircraft flying into *Hurricane Bonnie* during late August. If you have access to the Internet, you can find a lot more information about this Squadron and hurricane hunting in general. The 815th WRS have a web page - **http://www.hurricanehunters.com** which contains a lot of background information, details of current hurricanes and even a flight schedule for their aircraft whenever they go out 'hunting'.

A WC-130HH flying in clear weather. (USAF photo).

Antennas

The next request from Richard Patterson's letter is for some information about some aerial sites that he has been past recently.

The first of these, Richard lists as a 'Government Comms Station' near Bicester in Oxfordshire. The actual location is just outside the village of Poundon, which is between Bicester and Steeple Claydon. It is even marked on my road atlas as 'W.T. Station'. Richard says that he has never seen any mention of this site in print and wonders what it is used for.

Well Richard, I also have never seen anything in print, but if it is listed as a 'Government Comms Station', I suspect that it may be one of the many antenna sites dotted up and down the country used for 'government purposes' (i.e., GCHQ?).

I have a vague idea that there are some similar antennas at Hanslope Park, just north of Milton Keynes, so maybe they are connected. However, if anyone knows what the site at Poundon is used for, or any frequencies for it, I'd like to hear from you.

The other site that Richard mentions is up in the north-west. Between Preston and Blackpool is a small village of Freckleton, and just outside the village are a number of antennas which Richard is interested in.

I have been told that this is actually HMS *Inskip*, but it would be nice to get confirmation of this. Apparently, this is a Royal Navy installation, so it is probably involved in communications with ships and submarines.

Squadron patches from 53rd Weather Research Squadron - The Hurricane Hunters.

DX-394

Following my coverage of the Tandy/Radio-Shack DX-394 receiver a few months back, **Alan Burnett-Provan** writes to ask for some advice about his next receiver. He currently uses a Yaesu FRG-7000, but is considering changing it for a Yaesu FRG-8800 - but he's seen all the comments about the DX-394 and wonders whether to chose either that or the AKD Target HF3. Alan wants to try to decode some NAVTEX, but his current FRG-7000 only tunes down to 590kHz and he needs to get down to 518kHz.

Well Alan, unfortunately I have not really used any of the receivers that you mention, so my comments are based upon comments made about them by friends. One friend told me that the selectivity of his Target HF-3 was not too good, and that he was able to hear signals from adjacent s.s.b. stations several kilohertz away.

This means that if you are trying to decode a weak NAVTEX signal, it may be swamped by other signals. On the other hand, the FRG-8800 is quite a few years old now and the HF3 and DX-394 are more modern and the advancement of technology means that either of these may be better. *(You can find reviews of both these receivers in* SWM *back issues. The AKD Target HF3 is featured in* SWM *in November '96 and the Tandy DX-394 was reviewed in the April '98 issue of* SWM. *Copies of both reviews are available from the* SWM *Book Store* - **Ed.**).

If anyone has some definite ideas about either of these two receivers, and why one should be chosen rather than the other, please write in so that Alan can have the benefit of your wisdom.

■ PETER BOND c/o EDITORIAL OFFICES, BROADSTONE ■ E-MAIL: milair@pwpublishing.ltd.uk

MilAir

August was a relatively quiet month for letters so you must all have been enjoying your summer holidays, (or more likely driving hundreds of miles around the airshow, circuit!). Don't forget to send in any Milair information you noted in your travels.

Scorpion Ops

Two readers have been in touch to identify the Scorpion Ops Frequency heard in use at Mildenhall. It appears that the frequency **362.55** was a temporary allocation for use by the EC-130H's from the 43rd ECS based at Davis Monthan. They used the frequency whilst on temporary deployment to Mildenhall during exercise Central Enterprise. Thanks to **Mark** and **Steve**.

Cat Or Hat?

I seem to have opened a bit of a can of worms regarding the Mildenhall, 352nd Special Operations Group operations callsign, Blackcat/Blackhat. The postal score at the moment is Blackcat 6, Blackhat 5. Various theories have been put forward as to the correct callsign.

As I stated in a previous column, I had assumed it to be Blackcat due to the cat insignia on the Squadron Commanders vehicle but it seems our readers have other ideas. As a consequence, I have now written to those in the know and I shall report back my findings, hopefully with information direct from the horses mouth!

SELCALs

I hope Graham doesn't mind me drifting slightly into his utility territory but is does relate directly to 'MilAir'. **Bill** from Edinburgh and **Justin T.** are both fairly new to military airband listening and want to know a bit more about SELCALs, and in particular whether military aircraft use them as well as civil.

When aircrews are on long flights for example across the Atlantic Ocean, it is not ideal or practical for them to constantly monitor their radio. This is where the SELCAL system comes into its own and is utilised as an aid to communications.

Aircraft flying across the North Atlantic will be controlled on h.f. by one of the four primary Oceanic Control Centres, they are Shanwick, Gander, New York and Santa Maria. The SELCAL is used as an alerting device to indicate to the crews that the Oceanic Centre wish to communicate on the allocated h.f. frequency.

Each aircraft is allocated a four letter code which when transmitted produces a two-tone signal in the cockpit, this is the distinctive 'Bing-Bong' sound that can be heard whilst monitoring h.f. The four-letter code is split into two pairs and each of these two pairs must be in alphabetical order, i.e. AGCE or DJAB. (Before the letters start to pour in regarding this comment, I would just like to point out to readers that I am aware that there have been reports of SELCALs being noted in use out of the alphabetical sequence).

The same four-letter code can be allocated to more than one aircraft, although they are in theory issued to aircraft that are likely to operate geographically in different parts of the world. This is to minimise the chance of a code confliction taking place. Nevertheless, this has been known to happen.

Military aircraft are issued with SELCALs but as a general rule it is only the cargo and personnel type transport aircraft. The RAF has SELCALs allocated to the following types, VC-10, Tristar, C-130, HS25/Dominie plus the BAC146 of the Queens flight.

Surprisingly, what limited records I have, indicate that very few of the US military aircraft carry selcal equipment. The Boeing 747 variants, VC-25 and E-4 used by the president are fully equipped (not surprisingly), as are some EC-135s. Considering the many long journeys they make around the world and especially across the Atlantic, as far as I am aware the C-141 Starlifter and C-5 Galaxy do not appear to be selcal equipped.

Many other air arms also have transport aircraft selcal equipped - for example, German Air Force C-160 Transalls and Airbus A310 plus the French Air Force have equipped many of their various Falcons (50/900). These are obviously only examples, the full list of world-wide military aircraft is presumably quite extensive.

When To Listen?

Adam is one of our younger readers and he has recently started listening to the military airbands, he asks when is the best time to listen in to military aviation - a leading question? There is no definitive answer, but to generalise weekdays between 0800 and 1400 are always a good bet.

As a general observation, RAF airfields tend to be quieter in the afternoons and at weekends. In fact, during the cold war it was often jokingly said that if the Russians were to invade, around one o'clock on a Sunday lunchtime would probably do the trick! The USAF at Mildenhall and Lakenheath can be busy at any times including the weekend, although weekday mornings are again favourite.

Subscription to one of the aircraft enthusiast magazines can also help as they often list airshow and air exercises. If you are in the area, tuning in before and during these events can often give some worthwhile listening.

Milair On The Net

I have received several pieces of correspondence regarding sources of Military Aviation and Communications information on the Internet. This is an ever-expanding area of interest, which on occasion can be a bit of a minefield.

If we look at the World Wide Web, whilst there are a lot of interesting sites there are also some poor sites and some with dated information. In the past I have been sent Web addresses to browse, which supposedly contain the ultimate u.h.f. frequency lists. On checking them I have found they are years out-of-date and full of obsolete information.

Whilst there are quite a few aviation related sites, there are actually not that many Web sites that list detailed v.h.f./u.h.f. frequency information - especially for the UK. If you do go in search of frequency/callsign information, check to see if the site is regularly updated.

It always puzzles me why people go to the trouble of setting up a Web site and then when you interrogate the site you find the comment, last updated 3rd April 1996!

In future 'MilAir' columns I shall include any Web locations of interest, so please let me know of any good sites you find. To start you off, the Dutch Aviation Society who publish the magazine *Scramble* can be found at **http://www.scramble.nl/** This is a very good site with loads of aviation information.

Have a look at the Scramble Intelligence Service for a good overview of the current European aviation scene. Oh! - no need to panic, it's written in English.

Our photograph this month is 57+04, a Dornier 228 of MFG-3/German Navy arriving for the 1998 Yeovilton Airshow. That's all for this month - don't forget to let me have any latest London Military frequency/transmitter information for inclusion in a future column.

A Plea

Lastly, I hope you don't mind but I have included a brief note to help a long-standing friend who is now disabled. His car, which is specially converted for him to drive, was broken into at the RIAT at Fairford this year. His vehicle was immobilised and consequently safe but unfortunately his car radio and his scanner, Icom IC-R100, were stolen. He has tried in vain to replace the Icom but without much luck, it seems they are quite rare second-hand. If anyone has an IC-R100 they wish to sell please contact me via *SWM* and I will put you in touch with him - thanks. See you next month.

GODFREY MANNING G4GLM , C/O THE GODFREY MANNING AIRCRAFT MUSEUM, 63 THE DRIVE, EDGWARE, MIDDLESEX HA8 8PS

Airband

Technological developments enable such rapid changes in navigation. Where will it end? Are some of the changes accepted because they are cheaper, rather than better? For example, d.m.e. is here to stay, but v.o.r. is under threat!

At least I see from *GASIL* 4 of 1998 that the 130-plus n.d.b.s in the UK are to be retained. Good news for light aircraft pilots relying on simple equipment. Also reassuring for the enthusiasts who investigate propagation by trying to receive these beacons over unusually great distances.

Propagation

What performance can be expected at various frequencies? The mainstay of communications in our part of Europe is v.h.f. This wavelength mainly travels over line-of-sight paths. Actually, it goes slightly further than expected as if the Earth's curve was to a greater diameter.

Sometimes there are atmospheric conditions that enable the signal to go much further. The old 405-line television was plagued by these effects in good summer weather, continental transmitters then causing mutual interference. (Old system? Some of my younger work colleagues have never heard of it. They think that TV was always in colour. It's me that's getting old!).

Going towards the other end of the spectrum, we find the n.d.b.s on m.f. These long wavelengths twist and turn round obstructions and can follow round the earth's curved surface for a short distance. They are not able to penetrate the ionised atmospheric layers and so reflect back down to ground at some distant point.

