GARMIN

GPS12

Ideal first GPS receiver at a very affordable price

The Garmin GPS12 Personal Navigator is an affordable 12 parallel channel GPS receiver, packed with features and the same user-friendly operation that's made Garmin the world's number one manufacturer.

The GPS12 is ideal for use by walkers and hikers. It has fast satellite acquisition and stays locked on, even in tough conditions, under trees for example. It's rugged waterproof case features a built-in antenna, military-tough construction and its rocker keypad provides true one-hand operation to keep you on the move night and day. Powered by internal batteries.

There is a host of advanced navigation features: like a moving map plotter that displays waypoint names, symbols or comments, proximity waypoint alarms, average and maximum speed data and trip timers and you have a first class GPS receiver.

Includes Lat./Long, UTM/UPS, Ordnance Survey, Irish, Swiss, Swedish, German and Maidenhead Grids plus 107 map datums.

All in all, a superb product, ideal for you first GPS receiver but powerful enough for the serious user on a budget.

Lowe Price **£149.00** Carriage £10.00

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One of the best scanners that we have ever sold... The Yupiteru MVT 7100.

LSB/USB/AM/WBFM/ NBFM Reception
1000 memory channels
Highest sensitivity
Signal Strength Meter
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Switch key-lock
Switch attenuator
Beep (key touch sound)
On/Off four hours of continuous use
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GARMIN

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A new standard in Marine Handheld GPS Navigation

The GPS48 features a 12 parallel channel receiver for fast satellite acquisition and tight satellite lock along with updateable marinee database that graphically displays city locations and nautical navaids on the moving map.

- Uses up to 12 satellites for fast acquisition
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- Proximity waypoint feature warns you of approaching hazardous areas
- Room for 500 waypoints and 20 routes of up to 30 waypoints each

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PSR244

This scanner gives you direct access to over 24,000 exciting frequencies including those used by radio hams, civil aircraft and many other users. You can select up to 50 channels to scan and change your selections at any time.

Five Channel Storage Banks.
Two Second Scan delay.
Channel Skip.
Memory Bank Scan
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Lock Button
Priority Channel
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68.0000 to 88.0000 (5khz NFM) Utilities
118.0000 to 136.9875 (25khz AM) Civil aircraft band
137.0000 to 174.0000 (5khz NFM) Utilities
380.0 to 512.0000 (12.5khz NFM) UHF
Scanning Rate 25 channels per second
Searching rate 50 channels per second

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GPS ACTIVE ANTENNA

Low cost magnetic GPS antenna

The device shown here consists of a very efficient antenna, correctly polarised for the satellite signals. It is enclosed in a weather resistant plastic housing with fixing magnets in its base and self tapping holes for permanent fixing, together with a high gain, low noise active preamplifier. The preamp is powered by a 5v DC supply fed via the coax cable from the GPS receiver. Complete with 5 metres of cable and a BNC connector..

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Frequency coverage 25-1900MHz
High tenacity rare earth magnetic mount. Covers civil airband, military airband etc. **LOWE PRICE £19.95**

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A lightweight miniature speaker which fits comfortably over the ear. It is especially useful in noisy environments, such as crowds, public places etc. This type is very popular with the emergency services.
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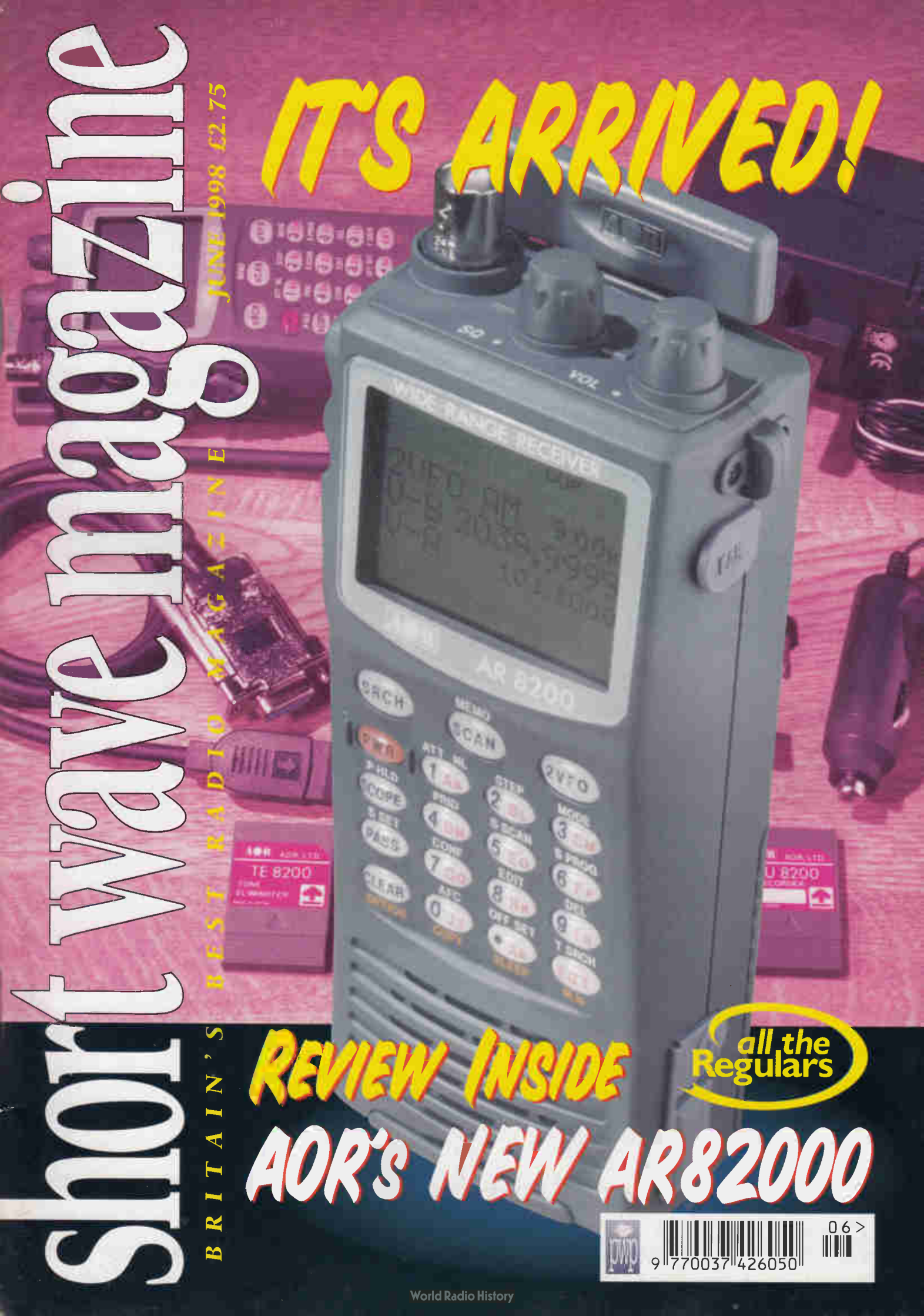

REVIEW INSIDE AOR'S NEW AR82000

all the Regulars

9 770037 426050 06>

JRC NRD 345G

A cracking new receiver aimed at the Broadcast and Shortwave listener. JRC build some of the World's finest receivers and this is no exception. Designed to give clarity and interference free reception.

- AM synchronous detector
- Low noise PLL chip
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- Noise blanker
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- Clock/Timer functions
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- Audio filter
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PCR OPTION
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A new low cost receiver with exceptional sensitivity, selectivity and dynamic range.