Or do they? Well, yes they do - at night. In the day it's different. One of the lowest ionised layers, the D layer, actually absorbs m.f. signals. They shoot up towards the sky, only to be lost in the D layer, never to return. The ionised layers form under the influence of the Sun's energy.

At night, with no direct sunlight, the D layer disappears. Now the m.f. signals can go on up to the F layer from where they reflect back to the ground. So, listening for a distant n.d.b. is done at night. Quite a challenge as all manner of nearby interfering signals are also arriving from great distances.

Yet, as I said above, the authorities want to keep n.d.b.s even though v.o.r. might be phased out. The trouble with n.d.b.s is that the m.f. signals twist and turn, as well as arriving from great distances at night. This confuses direction-finding equipment.

The v.o.r. is not subject to these problems, being on v.h.f. Even light aircraft are commonly equipped with v.o.r. receivers these days. So, I ask, why not also retain the useful v.o.r. beacons, if necessary at the expense of the less reliable n.d.b.s?

Receiver Hardware

If propagation plays tricks, then so can radio sets. The worst problem is hearing signals that aren't there. No, not an hallucination - there are predictable errors in the working of radio receivers that cause these so-called spurious responses.

In September, I conjectured that a signal on 128.525 might appear on a receiver at 150.225MHz because of image response. In this example, the receiver is tuned to 150.225 where the band is quiet. However, a strong transmission (actually on 128.525) is received.

For this to happen, the receiver's intermediate frequency would be 10.85MHz and the local oscillator would run below signal frequency (in this case, 150.225 - 10.85 = 139.375MHz).

What happens if poor front-end selectivity allows the 128.525 signal to mix with the local oscillator? Answer: 139.375 - 128.525 = 10.85MHz, the i.f. which is then resolved by the radio.

This does make assumptions, as **George Fisk** (South Shields) rightly points out. For example, the i.f. here is 10.85 which is not quite the more conventional 10.7MHz, further, the local oscillator is below signal frequency whereas many sets run it above signal frequency.

Yes, there are other ways in which spurious responses occur. A read of many of John Wilson's articles in recent issues of *SWM* will reveal more. The main culprit is strong off-tune signals mixing in the receiver to cause spurious products. Harmonics of signals and even of the local oscillator also play a part.

With synthesised receivers, such as scanners, it gets worse. The local oscillators often don't produce a pure signal, so it's as if several closely-spaced oscillators are all trying to mix with the signal at once.

With so many possibilities, I can't be certain as to exactly which effect could cause a (presumably spurious) 150.225MHz response.

Radio Procedures

On sighting an oil slick, or a ship discharging oil, a pilot should alert a suitable Air Traffic Service Unit who then pass the information on to the proper authority. The official procedure is to call as in the following example.

'London Information, Shortwave 198, Oil Pollution Report. Oil slick five miles south Lands End this time, two miles long, tanker discharging oil, high tide, wind calm, visibility good, sea calm, over.'

Can aircraft report this directly to the Coastguard? When I took the radio exam, no mention was made of this. I have an obscure reference in some notes about 135.65MHz being available for air-to-shore. Now **C.R. Holme** (Bournemouth) asks if 132.65MHz is also included. I've never had any experience of this, can anyone tell us more?

The London Airways frequencies are hard to keep track of! The best recommendation for those interested, such as **R. Hubbard** (West Byfleet), is to consult the latest Aerad *En-Route Supplement* Europe & Middle East. Now sold by Racal, ordering details appear on my *Airband Factsheet*.

I don't have a photocopier, so you **can't** get the *Factsheet* from me! But it's free of charge if you send a reply-paid self-addressed envelope, to hold two A4 sheets, to the Broadstone Editorial Offices address.

As the *AIP* should also carry the information, this could be consulted as an alternative source - although not as easy to read. I don't propose that readers buy one, they're too expensive, but your local flying school or club should have a copy. A respectful request would usually gain you permission to browse.

Unfortunately for R.H., the CAA won't allow me to list frequencies by control sector for the London FIR. It's not for the want of asking! However, Scottish airspace is different

Abbreviations

AIP	*Aeronautical Information Publication*
a.t.i.s.	automatic terminal information service
CAA	Civil Aviation Authority
d.m.e.	distance measuring equipment
FIR	Flight Information Region
FL	flight level
GASIL	*General Aviation Safety Information Leaflet*
i.f.	intermediate frequency
kHz	kilohertz
m.f.	medium frequency
MHz	megahertz
n.d.b.	non-directional beacon
v.h.f.	very high frequency
v.o.r.	very high frequency omni-directional radio range

Mooney F-GHBJ.
Christine Mlynek.

and I did indeed print a list in the May 1997 issue. If you want a repeat, write in and tell me.

I like the way R.H. refers to airways by the old names that I also remember, such as Green One. Here I go again, showing my age. Recent airways wouldn't correspond to a colour, try UN866 for instance.

Now, R.H., you ask for more detailed information but I'm afraid that you weren't specific enough. For example, overflights from the Atlantic to France. Which route(s) are you referring to? I can tell you frequency by airway, as this information is published. To do that, I need to know which airway you mean!

I am guessing that the airways running overhead your area are as follows. Midhurst-Lambourne: UR1. Midhurst-Brookmans Park: UR123. This should be covered by 127.425, 129.425, 132.45, 132.6, 135.05, 135.425 and 136.6MHz. Again, I assume upper airways (above FL245) as you haven't told me otherwise. The Aerad charts for the sector are *H201* (upper airways), *EUR1/2* (lower airspace) and the *London Area Chart*.

Frequency & Operational News

Information from the CAA is either provided by **Martin Sutton** or else extracted from *GASIL* 4 of 1998. As usual, I summarise much lengthier official documents. If you need further details, write in and ask me - but always remember to state which month's column you are referring to!

Aerodromes: New runway at Bourn is 06/24. Dunsfold Radar, originally 135.175, is now 122.55MHz. Southampton loses Tower/Approach 131.0MHz.

Airspace: Salisbury Plain danger areas D123/4/5/6/8 are notified by a a recorded Danger Area Activity Information Service 122.75MHz. In fact, this is called an a.t.i.s. as it is recorded, but it doesn't refer to a terminal of course.

Danger Area D020 is withdrawn. On certain routes above FL195, aircraft will be handed off to Danish control before reaching the FIR boundary.

Airways: There must be a rational reason for re-numbering so many airways. I don't think they do this just to confuse magazine columnists!

Anyway, I'll try to summarise a lengthy piece of information. (U)A37 is re-designated (U)M604, B2D becomes P600D and part of UB2 becomes UP60, (U)R41 is now partly (U)N866, UR4 is now partly UL603 or UL975, UR23 becomes UL983, part of UW551 is now UN866. Hence, UM604 and UN866 share a common section.

Beacons: A new n.d.b. is BRR at Barra 316kHz, a fresh challenge for those of you who look for these when assessing long-distance medium-frequency propagation. At Berry Head, the v.o.r. moves from 112.7 to 112.05MHz, so the new d.m.e. reply will be 1144MHz.

Farnborough has new localiser I-FNB 111.55 with d.m.e. (response 1139MHz) on runway 25, in time for the airshow. The Wick d.m.e. WIC (response: 979MHz) is withdrawn.

Reporting points: Withdrawn are BOWES, BUKEN, GATER and GERPA. New ones at FIR boundaries are RAPIX (on UG39), XAMAB (on (U)A1), XAMAN (on (U)R1). Other new ones: FIMLI, HOGBA and TOMMO, a new hold for Heathrow arrivals via Ockham.

Standard Terminal Arrival Routes: So, Heathrow has new Ockham procedures TOMMO 1A, 1B, 1C, 1D, 1E, 1F, 1G and 1H.

All letters/information received up to September 8 have been answered/included. The next three deadlines (for topical information) are November 9, December 7 and January 11. Replies always appear in this column and it is regretted that **no** direct correspondence is possible.

Taylorcraft BC-12D.
Christine Mlynek.

Reader Offer

***Airband Factsheet*:** To get your copy, send a reply-paid self-addressed envelope to: ***Airband Factsheet, Short Wave Magazine*, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.**

■ JACQUES D'AVIGNON VE3VIA ■ E-MAIL: jacques@pwpublishing.ltd.uk

Propagation Forecasts

How to use the Propagation Charts.

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

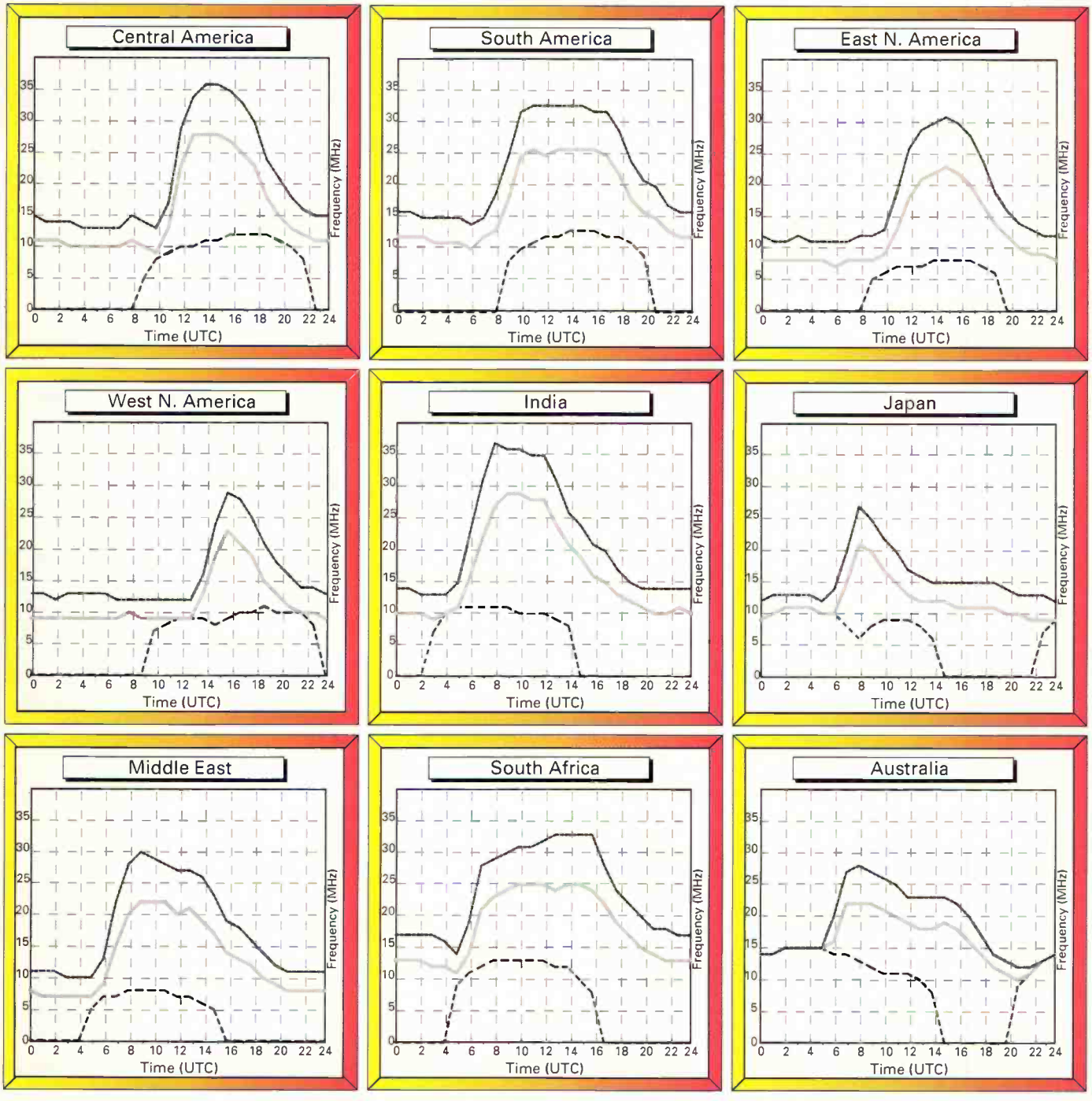
The middle line indicates the optimum working frequency (OWF) with a 90% probability of success for the particular path and time.