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- AM/SSB
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- Easy tuning
- Dual antenna inputs
- 12V DC operation

YAESU FRG-100

This receiver provides solid coverage from 50kHz to 30MHz with all mode reception of AM, SSB and CW. 50 fully tunable memory channels store frequency, mode and filter selections. The FRG-100 has twin 12 hour and 24 hour programmable clocks with on timer and sleep timer. The set requires 12V DC.

FM option available - add £39

ROBERTS R861

SYNTHESISED RECEIVER FM STEREO/MW/LW/SW PLL

- 307 memories (261 in SW, 18 each in MW/FM, 9 in LW plus priority station)
- ATS auto scan and preset in priority pf signal strength in FM/MW/LW bands
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- FM stereo via earphones
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- 8 characters for editing station name
- Built-in 42 world cities time plus DST devicer
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PORTABLE SHORTWAVE RADIO

- Covers 153kHz - 30MHz
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- FM stereo via earphones
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- External antenna & record jacks
- Clock/Timer with sleep & standby functions
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- *MEMORIES:* 200
- *BAND MEMORIES:* 10 (user re-programmable)
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- 66-956MHz (with gaps)
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£149.95

AOR AR8000

STILL the No1 seller!

- All mode FM, WFM, SSB, CW, AM
- 500kHz-1900MHz
- Computer control
- Data clone
- 1000 Memories
- C/w NiCads & charger

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ICOM IC-R10

- All mode - FM, WFM, SSB, CW, AM RX
- Newly designed 'BUSY CATCH SCAN'
- (0.5MHz -1300MHz)
- 1000 memory channels
- VSC (Voice Scan Control)
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- 4 AA NiCads or 4.5-16V ex power supply

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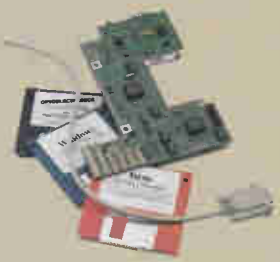

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short wave magazine

June 1998 Issue

Broadcast

SSB Special

features

Cover Subject

The AOR AR8200 hand-held wide band scanner – a base station in your hand?

regular columns

Contents

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Missing Review!

You may be wondering where the promised review of the new JRC, h.f. receiver, the NRD-545 has gone to. Unfortunately the CE approval process for this exciting new radio was only finalised on the 5th May. Jim Moon of JRC UK tells us that the product will now start to flow into the UK from the Japanese factory. We sincerely hope that we will be able to bring you the hotly awaited *Definitive Review* in the July issue of *SWM*.

We understand that the approval delay was due to a 'bureaucracy gone mad' scenario involving the choice of standards to use at the German test house conducting the approval testing.

Be assured that you can rely on *SWM* for the industry news first.

SELCALS 98

Available for **£6 including P&P**, *SELCALS 98* is available from **Flightdeck, 192 Wilmslow Road, Heald Green, Cheadle, Cheshire SK8 3BH**. With information on Rainford's Software *Flight Database 3* and *ACAR Data Look-Up*, which are supplementary utility programs for Air Master 2000 ACARS users, priced at £59.95 + P&P and £30.00 + P&P respectively. For more information contact Flightdeck at the above address or **Tel: 0161-499 9350, FAX: 0161-499 9349** or **E-mail: FlightDek@aol.com**

AR8000 ACCESSORIES FROM JAVIATION

Whilst the AR8000 was the main reason for producing the JAV-232, it is compatable with the AR2700, Icom equipment and the Optoelectronics Scout together with any other receiver requiring a TTL interface. Housed in a compact, diecast case with a 1.5m multicore cable terminated in a DB-9 RS-232 connector, the JAV-232 is also supplied with a FFC (Flat Flexible Cable) for use with the AR8000, AR2700 and some other receivers.

When using the AOR AR8000 with the supplied FFC, the JAV-232 interface also provides a constant audio output together with squelch activated tape recording. These outputs are provided via a high quality 6-way DIN plug.

When compared with the AOR CU-8232 interface, the JAC-232 offers unrivalled value for money combining both the CU-8232 (£99) and the CR-8000 (£44) in one unit together with compatibility with other receivers. The JAV-232 is priced at £69.99 (inc. VAT) for customers within the UK and EC member countries and £59.50 for export outside EC member countries.

Also available from Javiation is the *JAV-Scan 8000*, which is a low cost computer control package for the AR8000. Whilst there is a wide choice of compatible software for AR8000 owners to choose from, JAV-Scan is the only package to support the internal options that can be fitted to this radio. These include the DX-8000 narrow a.m. board (exclusively available from Javiation) or the DS-8000 speech inversion board.

JAV-Scan 8000 is a 32-bit application and will currently only run on Microsoft Windows95. A suitable interface such as the JAV-232 is required to connect the AR8000. *JAV-Scan 8000* is available as a demonstration version either on 3.5in floppy disk or it can be downloaded via the Internet from Javiation's web site at **www.javiation.co.uk** The full version of *JAV-Scan 8000* is available for just £19.99 plus P&P.

For further information or details, contact **Javiation** at **Carlton Works, Carlton Street, Bradford BD7 1DA, Tel: (01274) 732146, FAX: (01274) 722627, E-mail: info@javiation.co.uk**

WORLD'S FIRST!

AN UNCOOLED LASER DIODE

Mitsubishi Electric have announced the introduction of the world's first uncooled laser diode, providing the high reliability and performance of current advanced cooled designs, but at substantially lower costs. The FU-436SDF-4M1B and 4M1C are designed specifically to enhance CATV network applications supporting multimedia as well as mobile telephony systems.

The uncooled laser diodes operate at temperatures up to 85°C. They provide a perfectly stabilised output over the entire temperature range with a typical tracking error within 0.3dB. Operation is with low distortion, with second

Mitsubishi launches FU-436SDF-4M1B/4M1C, the world's first uncooled laser diode.

and third order figures less than -50dBC and -60dBC respectively. The designs also operate at low noise, typically less than -150dB/Hz, with a high differential efficiency of typically 0.2mW/mA.

With a central wavelength of 1290/1330nm, optical output is typically 2.5mW with 4mW maximum. Operating voltage is typically 12V. The FU-436SDF-4M1B is designed for front panel style mounting and FU-436SDF-4M1C is for PCB mounting.

Find out more by contacting **Mitsubishi Electric Europe BV, Semiconductors, Travellers Lane, Hatfield, Herts AL10 8XB, Tel: +44 (0) 1707 276100, Internet Website: http://www.mitsubishichips.com**

HOKA GOLDEN WINDOWS

Recently announced by Hoka, the creators of the the Code3 and Code30 families of data decoders and analysers is the latest version of Code3-Gold. Version1.5W is able to run under Windows95. Although not a fully compliant 'Plug and Play' Windows program. Version 1.5 has been engineered to work within the constraints of the Windows95 GUI.

Hoka say that Code3-Gold V1.5 **does** run under Windows95 in foreground mode and in background mode whilst running other programs such as frequency databases and receiver controllers. Code3-Gold runs whether you select it as a window or full screen.

The graphics windows are always full screen. Therefore Shift Speed, Oscilloscope, etc. are full screen even if the menus and decoders are in a window.

Also new with V1.5 are additional modes:

ATIS, the new Maritime Identification System, which is actually part of GMDSS.

ERMES, the new European Message System.

FMS-BOS, This is a German status message system, used by their police and some other government agencies.

ZVEI 2 this well known 5-tone Selective Call System has just been added.

The 'Output to Disk' option, now includes date and time, monitored frequency, decoded system and measured shift & speed details as a header to the captured ascii file. A very useful addition indeed for later identification of long monitoring sessions.

Currently, a 32-bit Windows95 version is under development. So watch these pages for news of its release.

Code3-Gold V1.5 and rest of the Hoka range can be obtained from: **Hoka Sales UK, PO Box 2630, Eastbourne, East Sussex BN20 9RU, Tel: (01323) 487919, FAX: (01323) 487919, E-mail: hokasales@pavilion.co.uk**

Forté Upgrade

The popular Forté uninterruptible 12V d.c. power supply has been upgraded for 1998. The standard Forté is now directly compatible with universal mains voltages - from 90 to 264V a.c. Coupled with the IEC mains input socket and universal approvals, this enables the unit to be shipped to any country in the world, and without specifying the end-user mains voltage.

The Forté is used primarily within the two-way mobile radio and general communication systems market. The unit combines 12V p.s.u. and battery back-up duties, but in a convenient and low cost package. The unit is also supplied ready for connection and immediate use.

The Forté is CE marked and normally available ex-stock. With an end-user price of under £200, the cost is comparable to ordinary p.s.u.s without battery back-up. Contact **Diplomat Communications Ltd., Unit 3 Summerlea Court, Herriard, Basingstoke, Hants RG25 2PN** for more information.

Forté gets international upgrade.

GRUNDIG GOES GLOBAL

Grundig's latest 14in teletext television, the P37 731/12 Globetrotter is the first portable TV in the range to include a 12-24V d.c. adaptor meaning that wherever you go - your TV can go too. The flexibility of the 12-24V d.c. adaptor will allow the TV to be used on boats, in caravans, motorhomes and in cars with total clarity of picture.

Grundig's new Globetrotter Portable TV.

Features include a 14in picture tube (34cm visible screen size), 69 + 1AV Teletext, u.h.f./v.h.f. tuning, which means it can be used in the UK and Ireland, headphone socket, telescopic rod antenna and ATS Automatic Tuning System. The P37 731/12 can also be used in those countries which have the following broadcast systems PAL 1, SECAM, BG, L/L. Now available, the recommended price is **£269.99**.

clué

Don't Forget!

Remember, you can still receive a full listing of 'Grassroots' by sending a stamped self-addressed envelope to Lorna Mower at the Editorial Offices. Please mark your envelope 'Grassroots List'. If you have Internet access, take a look at **www.pwpub.demon.co.uk/SWM/grassroots**

Send your news to Zoë Crabb at the Editorial Offices

rallies

May 30/31: Peterborough Radio Festival '98 will be held in the Sacrewell Farm & Country Centre, Wansford, Nr. Peterborough. There will be activities for all the family, displays and exhibitions, caravan and camping facilities, disco and BBQ (Saturday) and a Radio Car Boot Sale (Sunday). More information from **Vince Edwards** on **(01733) 331211** or **G8NGZ@compuserve.com**

June 7: The Royal Naval Amateur Radio Society are holding their annual mobile rally at The Playing Field, opposite HMS *Collingwood*, Fareham, Hants (off M27 at J11, follow A32 & B3385 towards Lee-on-the-Solent). All the usual RNARS Rally attractions, with trade stands, Bring & Buy, RAYNET, SUNPAC, Club stands and a talk-in via PC/PH. There is also a children's play area and various other stalls and attractions. A grand day out! Further details from the **Secretary, RNARS, 103 Torrington Road, North End, Portsmouth**.

June 7: The Spalding Radio Rally is to be held at Springfields Exhibition Centre, Springfields, Spalding, starting at 10am. Talk-in on S22. There is easy access for any disabled visitors, a licensed bar and catering, trade stands, a huge car boot area and acres of free parking. **Mick Pell G1APV** on **(0976) 271796** or **David G7VQH on (0966) 362828** or **Dennis Hoult G4OO** on **(01775) 750382**.

June 14: The Nunsfield House Amateur Radio Group present the 29th Elvaston Castle National Radio Rally taking place at the Elvaston Castle Country Park on the B5010, five miles south east of Derby. There will be all the usual traders plus Special Interest Groups, a grand Bring & Buy and a huge flea market. Over 48,000 square feet of marquees makes this the largest outdoor rally in Europe. With crafts, bands, a museum farm, children's entertainment and woodland walks, there is something for all the family. The venue also has a Caravan Club approved site. Talk in is provided by GB2ECR on S22 and SU22. **Brian Reid G1CUH** on **(01332) 751412** (combined telephone and FAX number).

June 14: The Bangor & District Amateur Radio Society are holding their major radio and computer rally at the Clandeboye Lodge Hotel (formerly The George), Estate Road, Bangor, County Down starting at 12 noon (11.30 for disabled visitors). This year's event will feature a full range of trade stands, including major cross St George's channel names a Bring & Buy and computer software, etc. Free parking, facilities for the disabled, full range of meals and bar services available throughout the day. Morse tests available on demand, operational stations and GI3XRQ/P running all day. Admission is £2, under 16s go free. Talk-in on Ch22. **Roy GI0WVN** on **(01247) 460716** or **Stuart GI4OCK** on **(01247) 454049**.

June 21: The Newbury & District Amateur Radio Society will be holding their 12th Annual Amateur Radio Car Boot Sale at Cold Ash playing field, near Newbury. Sellers/Traders should arrive at 0830, no earlier please. The sale will be open from 0900 to 1500. **Ian Trusson**, Secretary NADARS on Tel/FAX: **(01635) 826019**.

June 28: The Horncastle Rally is to be held at Horncastle Youth Centre. This Rally is held as a joint venture between the Youth Centre and the Fenland Repeater Group. The Rally is held on one level with very good access for disabled visitors. Food and drink is available, including the now legendary Horncastle Bacon-

CONTINUED ON PAGE 7

Next Generation

Brain Boxes have released the next generation of serial communications cards in their PCI two port RS-232 serial card, utilising all of the improved features of the PCI bus, whilst solving the problems of overcrowded PCs, in which the number of ISA slots is decreasing. PCI bus allows faster throughput to the I/O card, thus freeing the processor for other multitasking operations.

This new card provides two 9 pin D connectors on the bracket and a parallel port on a header. All ports have the advantage of automatic configuration, via true plug and play capability, avoiding system resource conflicts and using PCI shared interrupt facility.

Complete with a utility disc, with source code, plus informative manual and manufactured using the latest surface mount technology, the card is also available in four and eight port configurations. This range is also ideal for all RS-232 I/O applications, such as Remote Access Service connectivity, industrial control, robotics and many more.

More information from **Brain Boxes, Unit 3C Wavertree Boulevard South, Wavertree Technology Park, Liverpool L7 9PF, Tel: 00 44 151 220 2500, FAX: 00 44 151 252 0446 or E-mail: sales@brainboxes.com**

The RS-232 Two Port PCI card.

AERIAL TECHNIQUES

Aerial Techniques, the Poole based TV equipment antenna and accessory specialists, have two interesting additions to their product catalogue. The first is a multi-standard colour TV the other a 'Broadcast Quality' Digital Video Standards Converter.

The 10in Thompson multi-standard TV can be operated from a 12-24V d.c. supply or from a.c. mains. Complete with Teletext the set is capable of receiving PAL system I, for the UK, PAL B/G for Europe and for France SECAM L. Also provided are SECAM B/G and NTSC via SCART. The set is priced at £369.00 inc. VAT.

The CDM-820 broadcast-class converter allows conversion from any of NTSC 3.58, PAL B/D/G and I to any of the following standards, NTSC 3.58, PAL B/D/G and I.

The unit has two sets of S-VHS inputs and outputs.