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

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

Good luck and happy listening.

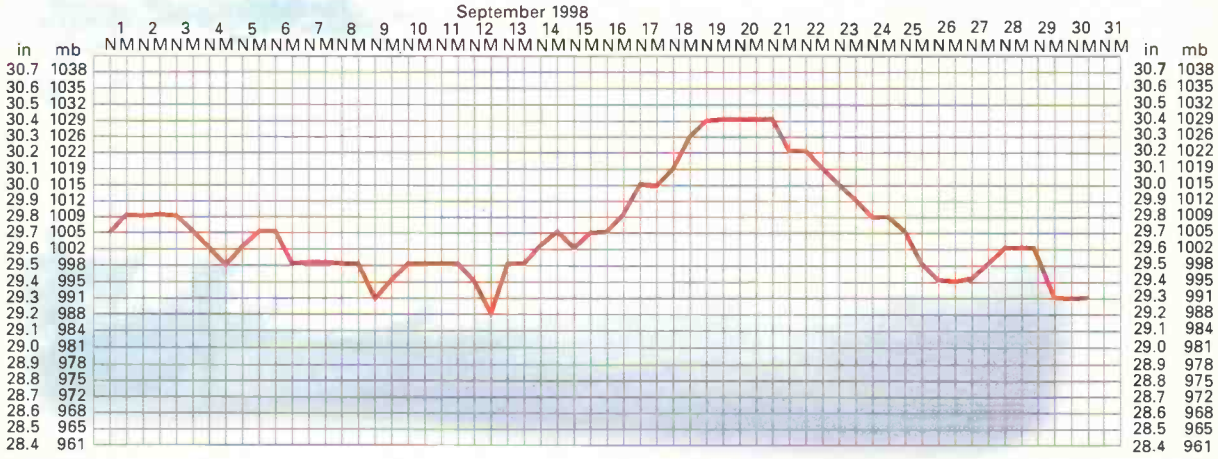
November 1998
Circuits to London

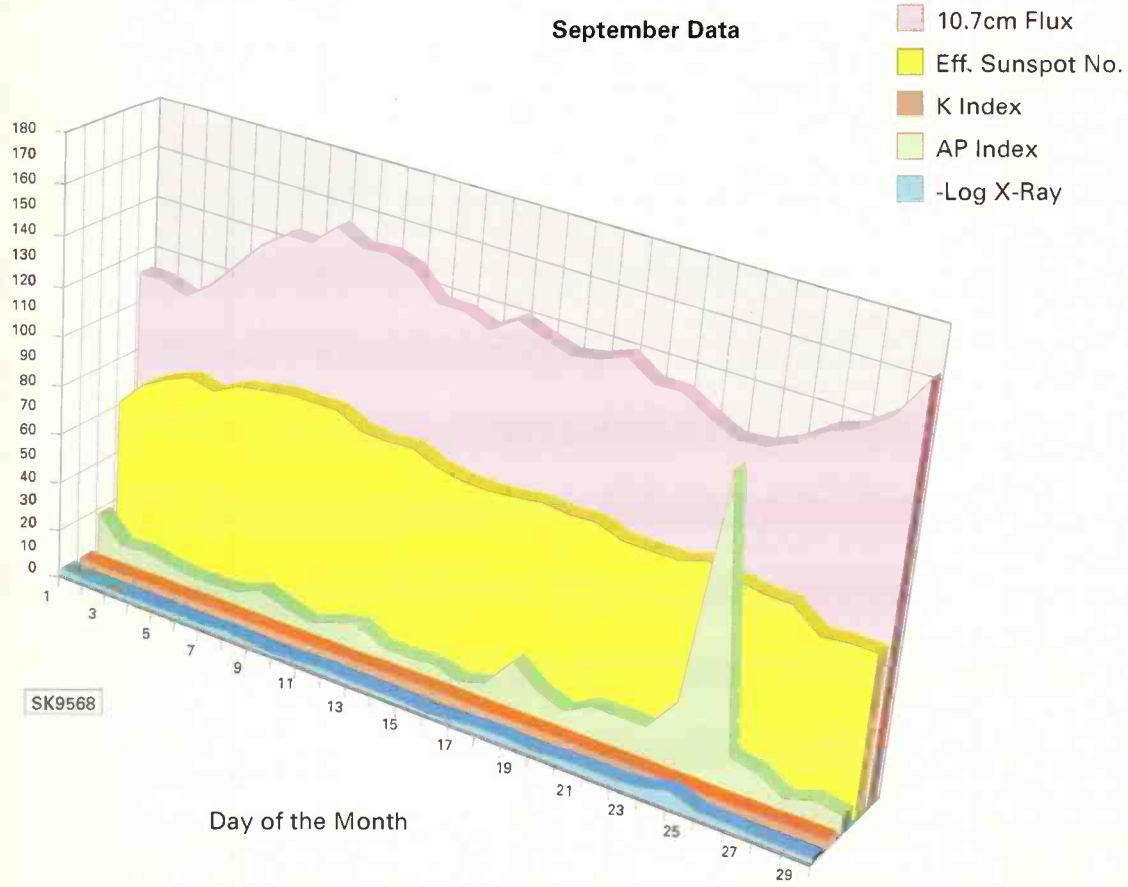


■ KEVIN NICE G7TZC, SWM EDITORIAL OFFICES, BROADSTONE ■ E-MAIL: kevin@pwpublishing.ltd.uk

Propagation Extra

Ron Ham's barometric pressure chart, taken at Storrington, W. Sussex, September 1998.





guide to the chart

The 10.7cm solar radio flux is used as an indicator of the general level of solar activity.

The K and AP indices are measures of geomagnetic activity.

The K index ranges from zero (very quiet) to nine (severely disturbed).

K values of five or greater correspond to geomagnetic storm conditions that can relate to poor propagation conditions.

The AP index ranges from 0 to 400. An AP of 30 is the threshold for geomagnetic storm conditions.

KEITH HAMER & GARRY SMITH, 17 COLLINGHAM GARDENS, DERBY DE22 4FS

DX Television

August was yet another remarkable month for Sporadic-E activity. Reception occurred daily with the 14th, 15th and 16th being the most productive dates. A tropospheric opening produced signals from Scandinavia, Éire, France and the Benelux countries between the 7th and 12th. The Perseids were active around the 12th with various meteor-shower 'pings' in Band I, mainly from Scandinavia. All-in-all, quite a busy month for TV DXers!

Readers' Reports

The rather elusive Tirana outlet of Albanian TV (RTSH) on Channel C (82.25MHz) was identified twice during the month. **Stephen Michie** (Bristol) saw it at 1240UTC on the 16th while **Simon Hockenhull** (Bristol) received it at 1145UTC on the 19th. In both instances, a boxing event was being transmitted.

Latvia has been successfully identified for the first time this season on the 15th by **Richard Reynolds** (Guildford) who noticed the TV-2 sign-on logo at 0710. The station was received later by **Vincent Richardson** (Conwy) using a 'LATVIJAS TV2' caption followed by a weather report at 1550.

On the 10th an intense tropospheric opening produced Scandinavian DX for **Peter Barclay** (Sunderland). On Channel E4, a station thought to be TV2 from Bokn was received but with an updated logo. The '2' was in a box situated in the lower-left of the picture.

Norway has not abandoned the test card just yet! On the 16th and 17th **Peter Barber** (Coventry) logged the PM5534 showing transmitter locations from the following sites: Melhus E2, Bagn E3, Hemnes E3, Bremanger E4 and Hadsel E4. Peter also reports a mystery 'disc' test card on Channel E2 lurking beneath RTP-1 on Channel E2 at 0752 on the 16th.

Richard Reynolds (Guildford) reports RTE-1 from the Gort transmitter on Channel B on the 9th, presumably received via Sporadic-E. A '1' logo was present in the lower left of the picture.

Stephen Michie (Bristol) identified RTE-1 and Network-2 broadcasts from Mt. Leinster on the 7th and confirms that on-screen logos are now in use. Network-2 displays a figure '2' enclosed within a circle. RTE-1 now broadcasts around-the-clock with 'Euronews' from 0500.

Tony Mancini (Derby) is back on the DX scene. A Beko multi-band colour TV receiver and a three-element chimney-mounted Band I antenna has been installed. The system seems to work reasonably well although strong interference from baby alarms over Channel RI is causing concern.