Featuring digital conversion from input TV signals of NTSC, PAL to output signals of NTSC or PAL an 8M bit field memory. A digital comb filter is provided for NTSC and PAL decoding. A built-in time base correction function provide signal synchronisation.

The CDM-820, which incorporates input auto detection, also has built-in a.g.c. to ensure 1V p-p output signal. The input level range is 0.5-2V p-p.

Weighing in at 3kg the CDM-820 can be powered by 110 or 220V a.c.

For further information on these and other products, contact: **Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH. Tel: (01202) 738232, FAX: (01202) 716951** or **E-mail: atech@dircon.co.uk**

GLOBAL RADIO CONTEST

Trevor Baylis, inventor of the world famous clockwork radio, launched World Radio Network's first international listener contest recently. Trevor won a BBC Design Award for innovation thanks to his unique clockwork radio and is now about to embark on a World Tour with the British Council to promote his radio and the design and engineering skills that went into manufacturing it.

The Baylis radio, now manufactured in South Africa and used across the African continent to give people in the remotest areas access to radio without the need for costly and difficult to obtain batteries, was the star prize in the London-based station's competition. The radios, from Britain's BayGen Power Company, were awarded to listeners entering the contest during April.

World Radio Network, Britain's second international radio broadcaster, launched its global listener contest to find out who is tuning to its world-wide English-language radio service, WRN1. WRN1 brings together programmes from the world's leading international radio stations in a 24 hour a day commercial-free channel, delivered on direct-to-home satellites across Europe, Africa, the middle East, Asia, the Pacific and North America.

Trevor Baylis with Edwina Jarvis, presenter of Network Plus, World Radio Network's global listener programme.

CARMARTHEN

The **Carmarthen Amateur Radio Society**, which was formed in 1981, has grown into one of the largest in the principality. Meetings generally commence at 1900 on the 1st and 3rd Tuesday in each month at **Hill House, Picton Terrace, Carmarthen, Carmarthenshire**. Visitors are most welcome to turn up on any club night.

The club now have a new 70cm Repeater Station, located at Peniel, north of Carmarthen, West Wales, callsign Charlie Mike, (new callers are always welcome). The repeater has an excellent range and operators can access from Cardiff to Ilfracombe to Pembroke.

The Club also operates a Carmarthen Amateur Radio Society Emergency Team (CARSET) and has assisted in local flooding and also during a major oil spill. If you would like to find out more, a full programme of activities has been arranged for the coming year, which include visits, talks, social events as well as club matters can be obtained from **Roy Holt GW6OLS** (Chairman) on **(01792) 875501** or **Islwyn Hughes GW4ZXL** (Secretary) on **(01267) 231359**.

New Range

A new range of switch-mode nickel-cadmium battery chargers which meet the safety requirements of the toy and hobby markets has been introduced by Arlec Power. The chargers are designed for operation from 230V a.c. or 12V d.c. supplies.

These units incorporate automatic switching from fast charge to trickle charge, with accurate detection of the end of the charging cycle using a delta-peak detection technique. Red, green and yellow l.e.d.s provide indication of fast charge, normal charge and power on, respectively.

More details from **Arlec Power UK Ltd., Kingsway House, Laporte Way, Luton, Bedfordshire LU4 8RJ.**

The CB Series of rapid chargers from Arlec Power.

RADIO & TVDX NEWS

We've heard that Gibraltar's new GBC m.w. transmitter will be located near to the Glacis Estate. The planned GBC-2 TV service has been scrapped and equipment purchased for the project will be used for updating existing GBC-TV equipment. The disliked BBC Prime service will be discontinued. In Botswana the Mmabatho TV service has been closed down. Radio Bop remains on-air and Radio Mmabatho has been absorbed into the SABC's Motsweding-FM service. Hungary's MTV-1 120kW e.r.p. outlet at Budapest is scheduled to close within the next 12 months and possibly during 1998. The Nagykanizsa R1 transmitter remains operational. The former MTV Pecs transmitter radiating 25kW e.r.p., also remains on-air though radiates RTL Klub. There are two MTV-1 relays on ch.R2 running 32 and 38W.

Ulster TV is planning a Northern Irish digital TV service opening early '99 that will air Irish produced programming plus their own regional offerings. This will include input from both RTE and the new commercial TV3 service which opens late '98.

South Africa, now poised to open the first national commercial TV channel, has indicated that a second private network may be given the go-ahead and that one of the unsuccessful bidders for the first round will be offered the franchise for the newly offered channel. The free to air licence will run for eight years.

Advent Television Pte Ltd. will be launching Asia's first digital terrestrial network from Singapore opening this summer for a trial period. Advent will then be free to apply to run the full digital service from end '98. Japan's National Association of Commercial Broadcasters (like the UK's ITCA) has expressed concern on the financial viability of the present commercial stations once digital terrestrial opens. They calculate that pre-tax profits relative to sales will fall from 9% to 5% in 2000 and downwards to 2% 10 years onward.

The Burmese Myanmar (the military regime) have just opened a TV relay transmitter in East Shan state and is transmitting government propaganda/programming into the nearby mountainous region. The USA maintains sanctions against the military run government and as such will not allow any American programming or equipment to be used on the TV service.

Hugh Cocks (Algarve) reports that monitoring 269.650MHz in n.b.f.m. - ideally around a 30kHz bandwidth between about 0800-1700UTC should hear programme output of 'Smile FM 93.9', a local f.m. station in Manila, Philipines. Either harmonic radiation or a studio-transmitter link is being received by a US Navy *COMSAT* around 42°E and is re-radiating the signal. On my AR2002 and discone its a weak signal though present all the time, a λ2 dipole will produce much better signal quality. How often do **you** receive f.m. radio in the UK from S.E. Asia?

OPPORTUNITY IN TURKEY

WorldSpace Corporation and Capital Radio of Ankara recently signed an agreement to use the WorldSpace satellite digital audio radio system to broadcast Capital Radio's programming throughout the Middle East and Eastern Africa.

The agreement calls for Capital Radio to broadcast a 24-hour all-music format channel, transmitted on the *AfriStar* satellite's East Beam. The broadcast will operate on a 64-kilobit bandwidth channel, allowing for higher quality sound and greater flexibility in services. The agreement is for a five-year renewable contract. A valuation of the deal has not been released.

"This venture is an exciting opportunity for WorldSpace to partner with a dynamic and progressive broadcaster in Capital Radio," said Noah Samara, WorldSpace Chairman and CEO. "Turkey is a major target market for us, given its growing middle-class population and sophisticated listening audience. It has also long been respected throughout the Middle Eastern region for its blend of tradition with Western culture. We are excited to be part of its growth in the Middle East and Africa."

Capital Radio began broadcasting on 17 October 1994, via satellite to several markets throughout Turkey and parts of southern Europe. It has developed since then into the largest commercial radio broadcasting facility in this area, which has a potential listening audience of approximately seven million people. Research and ratings show that Capital Radio consistently holds the top listening position in every city in which it operates.

Headquartered in Washington, DC, the WorldSpace business was founded in 1990 to provide direct satellite delivery of digital audio radio communications services to the emerging markets of the world, including Africa, the Middle East, Asia, Latin America and the Caribbean.

By the end of the decade, WorldSpace will have three satellites in orbit, with the first - *AfriStar* - to be launched in late 1998, followed by *AsiaStar* and *AmeriStar*. Each satellite will deliver over 80 channels of crystal clear audio programming directly to portable receivers. This unique global service will transmit quality information, education and entertainment programming to a service area that includes 4.6 billion people.