Tony queries a boxed '1' logo with what appeared to be 'SRG' below. This was initially logged as Switzerland. However, we can confirm that Switzerland currently displays 'SF-I' in the top-right of the screen. We have seen the 'SF-I' logo many times this season and **Kevin Bolger** (Dundee) noticed their 'SF-I' text pages at 0130UTC on the 16th.

Mysteries

A crop of mystery signals have been reported during the course of the month. On the 16th at 1937, Peter Barclay (Sunderland) became aware of a station with French sound co-channelling with Germany on Channel E3. A logo consisting of three letters with a horizontal bar through the middle was present in the lower-right of the picture. Earlier in the month, on the 4th at 0943, a weak signal emerged on Channel E2 consisting of colour bars but with indecipherable text or logo in the top-right.

During the recent bout of tropospheric activity, Peter spotted a new German station on Channel E46 featuring a logo resembling a figure '2'. Peter wonders if this could be RTL-2 being relayed by an NDR transmitter.

Peter has also received a twirling satellite antenna logo on Channel E36 from a Dutch regional station. This was recently identified by **Tom Crane** (Essex) as 'TV West'. Currently, TV West is confined to cable, so who else is radiating this programme?

Another odd sighting from the Netherlands was a PM5544 test card with 'TV2' at the bottom. This occurred at 1053 on the 10th and was preceded by a wide-screen version of the PM5544 with programmes scheduled to commence at 1105.

FM Reports

Tropospheric DX on August 6th produced a variety of distant UK transmissions for Simon Hockenhull (Bristol). These included local commercial stations from Croydon on 105.8, 106.2 and 105.4MHz at 0640UTC. During the same opening, unidentified French stations were heard on 107.1 and 107.5MHz.

On the 7th, strong French transmissions were heard on 87.9, 97.6 and 98.5MHz. Also, Irish stations from Mt. Leinster were identified as RTE-1 on 89.6MHz and RTE-2 on 91.8MHz. Simon is using a Roberts R817 receiver with only its rod antenna for DXing.

Between 1830 and 1945 on the 15th, an intense Sporadic-E opening produced Spain, Portugal, Italy and Germany up to 106.2MHz. On the 19th, the Eastern European f.m. band (formerly OIRT) was active between 1815 and 1840 with ten stations including one on 70.1MHz causing disruption to local fire services. Surprisingly no Band I TV signals were resolved during the opening.

Barry Bowman (Manchester) heard a Russian-speaking station on 87.70MHz at 0645 on the 15th which he could not identify. Around 1742 between 87.40 and 88.00MHz, various Portuguese stations were heard. The following morning, German and Hungarian stations were noted between these frequencies.

Mike Gaskin (Cornwall) reports possible short-skip Sporadic-E from Radio Humberside on 95.90MHz on the 16th. The signal took around ten minutes to attain a signal strength of 46dB and remained at this high level for a further ten minutes. An Arabic station was also heard which Mike suspects was of Libyan origin.

Logo Identified

In the September column, Fig. 5 showed an unidentified news programme with a logo in the top-left of the picture. This has now been identified as Belarus from the Minsk transmitter.

Service Information

Belgium: The RTBF-2 network now carries the identification 'LA DEUX' at the bottom of the PM5544 test card. Transmitter and channel details appear at the top, such as 'TOURNAI' and 'CANAL C63'. The second network has had several name changes. It used to be called 'Sports 21' and before that 'Télé 21'. The network is no longer encrypted.

France: In Eastern Paris a pirate TV station is on-air using Channel L36. A PM5544 test card is shown with the identification 'O.S.F' (Ondes Sans Frontière) and 'CANAL 36' below.

Germany: In the Berlin area, the satellite channel NTV is now available on Channel E51. The cable network in the city has eight channels devoted to digital TV.

All f.m. stations broadcast an RDS signal. Two stations (RTL on 104.6MHz and Energy on 103.4MHz) also broadcast weather and programme information as well as station identification. There is also a new f.m. transmitter relaying various satellite radio stations located in the Brandenburg region close to the town of Rangsdorf.

Netherlands: In the Amsterdam/Amersfoort area of Holland, both BBC-1 and BBC-2 are available via cable networks. The signals are received off-air in Calais and fed via microwave link. When programmes are not being distributed the networks transmit a Grundig electronic test pattern with identification.

The AFN-TV transmitter at Soesterberg appears to have closed as no signals could be received by an enthusiast when driving near the air base. The TV outlet used 525-line System M and was frequently received at u.h.f. in the UK on Channel A80 (approximately Channel E72!).

This month's Service Information was kindly supplied by **G. Scott** (Preston, Lancashire) and **Gösta van der Linden** (Rotterdam, Netherlands).

Keep On Writing!

Please send your TV and f.m. reception reports, news and information to arrive by the first of the month to:- **Garry Smith, 17 Collingham Gardens, Derby DE22 4FS.**

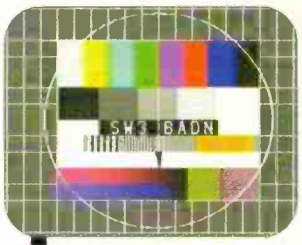


Fig. 1: The FuBK electronically-generated test card radiated by Südwest-3 from Baden Baden, Germany.

Fig. 2: The Philips PM5534 test card transmitted by RTT, Tunisia.

Fig. 3: An old favourite amongst TV DXers but now rarely seen. The monochrome 'EBU Bar' test pattern transmitted by NOS in the Netherlands.

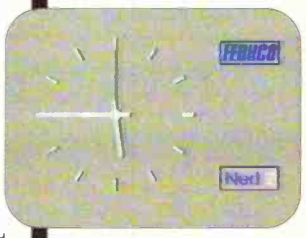


Fig. 4: Dutch clock caption preceding schools TV broadcasts.

Fig. 5: A pause caption during schools TV programmes in the Netherlands.

August Sporadic-E Log

The collective log includes reports supplied by Peter Barber (Coventry), Vincent Richardson (Conwy), **Barry Bowman** (Manchester), Richard Reynolds (Guildford), Peter Barclay (Sunderland), Stephen Michie (Bristol) and Simon Hockenhull (Bristol).

Day Log

1 Norway (NRK-1) E2; Lithuania (LTV) R2.
2 Italy (RAI UNO) IA; Spain (TVE-1).
3 Italy (RAI UNO) IA; Spain E3 and E4; Portugal (RTP-1) E3.
4 Spain E2, E3 and E4; Portugal E3; France (Canal Plus) L3; Sweden (SVT-1) E2; Norway (NRK) E2; Italy (RAI UNO) IA; Italy (VIDEO) E2; Italy (M NAPOLI) IA; Austria (ORF-1) E2a; Ukraine (YT-1) R2; Lithuania R2.
5 Italy (RAI UNO) IA and IB; Italy (M NAPOLI) IA.
6 Italy (RAI UNO) IA; Italy (M NAPOLI) IA; Estonia (ETV) R2; Ukraine (YT-1) R2; Lithuania (LTV) R2; Moldova (TVM) R2.
7 Estonia R2; Italy (RAI UNO) IA and IB; Italy (VIDEO) E2.
8 Italy (RAI UNO) IA; Italy (M NAPOLI) IA; Spain E2; Portugal E3.
9 Italy (RAI UNO) IA and IB; Italy (M NAPOLI) IA; Italy (VIDEO) E2; Corsica (Canal Plus) L2; Spain (TVE-1) E2, E3 and E4; Portugal E3; Éire (RTE-1) B.
10 Italy (RAI UNO) IA; Italy (M NAPOLI) IA; Italy (VIDEO) E2; Spain E2 and E3; Portugal E3; Croatia (HRT-1) E4; Germany (ARD-1) E2; Hungary (RTL KLUB) R2.
11 Norway E3; Portugal E3; Serbia (RTS-1) E3; Hungary (RTL KLUB) R2.
12 Italy (RAI UNO) IA and IB; Spain E3 and E4; Portugal E3; Sweden E3; Estonia R2; Denmark (DR-TV) E3.
13 Portugal E3; Spain E2 and E4.
14 Italy (RAI UNO) IA; Unidentified Italian private station on E2; Corsica L2; Portugal E3 and E4; Spain E2, E3 and E4; Sweden E2 and E3; Austria (ORF-1) E2a; Serbia E3; Unidentified Russian network on R2; Ukraine (YT-1) R2; Ukraine (YT-2) R2.
15 Italy (RAI UNO) IA; Spain E2, E3 and E4; Portugal E3; Norway (NRK-1) E3 and E4; Sweden E2, E3 and E4; Norway E2, E3 and E4; Estonia R2; Latvia R2; Unidentified Russian network R2; Ukraine (YT-1) R2; Serbia E3; Croatia E4; Hungary (RTL KLUB) R2; Lithuania (LTV) R2; Belarus (BT-1) R2; Czech Republic (TV NOVA) R1 and R2; Austria (ORF-1) E2a.
16 Spain E2 and E3; Italy (RAI UNO) IA and IB; Italy (M NAPOLI), also unidentified private station on IA; Italy (VIDEO) E2; Portugal E2 and E3; Norway E2, E3 and E4; Sweden E2, E3 and E4; France (Canal Plus) L3; Switzerland (SF-1) E2 and E3; Germany E2; Hungary (RTL KLUB) R2; Serbia E3; Croatia E4; Albania (RTSH/TVSH) IC.
17 Sweden E2 and E4; Norway E2, E3 and E4; Italy (RAI UNO) IA; Italy (M NAPOLI) IA; Spain E4; Portugal E3; Hungary (RTL KLUB) R2.
18 Spain E2, E3 and E4; Portugal E3; Italy (RAI UNO) IA and IB; Croatia E4; Serbia E3; Italy (RAI UNO) IA and IB; Italy (M NAPOLI) IA; Italy (VIDEO) E2; Corsica L2; Lithuania R2; Unidentified Russian network on R1; Hungary (RTL KLUB) R2; Norway E2, E3 and E4.
19 Italy (RAI UNO) IA and IB; Italy (M NAPOLI) IA; Italy (VIDEO) E2; Corsica L2; Spain E2; Germany E2; Slovenia (SLO-1) E3; Croatia E4; Albania (RTSH) IC; Norway E2, E3 and E4; Unidentified Russian network on R2 and R3; Sweden E3; Estonia R2; Hungary (RTL KLUB) R2.
20 Rumania (TVR-1) R2; Italy (M NAPOLI) IA; Italy (VIDEO) E2. Czech Republic (TV NOVA) R1; Serbia E3; Italy (RAI UNO) IA; Italy (VIDEO) E2; Portugal E3; Spain E2.
21 Serbia E3.
22 Denmark E3.
23 Portugal E3; Spain E2; Italy (VIDEO) E2.
24 Italy (RAI UNO) IA; Spain E2; Hungary (RTL KLUB) R2.
25 Denmark E3.
26 Denmark E3.
27 Denmark E3.
28 Spain E4.