Send your news to Zoë Crabb at the Editorial Offices

rallies

Butties. Tables are only £2 for six foot table (bookable and payable in advance). Cheques should be made payable to the Horncastle Youth Club, sent to: **Area Youth Office, Cagthorpe, Horncastle, Lincs LN9 6HW**. Entry fee for customers is £1. Please call **Tony Nightingale G6CZV** on **(01507) 522482** or E-mail Tony at: **antony.n@virgin.net** for further details.

July 5: The Harlow & District Amateur Radio Society are holding their Rally and Car Boot Sale (free entrance and parking) at a new and better venue, Mark Hall School, Harlow (A414), First Avenue. Tables inside £15, car boot plots, £7. For the best plots, book early! Talk-in on S22 & SU22. Morse tests on demand. **Len G7UFF** on **(01279) 832700** or FAX on **(01279) 864973** or E-mail: **len.brackstone@virgin.net**

July 5: The 9th York Radio Rally will be held in the Knavesmire Building, York Racecourse, York. Doors open at 1030 and admission is £1.50. Children accompanied with an adult go free. There is ample free car parking. There will be Amateur Radio, electronics and computers, Morse tests and repeater groups, refreshments and a licensed bar. Talk-in on S22. Further details from **Pat Trask G0DRF** on **(01904) 628036**.

July 12: The 18th Sussex Amateur Radio & Computer Fair will take place at the Brighton Race Course from 10.30am to 4pm. There will be free on-site parking and admission to the event is £2. The rally is one of the largest in the South of England with well over 100 trade stands covering Amateur Radio and CB radio, computer and electronics, etc. There is also a large Bring & Buy display area. Refreshments and bars at reasonable prices and a picnic area with views over the South Downs makes this a rally not to be missed! Further details on **(01323) 485704**.

July 19: The McMichael Mobile Rally will be held at the Haymill Youth & Community Centre, 112 Burnham Lane, Slough. Doors open at 1000. There will be trade stands, car boot sale, food and licensed facilities. Talk-in on S22. There will be disabled facilities also. **Dave Chislett** on **(01628) 625720** or for information on bookings, ring **0118-972 3504**.

July 26: The Colchester Radio & Computer Rally is to be held at St Helena School, Sheepen Road, Colchester, adjacent to the Colchester bypass, Avenue of Remembrance. Doors open 10am till 4pm. There will be a wide range of radio and computer traders, amateur radio, car boot sale and a Bring & Buy. RSGB Morse Tests on demand - don't forget to bring two passport size photos. Admission is £1.50. There will be ample free parking and disabled parking which is adjacent to the entrance with full access for wheelchair users. **David 2E1FRO** on **(01206) 369226**.

July 26: The Rugby Radio Rally will take place at the BP Truckstop, A5 Watling Street, Nr Rugby. **Arthur M0ASD** on **(01788) 550778** or **(0966) 433497**.

August 9: The Flight Refuelling ARS Hamfest 98 will take place at the Flight Refuelling Sports Centre, Merley, Wimborne, Dorset. The event will run from 10am till 5pm and will include the usual mix of traders, a Bring & Buy, craft exhibitors, car boot sale and field events. Overnight camping facilities are available for Saturday 8th. Talk-in will be on S22. **Richard Hogan G4VCQ** on **(01202) 691021**.

TOP QSL

Dear Sir

I have been a scanner user for a number of years now and I own a Yupiteru MVT-7000 scanner which I find to be very good at doing its job, however, I am a little disappointed about the length of time that I can use it before the batteries go flat. I gave up on the rechargeable ones years ago in favour of the ordinary ones, because although they do last longer they are not cheaper.

I also have a Nokia 1611 mobile 'phone, which when fully charged, will last some 100 hours, on standby, before it needs to be recharged. Maybe the scanner manufacturers could follow in the mobile 'phone industry footsteps and produce a battery that will have the same kind of performance as the ones in the 'phone.

Perhaps they could invent a scanner whereby the back-light and liquid crystal display are run from a watch battery, which will give it some two years or so life span and run the r.f. and audio stages from the rechargeables. Well, I have had my little gripe, I do like the new look *SWM*, keep up the good work.

Some day I may have enough money to purchase a receiver that will 'does' s.s.b. and I too can join in the fun! Many thanks.

Chris
Cambridgeshire

As many of you are now sending your letters to SWM via E-mail, please remember to provide your full postal address for your letter to be considered, as who knows, your letter could be the next Top QSL and winner of a £20 SWM voucher! ***Zoë.***

Dear Sir

As a s.w.l. since early 1949, I have had opportunity to experience the rewarding advances in technology embodied in the short wave receiver of today.

My equipment during the years has included a Murphy domestic receiver with short wave capability (l.m.s.), a Pye 'Cambridge' valved receiver, a Heathkit home constructed valved communications receiver with 'magic-eye' tuning, a Trio 9R 59DS valved communications receiver, and so the present, a solid state Trio R-2000 communications receiver. The use of those sets has served to accentuate the ongoing advanced performance made in those two desirable specifications, selectivity and sensitivity, the former of which I class paramount.

Now to the point, selectivity today is effectively reduced to a return of those early years by music and other background sounds being superimposed for the purpose of dramatising the spoken word. Most of the major international broadcasters are responsible, including the BBC, Radio Australia, Radio Canada International (e.g. listen to RCI's weekday magazine programme *Spectrum* at 2200UTC on 5.995, 7.235 and 13.650MHz).

The practice is likened to a strong interfering signal on a near or same frequency and negates the essence of international broadcasts, that being clarity of programme content. It would be interesting to know of readers' experience of this now established and undesirable trend.

Dennis Long, Staffordshire

Dear Sir

Why is it that after listening to short wave for about 10 years now it seems to be getting more like CB these days for peoples rudeness, especially the likes of the Italians/French/Spanish. Every time I try to decode some SSTV they are constantly yapping all over the top of everybody's transmissions, they seem to not have heard about the 'gentleman's agreement' with regards to not doing things like this and to make things worse, it also seems to be the case with Morse/RTTY and other modes not staying in their place and spoiling it for all the others who do.

Just the other day I was listening to some slow scan and yet again for about two hours I had Spaniards with massive power and taking up huge bandwidth with distorted modulation wiping out every slow scan (not forgetting other modes also) for several kilohertz around. Is it just me, or do their radios not pick up English talking transmissions as I heard many of them asking them to QSY but they just ignored them? Just seems to me that these countries are not enforcing their licences conditions hard enough.

I have been wanting to go for my licence for a while now, but I am constantly asking myself why bother when it is just becoming an unruly mess out there. I might as well just stick to listening and trying to sort out the jumble and rudeness and not try to have to transmit through it as well!

Just to make a point, a few years back me and a friend (with licence) were operating a TS-130 with just 10W and a very long wire and we were getting back to the mega stations better than they were getting out to others. Just goes to show if you are good with the equipment you do not need kilowatts of power and 150m antennas with mumbo jumbo rigs, etc. wiping out everybody else. Kinda like what they say about men with big sports cars and their lack of something, I guess.

Here's hoping that some lightning strikes the rude ones' radios!

Ian Koenig, Dorset

Dear Sir

I am writing about a letter in the March copy of *SWM* about bigger pictures and about non short wave topics as DXTV. Well, I am a DXTVer. It all started when I first got my copy of *SWM* about six years ago and now I am starting to listen to s.s.b. utilities as well as DXTV.

I am all for making it better, it is excellent as it is now, but where else can you find all topics of radio subjects in one magazine. I also like reading the stories about radio in the war and all the projects that appear from time to time and I read all the subjects from page to page and even Satellite TV News, even if I am not into them.