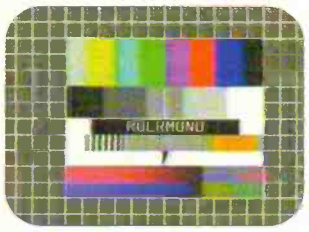


Fig. 6: The FuBK test card from the Dutch transmitter at Roermond, received in the UK during enhanced tropospheric conditions.

Fig. 7: The Philips PM5544 electronically-generated test card broadcast by the French-language TV service in Belgium.

Fig. 8: This month's 'Down Memory Lane' feature. This logo was used by ATV in the Midlands during the Seventies.

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Decode

Let's start this month by tackling a few readers' questions. It seems that lots of you enjoyed the Decode special issue a couple of months ago. The feature has also attracted some new listeners and for these the adventure into data decoding has sparked lots of questions so I'll try and tackle some of them here.

By far the most common question is an old chestnut of how to capture those first signals. Nearly everyone who writes with this question reports that they've managed to decode Morse okay, but have had no luck at all with the other modes.

This is interesting because Morse is actually quite a difficult mode to decode and generally requires accurate fine tuning and a degree of patience to get good results. So if you can receive Morse that's a very good step because it means you already have some of the main skills required to decode all the other modes.

In many cases the missing ingredient is a trained ear. I know I've mentioned this before in the column, but learning to recognise data signals from their sound on an s.s.b. receiver is a great time saver.

They even have Teleprinters in space!

When I'm tuning around the bands I find that I search by ear probably 90% of the time, it's only when I find what sounds like the signal I'm looking for that I switch-in the decoder. I expect you will find this is the case for the vast majority of experienced listeners.

Now you might think that having a good frequency list will solve all your problems - wrong! This is because the utility sections of the h.f. bands are usually pretty busy and when you tune-in to the frequency shown in your frequency list you can more than likely hear two or three data type signals of which one is the station you're after and the others could be totally different systems.

If you know the sounds of the different systems, finding the one you're after is dead easy, but if you don't, you can get in a real muddle very quickly. Training your ear to recognise the various systems is not at all difficult and like all things worth doing, just requires some regular practice.

The trick is to start with the basic systems. I suggest the first one to learn is good old 50 baud RTTY. One of the best places to tune to for this is the Hamburg met 24hr coded weather transmissions on 7646kHz.

Now, don't think you have to sit there intently listening to the signal. I suggest you leave the signal running in the background whilst you get on with doing something else like trying some home-brew. I've always found that this simple technique is a very effective way to get familiar with a repetitive sound.

Now, in addition to learning the rhythm of RTTY, if you listen carefully you will note that it stops from time-to-time and drops back to a single tone rather than the normal alternating sequence. This is a very important feature of the signal and clearly identifies it as an asynchronous signal.

Another pattern you may begin to recognise is the special sound created when the station is sending a continuous stream of RYRYRYRYRY. You may ask why do they do that and I'll just quickly divert to explain that.

Back In Time

Back in the early days of Teleprinter based communications, electro-mechanical relays were used extensively to handle the signals as they passed through the communications networks. Being electro-mechanical, these relays required regular adjustment to keep them working properly.

In particular, the high-speed Carpenter relays needed adjustment to minimise any distortion of the signal. This distortion came in the form of changes in the mark to space ratio of the signal. By this I mean that if the signal was alternating evenly between a mark and space (the two tones of the RTTY signal) the signal at the end of the link remained evenly spaced between marks and spaces.

This type of setting-up used to be done with a device known as a TDMS (Transmission Distortion Measuring Set) which could inject an accurate 1:1 signal at the start of the link and then check the 1:1 accuracy at the end of the link. The engineers could then adjust the relays in the route for minimum distortion.

As these measuring devices were very expensive, operators soon discovered that sending the letters R and Y continuously produced patter very close to the 1:1 used in the measuring systems. This could then be monitored at the receive end with a simple centre-zero analogue meter to give an approximation of the distortion on the route.

For radio based systems, the use of the RY pattern is very useful for getting the receiver's tuning spot-on.

Anyway, getting back to the point of recognising patterns, you will find that virtually all RTTY systems on the h.f. bands send RYs at some point in their transmission, so learning the specific sound of this pattern gives you a very strong clue as to the mode you are monitoring.

Once you've mastered the sound of basic RTTY (it really won't take long!) I suggest the next one you try is SITOR-A which is probably the most common ARQ (Automatic Repeat reQuest) mode. There are loads of these scattered all over the h.f. bands but try Scheveningen Radio on 4.217 or 8.428.5MHz for starters.

When idle, this station sends bursts of SITOR-A followed by the callsign in Morse code. Again, the way to learn is to leave a signal running in the background. With these two modes under your belt, the next mode you learn really depends on where your interest takes you.

If you're really attracted by FAX transmissions, you can start to teach yourself the sounds of the different drum speeds i.e. 60, 90 and the more common 120 r.p.m. If, on the other hand, you're interested in the more complex modes you need to move on to ARQ-E and ARQ-M signals.

What's The Frequency?

There's a song about this, but if you're new into decoding you may well be wondering why the stations you do manage to receive are never on the frequency printed in the frequency list.

Don't worry, this is normal and is nothing to do with the accuracy of your receiver or the frequency list.

The root cause of the problem is that just about everyone uses a receiver set to s.s.b. to receive data signals rather than a dedicated data mode on the receiver. There are a few exceptions to this but this generally only applies to top-end communications receivers.

Let's take a quick look at s.s.b. to see why this causes us a problem. In case you didn't know, s.s.b. is an acronym for Single Side Band suppressed carrier. Now, the basic technique used for sending audio signals by radio starts with two signals.

The first is the audio signal itself and the second is a plain radio signal. These two signals are mixed together in a special electronic device that produces a combined sum and difference signal. This may sound complicated, but it isn't really.

Here's an example with real numbers to show you how simple it is. For the sake of the example, lets use a radio signal of 10MHz (known as the carrier) and a single audio tone of 1000Hz. When this is passed through the mixer you will find the original 1000Hz and 10MHz signal, but there will be two extra signals at 10MHz + 1000Hz and 10MHz - 1000Hz. These extra signals are called sidebands - upper for the 10MHz + 1000Hz and lower for 10MHz - 1000Hz.

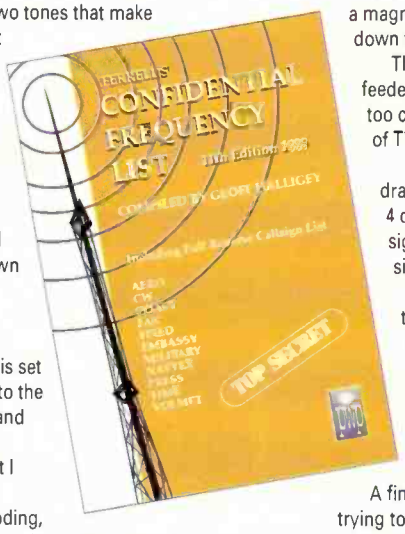
In a simple a.m. broadcast, as used by the commercial radio stations, the 1000Hz basic audio would be filtered-out and the 10MHz and ± 1000Hz would be transmitted. At the receiver, another mixing process is used to effectively remove the 10MHz part of the signal and so recover the original 1000Hz signal.

It was soon noticed that this is a rather inefficient way of sending an audio signal as the powerful carrier is discarded by the receiver along with one of the sidebands. The new mode used just one of the sidebands (hence single sideband) and got rid of the carrier (suppressed carrier).

With this new mode came two options to use either the upper side band or the lower side band. The convention currently in use is to use upper side band above 10MHz and lower below.

Now getting back to our tuning problem. The common practice with communication receivers when using s.s.b. is to display the frequency of the suppressed carrier. So what about our data frequency lists?

Well, the standard is to quote the frequency of a mark signal or the lower of the two tones that make up the data signal. As most decoder's expect this signal to produce an audio tone of around 1.7kHz, you can see that, providing your receiver is set to upper side band, it will need to be tuned to display a frequency around 1.7kHz lower than that shown in your frequency list.



It's well worthwhile checking this out for your system. All you have to do is set your receiver and decoder to the settings you normally use and tune to a station of known accuracy, like Hamburg Met I mentioned earlier.

Once tuned-in and decoding, you just need to make a note of the difference between the published frequency and that shown on your receiver's display. This then becomes the standard off-set that you can use throughout the h.f. bands.

As just about everyone uses s.s.b. for data reception, you may well ask why the frequency lists don't recognise this and print off-set frequencies. The reason this is not done is because the required offsets will vary from system to system depending on the way in which the decoders are set-up.

So it's not possible to use a standard figure. At least with the existing system we have a clearly defined standard that we can use to build our own customised off-set.

Next Steps

Once you've utilised these tips, you will find that you can quickly identify all the common data modes and tune your receiver accurately to the frequencies shown in published frequency lists. If you're still having problems finding signals, there are one or two other things that may be going wrong.

If you're using a scanner for h.f. listening or maybe a portable receiver you could be suffering overload or interference problems. One of the difficulties with these receivers is that the initial stages of the receivers often have inadequate filtering. As a result, strong signals from a reasonably good antenna can cause all manner of overload problems.

The most common manifestation is lots of spurious signals throughout the band. These show as various whistles and whines that may well be mistaken as signals and leave you thinking your receiver is very sensitive!

There are a number of ways to overcome this problem, the simplest of which is to reduce the size of your antenna so reducing the signal presented to the receiver. Another option is to try an antenna tuner unit. Although these are primarily designed to improve the matching between antenna and receiver, they include tuned circuits that can be helpful in reducing the levels of powerful out-of-band signals.

The correct way to achieve this attenuation of out-of-band signals is to use a pre-selector. This puts back in place the front-end filtering that you will find in any decent communications receiver.

Another option would be to fit a variable attenuator in the antenna lead. You could then increase the amount of attenuation until the spurious signals reduce to an acceptable level. If local interference is present a solution can be rather more problematic.

However, one option may be to relocate your antenna or even change it completely. I recently had the to opportunity to play with a Wellbrook ALA 1530 magnetic loop antenna and I must say I was really impressed with its interference reduction properties. In my case I was using a random wire antenna with a magnetic long wire balun around 20m long and running down the garden.

The weakness in this system was the routing of the feeder and the fact that the feed end of the antenna was far too close to the TV. As a result I suffer a relatively high level of TV interference.

Switching to the magnetic loop antenna showed a dramatic reduction in the worst of the local noise of up to 4 or 5 'S' points without any significant loss in the wanted signal. This gave me a tremendous increase in the real signal to noise ratio.

I haven't recently tried any of the other designs on the market, but will be looking around over the next month or two. Other than the reduction in local electrical noise, the other advantage of this type of active antenna is its very compact construction. This means that it is very easy to find a quiet location for the antenna without upsetting the family or the neighbours!

A final point to note for new listeners, particularly those trying to decode ACARS data from the airbands, is that errors are inevitable with most radio based data systems. With a system such as ACARS, where all the stations transmit on the same frequency, you are bound to receive signals from some planes that are so weak they are at the very edge of your systems capabilities. These signals will be shown on your decoder with at least some errors.

The only way around this is to have some form of noise threshold setting in your decoder to reject signals that fail to reach a critical level of signal to noise ratio. For most of us this is not possible, so you just have to lump the errors!

Readers Special Offers

If you'd like a copy of *Hamcomm/JVFAX*, etc. I've arranged a very special offer with the Public Domain and Shareware Library (PDSL). They have put together a library set of all five disks for just £12.00, all inclusive. Using PDSL also makes ordering simpler as they accept all the usual credit cards so you can order by 'phone - you don't even have to write a letter. Please direct all orders and enquiries about this disk set to **PDSL, Winscombe House, Beacon Road, Crowborough, Sussex TN6 1UL, Tel: (01892) 663298** and request library volume: H008739abcde. IBM PC Software(1.44Mb disks):

Disk A - *JVFAX 7.1, HAMCOMM 3.1* and *WXFAX 3.2.*

Disk B - DSP Starter plus Texas device selection software.

Disk C - *NuMorse 1.3.*

Disk D - *UltraPak 4.0.*

Disk E - *Mscan 1.3* and *2.0.*

Don't forget to keep an eye on my Web page for all the latest hot software!

Check out the station you've monitored with the indispensable *Ferrell's Confidential Frequency List.* 11th Edition now available from the *SWM* Book Store.

■ JOHN HODGKINSON - ALRS, c/o *SWM* EDITORIAL OFFICES
■ E-MAIL: aas@pwpublishing.ltd.uk

All At Sea

The Admiralty List of Radio Signals is a division of the United Kingdom Hydrographic Office (UKHO) based in Taunton, Somerset. The Hydrographic Office are world leaders in providing the maritime community with nautical navigational charts and nautical publications such as *ALRS*, *List of Lights*, *Sailing Directions*, etc. In fact, everything that a vessel would need to navigate its way around the world in safety.

The publications that the ALRS section produce provide the navigation officer or Radio Officer with all the radio information that he would need to carry out his duties onboard a seagoing vessel. Our publications are produced annually (except Volume 4) and are each allocated a Volume number as follows.

***Volume 1 Coast Radio Stations*:** Lists details of every maritime coast radio station in the world. These stations handle public correspondence or search and rescue communications or both and are listed in country order beginning in the United Kingdom.

Each station's frequencies and classes of emission are listed together with the power output of each transmitter and the hours that the station is keeping a watch. Ancillary items such as how to obtain medical advice by radio, arrangements for obtaining quarantine clearance, Ship Reporting Systems, etc. are also listed as they are dictated by radio communication procedures with the relevant shore authority.

Volume 1 is published in two parts. Part 1 covers Europe, Africa and Asia (excluding the Philippine Islands and Indonesia) and Part 2 covers the Philippines, Indonesia, Australasia, the Americas, Greenland and Iceland.

***Volume 2 Radio Navigational Aids*:** Includes aero radiobeacons in coastal regions, Radio Direction Finding stations, Coast Radio stations which give a radio direction finding service, Radar Beacons (Ramarks and Racons), Radio Time Signals, Legal Time and Electronic Position Fixing systems.

***Volume 3 Radio Weather Services and Navigational Warnings*:** Designed to complement *Volume 1* detailing every Coast Radio and Broadcast Station which provides a Radio Weather Broadcast and/or Navigational Warning service. These broadcasts come under the umbrella of Maritime Safety Information (MSI).

Also included are listings of Weather Facsimile stations and information about Weather Satellite transmissions thus giving a comprehensive guide to all aspects of Radio Weather transmissions. Each station listing also gives details of NAVTEX transmissions where applicable together with full colour diagrams detailing forecast areas and warning areas.

***Volume 4 Meteorological Observation Stations*:** Not really of any interest to most short wave listeners!

***Volume 5 Global Maritime Distress and Safety System (GMDSS)*:** Information on various Distress/Search and Rescue procedures together with all the services available to assist vessels using or participating in the GMDSS. Details of all frequencies used in GMDSS together with a comprehensive listing of world-wide Marine Rescue Co-ordination Centres (MRCC) are included, full colour diagrams again, being used to complement the text.

***Volumes 6 & 7 Pilot Services and Port Operations and Vessel Traffic Services*:** Includes all frequencies and radio procedures essential for vessels approaching, entering or leaving port together with Harbour and Marina v.h.f. frequencies. Each volume is in two parts, Part 1 covers Europe and the Mediterranean and Part 2 covers Africa, Asia, Australasia, the Americas, Greenland and Iceland.

***Volume 8 Satellite Navigation Systems*:** Contains comprehensive information on all aspects of Satellite Navigation Systems including detailed explanation and advice on various position error sources. This volume also includes a full listing of maritime radio beacons which transmit DGPS (Differential Global Positioning System) corrections.

Accurate Information

Each of these publications has its own Editor whose remit is to ensure that the information contained in the book is completely accurate and relevant to its title. This is achieved by a variety of methods.

Great use is made of the telephone, FAX machine and E-mail to contact various telecommunication authorities, Radio Stations, meteorological authorities, etc. We also depend heavily on reports from ships officers and a small band of avid short wave listeners to advise us on changes to frequencies, hours of watch, in fact, any information which contradicts or adds to what is already published.

All this data is collated and verified wherever possible, with the radio station or telecommunication authority concerned, and promulgated to users of our publications by a method known as *Weekly Notices to Mariners*. These notices contain details of the new information, formatted in such a way that the user can easily incorporate it (actually stick it on the appropriate page) into the relevant book. In this way, each book is updated on a weekly basis and hopefully stays as accurate as possible throughout its annual cycle.

We also endeavour to improve our books each year by increasing the 'user-friendliness' and incorporating diagrams wherever possible. A picture says a thousand words, as the old saying goes.

My duties as Editor of *Volume 1* are basically as above with the addition of a couple of tools to aid collection and verification of incoming data. These are a JRC NRD-535 h.f. receiver both coupled to a HOKA Code 3 Gold decoder with Windom and long wire antennas on the roof of our office building. Not a bad set-up, but the interference from around two hundred computers is a little savage!

Nevertheless, given the adverse reception conditions, they perform very well indeed and within limits, all *Volume 1* incoming data is checked at source and verified before publication of the *Weekly*.

My History

My own history is fairly chequered, beginning my career in radio as a Merchant Navy Radio/Electronics Officer some 25 years ago. After four years of cruising the world, I decided to come ashore and joined what was then the General Post Office Maritime Communications branch and was posted to Anglesey Coastal Radio station.

After a very enjoyable ten year sojurn in North Wales, British Telecom, as the telecommunication section of the GPO had then become, decided to close Anglesey Radio as part of a Coast Station rationalisation programme and I was again on the move, this time to Portishead Radio (known affectionately as the 'Sleeping Giant' amongst the Radio Officer community).

As this station was considerably bigger than Anglesey, the work was extremely varied, including operating Morse to and from ships on h.f. to working aircraft on RT from all parts of the globe.

As I am sure everyone is aware, Portishead is due for closure in 1999 so in 1993, seeing the 'writing on the wall' so to speak, I decided to make a career move and for the next three years spent my time working for HM Government until that establishment also announced plans to close.

As radio station closures appeared to be following me around like a bad smell, I decided to change direction completely and was fortunate enough to be offered employment by the UKHO as editor of *Volume 1 Coast Radio Stations*. Needless to say, everyone in my office is now sweating on when the closure will be!

The views expressed in this article are entirely those of the writer and are not to be construed as reflecting in any way the policies or views of the UK Hydrographic Office.

ALRS is the abbreviation for Admiralty List of Radio Signals. For those short wave listeners reading this article who have never heard of us, and I suspect there are many of you who haven't, unless you happen to be ex Merchant Navy Radio Officers or Royal Navy wireless operators, a brief introduction is required as to who we are, what we do and how we fit into the world of maritime radio communications.

Radical Change

The world of maritime radio is undergoing radical change which really began in earnest with the advent of satellite communications back in the early 1980s. Maritime radio stations which have been in existence since the early 1900s are now going down like ninepins.

The old marine radio distress system, which depended on the carriage of Radio Officers on board merchant ships, will soon be superseded by the GMDSS and the demise of the dedicated Radio Officer is now imminent!

Each month I shall endeavour to bring you the latest news and developments on maritime radio from around the world. Subjects will range from radio station closures, new radio stations, weather broadcasts and facsimile stations, NAVTEX and the GMDSS.

As I said previously, we depend heavily on reports from third parties for our weekly corrections. If there are any keen maritime listeners out there and you come across something you think may be useful to ALRS, then please do not hesitate to contact us.

■ ROGER BUNNEY, 35 GRAYLING MEAD, FISHLAKE, ROMSEY, HANTS SO51 7RU

Satellite TV News

Despite the trend into digital, satellite TV still produces surprises in the old fangled analogue mode! This column is mainly old fangled as well. Home from the daily slavery evening of September 8 and checking out the 43°W slot on *PAS-3R*/*PAS-6* I came across 'SGI NETWORK TEST EUROPE/S.AFRICA' at 12.696GHz vertical - unusual since it was using the American NTSC which suggests the uplink site was in the 'States.