They are all an excellent read, so please keep up the good work - the top radio magazine

Shaun Taylor, E. Yorkshire

Dear Sir

Having been, in the past, one of the moaners and groaners about aspects of the magazine, I am very pleased to write that I find the magazine's new layout very acceptable. I do find the distorted images in some of the margins weird, but then the same thing appears on our TV screens these days!

Looking back to when you first took over, your development of *SWM* over the years since then is a first class job of work.

P. Townsend, London

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.

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

Dear Sir,

In the current issue of *SWM*, in the article 'What makes a Landmark', there is a picture of an AR88 with digital frequency counter fitted. Can you please tell me whether this picture is one that you have on file, or one that has been supplied from an outside source, if the latter of the two, where? Or do any readers have any info on it?

The reason I ask is that here in Bristol we have quite an avid group of s.w.l./amateur users that congregate on Ch.16/27.155MHz. of the 11 metre band(CB), several of whom have AR88s and would like to fit a counter to them, one or two experiments have been tried the past but without success.

I would also like to add, in defence of the format of the magazine and your editorial, whatever the format you cannot please all of the people all of the time but I shall carry on reading it regardless as will the majority!

Geoff Mansell G-20883 (ISWL)

The photograph of the AR88 was taken from our archives. We think that the digital display was available as a kit from Cirkit, but has long been discontinued. ***Ed.***

Dear Sir

In *SWM* March 1998 there is an interesting article on constructing the 'Medfrex Antenna' for reception of US c.w. stations in the band 1610-1705kHz. However, perhaps you can help me please?

The only signal I find, apart from a navigation beacon (code PCH) is garbled voices over the entire band! The voices can partially be resolved on a.m. mode, I suspect they may be f.m. transmissions and receive them via 'slope' detection. The voices seem to be domestic telephone conversations, probably these remote/radio hand sets. Do these people realise that their private conversations are anything but private? Are these legal frequencies for such use? Both sides of conversations can be heard!

I carried out a test with a friend's 'radiophone' which is a BT approved model. Indeed, it transmits on 1740kHz f.m. and can be heard on a simple antenna (using a general coverage FRG-7 receiver) at approx. 200m.

As with 'Baby Alarms' on 49MHz, people really are bugging their own homes! Your comments required please!

B. Williams GW0GHF
S. Glamorgan

Dear Sir

I decided that I had to write in your defence regarding certain comments made in the letters column recently. I feel the colour and increased photographic content is extremely good. I can't believe that people fail to realise that our magazine is a general overview of the listening hobby in its entirety.

I was enraged to see that in some eyes DXTV is not classed as part of our hobby. And as for propagation not being part of the hobby, well!

Well, I like the improvements as a whole. Even though certain articles aren't for me personally, I understand that others will enjoy them.

I have just one quibble. As a newsagent, I am disappointed to see no newsagents' order form for reservation or delivery. We can get *SWM* in for people and an order form would encourage this.

Name and address withheld.

You can find a newsagents' order form on page 23 of this issue - **KN.**

Dear Sir

May I congratulate on the new look and format of the April edition of *SWM*. In the past I have sat quietly and have read about the type face, backgrounds and all of the other moans from some of your readers, but it is the content that is most important. Now there is the best of both worlds, content and a magazine which would put many to shame.

You may think that I am a reader from just a year or so ago, but I am not. I can go back to the days when the HAC home-brew kit was one of the main advertisers on your front page.

Congratulations and I hope that you have no more 'Moaning Minnies'.

Dennis Stapleton, Huntingdon
Cambs

Dear Sir

I read with dismay some of the comments about the contents of *SWM*. I have a couple of questions for the complainants - What would you like to read about in every issue? Only articles concerning your own favourite mode and portion of the spectrum? This specialising would make a dull read for those into one or more of the many other facets of radio, as well as ruining the best radio magazine there is. Look on *SWM* as a good wide-coverage receiver which covers all bands and modes, it is up to you to select the band you like most but you can still tune the rest of the spectrum!

Dear Sir
Congratulations on the great new look SWM - looks great.
Roger Caird SW2252
Dublin

Like most, my first experiences in radio were broadcast stations. However, by reading articles that dealt with the then (to me) unknown, my horizons were broadened into amateur bands, then utilities, decoding and antenna design and construction. Without the stimulation of reading about other branches of the hobby my interest would probably have waned and I would have missed out on many years of pleasure. At present I have no real interest in, for example, satellite TV, but I read and try to absorb the basics of this branch of the hobby. Why? Because I may try it someday, if so I will have at least a foundation on which to build.

My subscription is safe. *SWM* is read from cover to cover as soon as it is received, re-read until the next issue arrives, then stored for future reference. Criticisms should be constructive, I'm sure Dick and the team would welcome ideas for future articles and construction projects a lot more than nit-picking comments.

Regards.

David Wall.
Lisburn, Co. Antrim

MVT-9000 Manual

Dear Sir

After I saw the letter from Andy Goloskof in April's *SWM*, I went off in search of Richard Wells' web site, as I, too, am totally disillusioned by the quality of the manual for my newly acquired Yupiteru MVT-9000. It didn't prove to be that straightforward to find, as none of the search engines came up with Richard's name, so I thought your readers might find the actual web address useful to have. It is: **http://www.qsl.net/n2mca/RADIO.HTM**

There is an amazing amount of stuff on the site and it's well worth a visit. There are links to other useful web sites, such as Yupiteru's own. And, by the way, Richard's rewrite of the MVT-9000 manual is excellent, and I'm now a proficient user of my new toy!

Bob Elen
Coventry
Warwickshire

Dear Sir

I received the 'new look' *Short Wave Magazine* and I must say I am most impressed. However, I must lament the passing of the regular dedicated 'Scanning' column. I have learned a tremendous amount about the various aspects of our hobby over the years from this column and I would like to thank John Griffiths for all his efforts. His opinions on equipment and accessories have been honest and interesting while his answers to questions have been full and to the point. I for one will miss the column greatly and would like to wish John all the very best for the future in his chosen career.

Like Andy Goloskof (April issue) I, too, have been very disappointed with the manual for the Yupiteru MVT-9000. So, it is with thanks to him that I have discovered the rewrite by Richard Wells on the 'net.

Apart from the rewritten manual, there is a very full and frank review of the MVT-9000 where Mr Wells compares it to other similar scanners types. The review, 14 full A4 pages, does not mince words and comes up with some very surprising remarks.

All the tests are carried out so that we can compare each scanner specification like with like and is written in layman's language so that it is very clearly understood. Thank you, Mr Wells, for a very well written and comprehensive review and owner's guide to the Yupiteru MVT-9000.

H. G. Miller
New Costessey
Norwich

Dear Sir

In reference to Andy Goloskof's letter in the April 98 issue, I too had great difficulty in understanding the manual supplied with the Yupiteru MVT-9000, that is until I twigged on that the page numbers in the index were all wrong, i.e. page 27 'mode scan' does not exist in the index and page 21 in the index should be page 19, etc.

I spent countless telephone calls to the well known main dealer I bought the set from and even they were stuck on a lot of questions, even to the point where I had to tell them how to open Bank 'B' in scanning mode.

I would be most interested in getting a copy of Rich Wells' 'rewritten' manual, but unfortunately I do not have access to the 'net, so could you please suggest how I may obtain a copy.