The same bird was feeding the Spanish Aridente Marathon cycle race on the 5/6th September via the Spanish SNG truck ETT-3, initially from Cordoba and the next day Cadiz using 12.731GHz horizontal. It looked similar to the *Tour de France* only the weather was a lot hotter!

Fig. 1: Romsey Teleport, the r.h. dish is my old 1.5m now in use for C-Band (4GHz) and the l.h. dish is the Ku-band 1.2m.

Fig. 2: The 4GHz LNB is protected with this cover made from a two litre polythene white spirit container.

The 43°W slot was extensively used during early September following the SwissAir disaster when 229 passengers/crew were lost after the plane crashed into the sea off Nova Scotia. Nearest landfall to the crash area was Peggy's Cove and soon the media descended hopefully for the rescue and then the salvage/black box recovery.

The EBU co-ordinated the European bound news feeds eventually setting up base at Halifax, NS. The 12.703GHz horizontal slot on *PAS-6* was running for hours with live feeds into the main European networks, ARD, SAT-1, BBC, etc. though in 525-lines NTSC.

PAS-3R and *PAS-6* operate at a collocated slot at 43°W, *PAS-6* has problems with its solar panels and is running with reduced transponder loading, I suspect that *PAS-3R* is carrying C-band traffic and *PAS-6* maintains activity in Ku-band only.

Intelsat K is a favoured satellite of mine, there's always something going on. For example, with the end of the annual GMTV programme trip to Spain - this usually runs for 5-6 weeks - the crew have returned and most days sees 'UKI-149 GMTV SNG' offering live UK domestic items into the breakfast show around the 11.529GHz spot.

The live summer Spanish inserts were put into weekday mid-morning programming rather than early morning breakfast shows so I missed these due to the necessary daily slavery. Remember Hurricane *Bonnie* that slashed across the Eastern Seaboard of the 'States late August? On the 27th we found an American stalwart reporter leaning on the wind and horizontal rain atop a sand dune with massive waves pounding the shore behind.

It's an effort to maintain a good sound quality when shouting against the howling wind - when our gallant reporter had struggled to finish he relaxed and a look of horror when the equally hurricane blown cameraman shouted back 'they want you to do a take two'! This at 1800 on 11.498GHz horizontal.

One of our sports enthusiast readers commented on the European Athletics Championships from the Nep Stadium, Budapest, mid August. The BBC input was fed via *Telecom 2C* @ 3°E (12.645GHz vertical) using clear analogue with conventional audio subcarrier plus SIS (sound in syncs). Backup links were also funnelled via *Telecom 2B* @ 5°W including live interview inserts.

Telecom capacity at 5°W was also used on August 18th @ 1800hrs when Prince Charles and Mo Mowlem visited the devastation following the Omagh bomb blast - satellite news gathering reflects both the happy and tragic events in life. Around the same period the trans-Atlantic circuits were busy with the President Clinton confessions and relationships with younger secretarial staff.

September 10th, 11th and again the White House, the president and more revelations were hitting the airwaves with continuous feeds through the evening on *Intelsat K*. Both *PAS-6*/*Intelsat K* were favoured with this material that continues up to the time of writing.

Whereas the above activities cover analogue reception, the future seems inevitably to be digital. To this end and after much dithering I opted for a UK made digital receiver and not the famed Nokia box that is favoured by most, the RSD ODM-300 - it had good reviews elsewhere as 'user friendly' and suited for 'enthusiasts'. I'd support British industry.

Compared with my analogue receivers, 'tuning' is tedious with the remote, inputting frequency, bit rate, FEC (or left on auto), polarity and then command to 'scan', this does seem the norm for tuning digital receivers in discussion with those that possess Nokias. Up comes a signal strength graph which indicates signal

Fig. 3 : This test card is often seen on the French Telecom satellites.

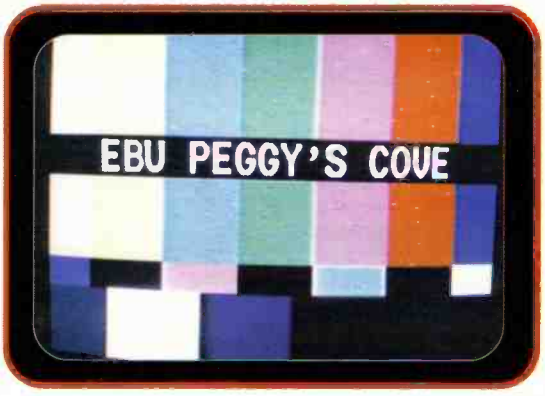


Fig. 4: The SNG ident card via *PAS-3/-6* @ 43°W uplinked out of Nova Scotia after the SwissAir plane crash.

strength from poor to good, if a signal is found then you acquire FEC and QPSK lock.

The 'locked' signals then appear on a listing and automatically enter into programme memory. Coming out of 'scan' the memories can then be selected.

I hit problems and eventually John Locker talked me through finding news feeds on *Intelsat K* and up came various test patterns and feeds, though inlaid over all images was a caption 'Picture Lock Lost'. Movement was seen on several feeds but in freeze frame to freeze frame action and then up came the now familiar 'Picture Lock Lost'!

A digital platform on *Hot Bird* 13°E was locked with good sound and pictures but the next day the receiver wouldn't resolve anything. Perhaps it's my simple analogue 405-line brain but the receiver has now been returned to the factory for their examination.

More luck with C-band work here as I mentioned last month with the final touches to the dish system and it's all working well. Most of the Arabic world news feeds seem to take place via *Arabsat 2B* @ 30.5°E, many are of low signal levels such as the Asian Broadcasting Union lease out of Singapore (3.965GHz LHC) and that of 'The International News Center Cairo' - 4.082GHz.

The 4.099GHz LHC frequency however was recently seen with uplinks out of JRTV, Jordan with edited packages for broadcasters LBC and MBC, a frequency also in use by Saudi TV. Good to see the JRTV Jordan test card in clear PAL rather than the usual smudgy offering via Sporadic-E terrestrial TVDX!

August 26th and *Astra 2A* was launched ex Kourou, earlier that same evening 'Kourou CTS' appeared on colour bars via French Telecom capacity at 8°W -3.772GHz RHC and a launch broadcast was anticipated to screen at this venue but nothing was ever seen, colour bars remained throughout the 2nd day.

One 'DX' catch was via *Gorizont 32* @ 53°E, a very weak 3.675GHz 0169 type test card, visible only with extensive threshold extention cranked in on a 29dBW contour. Programmes are of course everywhere with noise free pictures from Russia at 11, 14°W and 40.5°E, Arabic home networks on 26 °E with Iran and Libya popping up elsewhere! There's still a feel of pioneering when you're active in C-band!

News In Orbit

Intelsat 801 @ 31.5°W is downlinking a French speaking digital DTH service into the Caribbean spotted on Martinique/Guadeloupe at 52dBW (600m dishes). Canal Satellite Antilles uplinks out of the new BT teleport at Paris-Boulogne in MPEG-2/DVB format with Mediaguard encryption. There are 13 TV channels plus a single radio channel at present carried on the Antilles service.

With increasing satellite activity and wider downlink transmit bandwidths in the airwaves across Europe and to protect the 3° spaced satellites from adjacent bird uplink interference additional spectrum has been made available. Usually Ku-band has a 13-14GHz uplink with an 11-12GHz downlink, but now space is available in K-band 17.3-18.4GHz and newly constructed satellites have K-band receive capacity incorporated. The higher frequencies allow higher performance dishes with typical uplink beamwidths down to 0.1° for a 7.6m @ 60% efficiency prime focus structure.

A recent press release ex Intelsat advises that they are able to react to fast breaking news action by moving coverage spot beams to focus on any 'hot spot' expediting uplinking capacity. Recently news breaking in Kenya, Sudan and Afghanistan required ease of uplinking and the *Intelsat 511* satellite swung a Ku spot beam to accept Ku uplinks and also providing capacity on three other satellites.

A couple of German networks have merged to form a single group. The SWF (Sudwestfunk in Baden-Baden) and SDR (Suddeutscher Rundfunk in Stuttgart) are now named as one - SWR - which I guess is SudwestRundfunk. This makes for the second largest German broadcaster, almost rivalling that of the WDR in Cologne. Look out for changes to corner logos on the Astra German programmes (and of course to radio and terrestrial TV broadcasts).

Expansion of the UK's SISLink group who provide uplinking comms for most of the UK's broadcasters. Currently operating 20 SNG trucks, another 10 are on order for a phased expansion through to Spring 1998.

Expansion has been brought about by a new five year contract with ITN which calls for eight trucks in England/Wales and one permanently based in each of Scotland and NI. ITN also have bought a London fixed uplink and downlink for the Euronews centre in Lyons, France. Trucks will operate in both MPEG-2 compression and PAL analogue.

PanAmSat are planning the purchase of four new satellites to offer backup protection should one of their fleet decease in orbit. It's likely that several of them will remain as on-ground spares being a cheaper option that launching all four birds.

PanAm have been suffering problems in recent times with certain of their fleet - *Galaxy 4*, *Galaxy 7*, *PAS-5* and *PAS-6*. Similar problems have hit the American coverage *DBS-1* @ 101°W after its control processor failed though the backup spare automatically switched in.

If that too fails the operators can switch programme output to co-located *DBS-2* and *DBS-3*. Failures also with the low earth orbiting fleet (LEOS) of Iridium craft which has now suffered seven failures taking them down to 65 operational birds, below the number 66 for full earth coverage. The Leo-Iridium system, run by Motorola is advertised as a September 23rd opening...

Hopefully without problem will be the launch next Summer of *Orion-2* to co-locate mid Atlantic @ 37°W with 38 high powered Ku-band transponders covering the Americas and Europe.

There is a degree of concern within the satellite industry and the soon to arrive Leonids Meteor Shower - November 17th timetabled for UK mid evening. The shower peaks every 33 years, (the last peak was 1966) and with the Earth on an intersecting phase with the *Tempel-Tuttle* comet trail adds up to concern for the mass of satellites now in orbit. The big question in the industry is, will any be struck down?