D. Henderson
Hartlepool

For those readers who do not have Internet access, photocopies of Rich Wells' 'rewritten' manual for the MVT-9000 scanner are available from the Editorial Offices. The 'standard charges for photocopies of articles apply, making the cost of the handbook and review a total of £3.85. ***Ed.***

ed's comments

Farewell

It' doesn't seem like eleven years have passed since I took over as Editor of *SWM* and relaunched it as a magazine for the listening enthusiast. Then the circulation was just 3000 and going down and the paid for advertising amounted to about three pages - quarto pages at that! My aim then was to produce a magazine that would be informative as well as a 'good read' and would cover all aspects of listening.

I would like to think that I have managed to achieve that goal - helped along the way by a succession of excellent Editorial staffers and, of course, the best authors and columnists available, anywhere. With their help, *SWM* has long been the best-selling hobby radio magazine in the UK. To them, and you the readers, I would like to say "thank you".

Now it is time for me to bow out. I'm sure that Kevin Nice, who assumes the Editor's mantle with the July issue, will take the magazine on to new heights - ably assisted by Zoë, of course.

As for me, I am going off to play trains. Many of you will know that, although I have been interested in radio from about the age of eight, my real hobby is model railways and model engineering. I intend to build a new workshop and finish the many projects that are languishing in boxes or under covers. Any reader who is in the Bournemouth area on a Sunday is welcome to visit the miniature railway in Kings Park - you never know, you might even get to ride behind one of my locomotives.

Over the last fifteen years or so, Brown Owl and I have taken the *SWM* and *Practical Wireless* stand to many rallies, making a lot of friends in the process. We will miss you all.

Over to you, Kevin.

Dick Ganderton G8VFH

Greg Baker,
PO Box 3307, Manuka,
ACT 2603,
Australia

Bandscan Australia

Australian radio and television seem to have been really humming in the past few months. In this column I have news of digital radio and television, telecommunications, bush television services, defence radar and a swag of other news including more Radio Australia reception reports.

Digital Television

Digital television broadcasting has come a step closer in Australia with the announcement by the government of start-up dates and licence conditions for high definition television (HDTV). Commercial and nation free-to-air broadcasters will be required to start these transmissions in metropolitan areas by 1 January 2001 and to progressively extend the services so that all areas are covered by 1 January 2004.

Included in these plans are an eight year overlapping period with simultaneous analogue services to not disadvantage people with old analogue receivers. To facilitate this changeover, the government has decided to allocate an additional 7MHz of spectrum free of charge for the eight year period to each existing free-to-air broadcaster.

As well as providing HDTV, these transmissions will permit a range of additional services including a range of data services. In recognition of the high costs of this conversion, the government will not permit new entrants to the free-to-air television transmission market until after December 2008.

Digital Radio

Digital radio is also scheduled to begin in Australia in 2001 using the Eureka 147 system. This system will use the L-band but in regional areas some consideration will be given to the use of the v.h.f. spectrum. The government has put in place a planning process involving government representatives and industry bodies to examine technical issues and to develop appropriate legislation.

It is expected that commercial, community and national broadcasters will be permitted to convert their transmissions to digital but they will be expected to ensure a period of overlap with existing analogue services. New entrants to the digital radio market are expected in the new digital era.

Telecommunications

The national telecommunications carrier Telstra which was one third privatised last year is now targeted for full privatisation if the government has its way. In this situation, there is considerable concern particularly in the rural community that telecommunications service levels will decline if a purely commercial regime is instituted.

To reassure these people and to bolster what appears to be largely an ideological commitment to the privatisation of national assets, the government has made a commitment that telecommunications carriers will be required by law to provide all Australians with telephone services at prescribed levels. This guarantee would mean a retention of untimed local voice and data calls for residential customers and untimed local voice calls for business customers.

REACH

There has been an outcry recently from country-based freelance television stringers who fear they will be cut off from providing timely coverage of events in the bush. To date, the national telecommunications carrier Telstra has provided access to their transmission network to allow the stringers and television industry personnel to send and receive timely pictures to and from country locations.

This access system, called REACH, at one time contained as many as 140 access points across Australia. This has been progressively reduced over the past few years to around 100 points.

Recently Telstra announced that it planned to cease the REACH service altogether by the end of February 1998. Telstra claimed that the REACH system was underutilised and that its removal would allow better use to be made of the system capacity. This led to an outcry, in part because of the shortness of notice, from the television networks.

In response, Telstra has agreed to keep 29 REACH points open until July - August 1998. In this time television networks are supposed to explore other transmission options including the use of satellite news gathering equipment.

Stringers remain unhappy about this however, feeling that they are being forced to outlay large sums of money for satellite equipment and they fear that news from the bush will lose its immediacy in the cities if footage has to be flown to major centres. They argue that rural issues will be devalued further among city audiences than they appear to be at the moment.

My feeling is that the Telstra move is more in line with maintaining its commercial bottom line in the run up to privatisation than in attempting to provide a full range of community services.

Radio Australia Reception

For this issue, more *SWM* listeners have provided reception reports from Radio Australia (RA).

Mike Dickinson has written again to say that RA can be heard on 9.500MHz from 2000 to 2200UTC. Mike says that he has been unable to find this time for this frequency on RA's web site.

I notice that RA transmits English to Asia on 9.500MHz from 1430-2200UTC and RA bills this as being able to be heard in Western Europe. For the Internet equipped the site I tried is **http://www.abc.net.au/ra/special.htm.**

Ed van den Heever has brought me a rare report from South Africa. There he has heard RA on 17.750MHz from 0630-0800UTC, 11.880MHz from 0643-0800UTC and 15.240MHz from 0643-0800UTC. Ed's shack runs to an Icom 725, a Grundig Sat 600 and a Sony SW55 fed via an MFJ 595 tuner from a delta loop with a maximum height of 16 metres above ground level. His signals of RA come in at 5/7 and 7/9 and he says that his antenna system renders wonderful clear sounds with very little atmospheric noise. Given its height that comment does not come as a huge surprise.

Albert Moulder using an Icom 751 and a long wire has brought in 11.660MHz at 1555UTC at SINPO 44444. He says that the 9.500MHz signal could only just be heard using l.s.b.

Adam Farnsworth reports that he has pulled in 9.500MHz at around 2000UTC at SIO 555 using a Matsui 220WR without an external antenna. Adam wonders the target area for this signal. This signal must be the same as that picked up by Mike and noted above. This transmission is from Shepparton in Victoria running 100kW aimed at a bearing of 329°.

Martyn Gardiner from Portsmouth has been onto RA again with his Drake R8E and JRC NRD-535 through a long wire antenna. He has reported 9.500MHz clearly from 2030-2130UTC but less strong until close at 2200UTC.

The 17.750MHz signal has been weak but readable in the period 0826-0900UTC, he says that 15.415MHz was audible at 0715UTC but weak at 0830UTC. He says that 13.605MHz was audible from 0700UTC. Martyn reports interference also with the 11.880MHz RA signal from 0900UTC and 9.500MHz from 1830-1900UTC.

Other News

The SBS television network has been extended to take in an additional 230000 New South Wales residents. SBS broadcasts a mix of English and foreign language programs.

Nine organisations have lodged expressions of interest for the auction of parts of the 800MHz and 1.8GHz spectrum. The government believes that this augers well for increased competition and better and cheaper services for mobile 'phone users. Given the small Australian market size it remains to be seen whether the long run shake out in the industry will lead to better prices and services for customers.

The government has decided to amend legislation to force local pay television operators to comply with 10% Australian content rules. The government claims to be concerned that spending on Australian drama on pay television has fallen below that level.