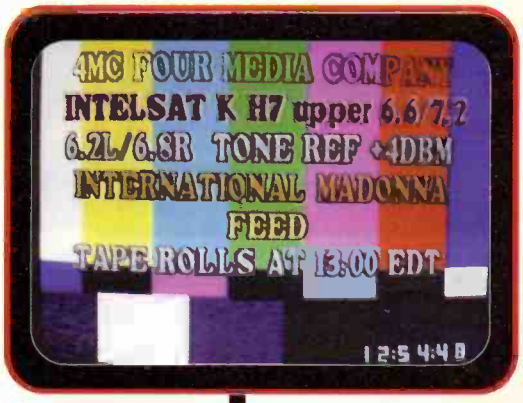


Fig. 5: The caption overlay says it all.

Fig. 6: Syrian TV as received via *Arabsat 2A* @ 26°E, 4.085GHz RHC.

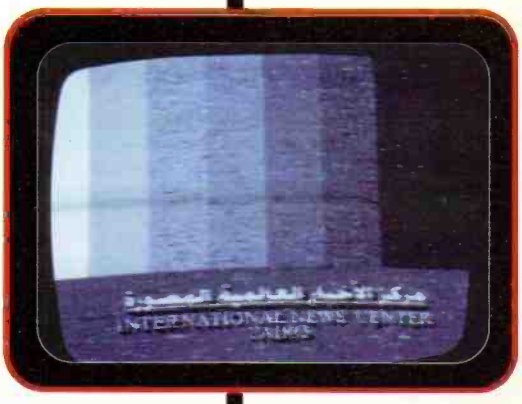


Fig. 7: A scratchy news exchange via *Arabsat 2B* @ 30.5°E, C-Band.

Fig. 8: Reuters often show a rundown of upcoming news packages on *Intelsat K* - actual items when transmitted may be encrypted.

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ShackWare

Have I been having fun with my new Libretto! More on this incredible machine later but first, let's kick off with some excellent news for anyone with an Apple Mac who feels left out in the cold when it comes to decode programs...

Stop Press

The last time I mentioned the very promising (though fledgling) Mac decode package *MultiMode*, I had a surprising amount of interest - there are certainly quite a few of s.w.l.s with Macs who are keen to use them in the shack. Well, good news this month because author **Chris Smolinski** has just released an updated version (I'm writing this on September 10th, the program was released on the 7th!), the first full-blown shareware version in fact since previous releases were 'beta' versions.

Now designated version 1.0, *MultiMode* truly lives up to its name, offering a comprehensive selection of decode options all from within one package, and all using the Mac's built in sound hardware and A to D circuitry. In fact, all you have to do to decode just about all the simple modes available on short wave is to supply your Mac with an a.f. signal from your receiver's line out or earphone port.

MultiMode decodes c.w., RTTY, SITOR A/B, NAVTEX, FEC, WEFAX, ACARS, standard time station signals and even d.t.m.f. telephone tones. What's more, there's a built in spectrum analyser to aid delicate tuning, this really is exciting news for Mac users.

The program supports both 68K and PPC Macs but be warned: you'll need at least a fast 68040 Mac (minimum an LC475) otherwise there's a good chance that there won't be enough raw processing power to produce anything recognisable.

First thing to note about the new release is its intuitive user-interface. Gone is the large spectrum display above the decode window and in its place is a panel containing buttons for each of the modes available. There's also a lot of useful information posted in this window too during processing.

I tried *MultiMode* with FAX transmissions from Hamburg on 3.855 and 7.880MHz first. Initial results were disappointing, but after fiddling about with signal levels, I managed to get some impressive results and to be fair, the accompanying documentation does say that you should turn the receiver's volume down (rather than up as I was) otherwise audio is clipped and the results will be unreadable.

Next I fired up my PRO-2029 and tuned to the European Primary ACARS channel on 131.725MHz a.m. I had one or two false starts here too, mainly bad packets, but patience and a bit of tweaking paid off and *MultiMode* was soon doing its stuff faultlessly.

Other modes worked well too, though try as I might I couldn't get anything sensible from the WWVB time station option, though that might be because of something I was doing. I've never tried to decode this station, in fact, I've never even listened to it before!

All in all, I'm very impressed by *MultiMode* and at a shareware price of just $25, it won't break the bank. How you'd actually register it is a problem of a very different sort!

MultiMode is available for download on Chris's web site at **www.access.digex.net/~cps/bcs/index.html** or from me if you send a disk and s.a.e. Chris's web site also offers lots of other Mac programs useful to s.w.l.s too, including a propagation forecaster, antenna analysis and design, receiver control software and so on. If you're reading this Chris, I'm sure many Mac users will give thanks for a great program!

Oh, and one other bit of software that I've been meaning to mention for many months before we press on to the mail bag. *SatFax* from American enthusiast **John Wilson** (**www.erols.com/jwilson9/**) is an interesting PC weather satellite program with a difference. It's designed to compensate for signals received using sets with an inadequate bandwidth, such as a scanner.

The problem with a scanner is that set to narrow-band f.m. (or n.b.f.m.) mode, the greater part of the received picture's detail is filtered out! This is a great pity because many scanner owners would enjoy casual satellite decoding but might not be sufficiently interested to invest several hundred pounds for the hardware.

If the pictures published at John's web site are to be believed, *SatFax* makes a very passable attempt at getting the best from a typical 20kHz bandwidth. Unfortunately, there's no demo version so I can't actually try it and report the results here.

John asks a reasonable $25 for his software and, upon receipt, the program is E-mailed to you. Obviously as a private individual he isn't able to accept a credit card number and so you must resort to international money orders or sending banknotes in envelopes, feasible but not very practical. I'd be very interested to hear from anyone using the program.

Libretto Update

Yes, Toshiba's tiny Libretto (a full Pentium-class TFT SVGA, SoundBlaster-compatible notebook in a palmtop case, for those who missed my last 'ShackWare') is everything I hoped it would be. I've tried everything from *Hamcomm* to *JVFAX* (DOS and Windows versions), to *WxSat* on it, and all without a flaw. At last, I've found a pocket machine with the muscle for a truly portable decode station!

Pictured here, it's sitting on a copy of *SWM* for a size comparison, alongside my home-brew 137MHz band receiver, and a Maplin DSP/satellite interface. On screen is the soundcard weather satellite decode software *WxSat*'s parameters dialogue. The equipment folds down into a little padded camera bag I bought second-hand at the Sussex Amateur Radio and Computer show especially for the purpose.

Of course, the Libretto is absolutely made for the Icom PCR1000 which would instantly replace the two boxes on the right and provide coverage of all the bands I'm interested in. When I've replenished my bank balance sufficiently to afford one (or if a kind distributor wants to make a loan of one for a long-term test!) I'll let you know what that potentially magnificent combination is like.

Until then, good listening.

Mail Bag

First, I must apologise to previous 'ShackWare' correspondent **Geoff Chance** of Redruth, Cornwall. Geoff E-mailed me what seems like months ago with a question about a trackball he'd picked up for a song that he wanted to use with his PC.

I answered this E-mail but (and it's a big but) my ISP NetDirect has had several funny five minutes sessions with its telephone numbers and it appears that Geoff didn't receive my reply (and neither did **Stan Jordan** and **Gary Coulton** which I only realised after I'd E-mailed them a second time with updates to the first info).

Anyway, Geoff wrote again but this time, by 'snail-mail'. Unfortunately, I must disappoint him a second time. Without actually seeing this device and 'playing' with it, I can't say whether it will work. That said, the chances are good.

I have an MC Track trackball that I acquired while working on ST Format magazine around 10 years ago. It came with 'adapters' for both the Amiga and the PC. These adapters were essentially rewired nine-pin plugs.

Best bet is to try it in 'generic serial mouse' mode but short of seeing it, taking it apart and experimenting, there's little I can add. But I do apologise for the time it's taken for that pretty useless piece of advice! The name of the trackball is 'Contriver' and if anyone has any information I'd be very glad indeed to pass it on to Geoff - and congrats to Geoff (now **Geoff M1BUI**) on passing his RAE recently.

Steven Overall of London next, with a request for my Atari 8-bit weather software and a disk of Amiga ham utilities that I can't actually try out because the Amiga is one of the few machines I don't actually own at the moment. However, anyone who wants to borrow the disk is welcome upon receipt of an s.a.e.

I must also disappoint Steven - it just isn't my month! It's a dead cert that the Atari 8-bit software will not work with the Amiga-based emulator Steven wants to run it on. That is, while the software will run, the device polling routines are very tight on time and, even with an emulator that mimics the Atari 8-bit's PIA ports, the timing would probably be off by a few machine cycles and so therefore useless.

Believe me, it took me many sleepless nights to get those polling routines right. Thanks for the Amiga disk though, Steven.

The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Many titles are overseas in origin.

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DXTV

DXTV FOR BEGINNERS. Simon Hamer.	31 pages	£3.95
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RSGB IOTA DIRECTORY & YEARBOOK 1998/9 (A4 size)	112 pages	£8.95
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WORLD RADIO TV HANDBOOK 1999.	608 pages	£19.50

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HF Receivers

Due to the tremendous success of the new JRC receiver, the NRD 545, we have been inundated with customers trading in their existing receivers for one of these superb units.
As a result, we have currently, a very wide selection of good quality second hand HF receivers and scanners, and are able to offer them at excellent prices. All items have been checked by our workshops and are offered with a full 3 months parts and labour warranty.

JRC NRD 535
The famous predecessor of the NRD 545 (choice of 2)
Prices from £800

Kenwood R 5000
The top of the line HF receiver from Kenwood, now sadly discontinued (choice of 5 - one fitted with the VHF converter)
Prices from £600

AOR AR 7030
Excellent performance if you can master the menu system (choice of 3)
Prices from £500)

LOWE HF 250
High performance at a budget price (choice of 2
Prices from £400

FRG 100
Still the only receiver from Yaesu (choice of 2)
Prices from £300

JRC NRD 345
The current JRC mid range receiver. Excellent design and performance
Prices from £450)

ICOM ICR 72
ICOM quality and perfomance
Prices from £550

ICOM ICR 71
Bit long in the tooth but still a good buy
Prices from £400

Kenwood R 2000
Obsolete but a nice budget unit
Prices from £250

LOWE HF 225
One of our most successful models (choice of 5) yes really!
Prices from £200

SCANNER BARGAINS

Yupiteru MVT 7100
Still our very best seller. Does everything the scanner user wants. Easy to drive and sparkling perfomance. (Choice of 5, all in super condition
Prices from £170

GRE PSR 244
Current bargain scanner. Ideal for civil (VHF) airband listening (choice of 3)
Prices from £90

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