I welcome any news and comments. In particular I am interested in any s.w.l. information on Australian stations heard by *SWM* readers so I can chase up more details and interesting snippets from this end. My address is **PO Box 3307, Manuka, ACT 2603, Australia**. For personal replies please send two IRCs. Those with an Internet connection can get me at **greg@pcug.org.au**

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

LM&S

Many of the international broadcasters altered their s.w. schedules at the end of March. Some of these changes are reflected in the data herein. The latest reports reaching me indicate that some broadcasts, which could be received quite well prior to these schedule changes, now suffer from an intolerable amount of co-channel interference.

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 March.

In the hope of receiving at night some of the broadcasts from l.w. European stations over transatlantic paths **Jacques d'Avignon** (Peterborough, Ontario) and three other listeners set up a temporary receiving site at an r.f. quiet location for use during the weekend of March 14/15. A Beverage antenna, over 330m long and directed to Europe, was coupled to three different receivers. The broadcasts from Allouis, France (2000kW) on **162kHz**; the BBC via Droitwich (500kW), Burghead (50kW) & Westerglen (50kW) on **198**; also Tipaza, Algeria on **252** were very well received but the best signal came from Gufuskalar, Iceland (300kW) on **189** - it was as good as a local!

Medium Wave Reports

The reports suggest that very few of the broadcasts from m.w. stations in E.Canada and E.USA reached the UK at night during March. Frequent checks were made by **Robert Connolly** (Kilkeel, Co.Down) but he found the conditions poor, except for two nights when a few stations were identified. On the 8th he heard CKVO in Clarenville, NF on **710kHz** (SINPO 23322 at 0115UTC); CHAM Hamilton, ON on **820** (22222 at 0125); WINS New York, NY on **1010** (22222 at 0140); WTOP Washington, DC on **1500** (22332 at 0150); also WCMQ Miami Springs, FL on **1700** (22222 at 0200). On the 17th CKVO was 23332 at 0150 and WCMQ was 22222 at 0210.

A broadcast from WNRB in Boston, MA on **1510** was picked up at 0240 by **David Hall** in Morpeth. It peaked 23322. On the 31st **John Slater** (Scalloway, Shetland) heard a very brief snatch of a broadcast on **930kHz**, which probably originated from CJYQ in St.John's, NF.

Also received at night were the sky waves from some of the m.w. stations in the Middle East, N.Africa, Europe, Russia and Scandinavia - see chart. VOA via Kuwait City on **1548** was logged by **Brian Keyte** (Gt.Bookham) as 33532 at 0010. During daylight the ground waves from some m.w. local radio outlets reached remarkably distant places - see chart. The return of BBC R.Gloucestershire to the m.w. band was mentioned by **Simon Hockenhull** (E.Bristol) and others. A transmitter at Bourton-on-the-Water is to serve E.Gloucestershire and another at Berkley Heath will serve SW.Gloucestershire and the Forest of Dean. Both will operate on **1413kHz**. From **George Millmore** (Wootton, IoW) came the news that ILR Isle of Wight Radio is about to cease using **1242kHz** - they are transferring their service to **107MHz** in the v.h.f. band (**102MHz** for Ventnor).

LONG WAVE CHART

Freq (kHz)	Station	Country	Power (kW)	Listener
153	Bechar	Algeria	1000	G*
153	Donebach DLF	Germany	500	A,C*,D,E*,F,G*,H*,I,J,K,L
162	Allouis	France	2000	A,B*,D*,E*,F,G*, H*,I,J,K,L
171	Nador Medi-1	Morocco	2000	G*
171	B'shakovo etc	Russia	1200	A,D*,E*,F,J*,K,L
171	Lvov	Ukraine	500	H*
177	Dranienburg	Germany	750	A,C*,D*,E*,F,H*,I,J,K,L
183	Saarlouis	Germany	2000	A,D*,E*,F,G*,H*,I,J,K,L
189	Gufuskalar	W.Iceland	150	B*
198	Droitwich BBC	UK	500	A,B*,D,E*,F,H*,I,J,K,L
207	Munich DLF	Germany	500	A*,C*,D*,E*,F,G*, H*,I,J*,K,L
207	Azilal	Morocco	800	G*,H*
216	Roumoules RMC	S.France	1400	A,C*,D,E*,F,G*,H,I,J*,K,L
225	Raszyn Resv	Poland	?	A,D*,F,G*,H,K
234	Beidweiler	Luxembourg	2000	A,D,E*,F,G*,H,I,J*,K,L
243	Kalundborg	Denmark	300	A,C*,D*,E*,F,H,K,L
252	Tipaza	Algeria	1500	B*,C*,D*,G*,H,J*
252	Atlantic 252	S.Ireland	500	A,D*,E*,F,G*,H,I,J,K,L
261	Burg(R.Ropa)	Germany	200	C*,D*,F,G*,H,J*,K
270	Topolna	Czech Rep	1500	D*,E*,F*,G*,H,K,L
279	Sasnovy	Belarus	500	D*,E*,F*,H,K

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

Listeners:-
(A) Martin Dale, Stockport.
(B) Jacques d'Avignon, Ontario, Canada.
(C) Simon Hockenhull, E.Bristol.
(D) Sheila Hughes, Morden.
(E) Eddie McKeown, Newry.
(F) George Millmore, Wootton, IoW.
(G) Fred Pallant, Storrington.
(H) Harry Richards, Barton-on-Humber.
(I) Tom Smyth, Co.Fermanagh.
(J) David Stevenson, Swansea.
(K) Ernie Strong, Ramsey, Cambs.
(L) Phil Townsend, E.London.

Short Wave Reports

Many listeners were disappointed to find no mention of the **25MHz (11m)** band in the broadcast schedules introduced at the end of March.

Quite a few broadcasters are taking advantage of the conditions now prevailing in the **21MHz (13m)** band. They include DW via Sri Lanka **21.705** (Eng to W.Africa, Far East 0600-0650), rated 45554 at 0605 by **John Parry** in Larnaca, Cyprus; Voice of Russia **21.760** (Eng [WS]) 44444 at 0800 by **Bernard Curtis** in Stalbridge; BSKSA Saudi Arabia **21.495** (Ar [Holy Quran] to SE.Asia 0900-1200) 45444 at 0910 by **Vic Prier** in Colyton; R.Prague via Rimavska Sobota **21.745** (Eng to Australia 0900-0930) 35333 at 0925 by **Darren Beasley** in Bridgwater; UAER, Dubai **21.605** (Eng to Eur 1030-1100) SIO544 at 1048 by **Philip Rambaut** in Macclesfield; RFI via Issoudun? **21.580** (Fr to S.Africa 0900-1600) 23332 at 1050 in Kilkeel; BBC via Ascension Is **21.660** (Eng to W/E/S.Africa 1100-1700) 34333 at 1102 by **Rhoderick Illman** in Oxted; R.Portugal Int via Sines **21.655** (Port to Brazil 0800-2100 Sat/Sun) 35443 at 1120 by **Ross Lockley** in Galashiels; RFI via Issoudun 21.620 (Fr to E.Africa 0900?-1500) 25333 at 1140 in E.Bristol; BBC via Ascension Is **21.640** (Eng? to S.Africa? 1200-1245) 41144 at 1200 in Morpeth; R.Sweden **21.810** (Sw to ? 1200-1230) 44444 at 1220 by Thomas Williams in Truro; R.Prague via Rimavska Sobota **21.745** (Eng to N.America?, E.Africa? 1300-1330) 44343 at 1300 by **Eddie McKeown** in Newry; Voice of Russia **21.760** (Eng [WS]) 44444 at 1320 by **Fred Pallant** in Storrington; DW via Wertachtal **21.705** (Ar to M.East 1300-1600) 32232 at 1325 by **Robert Hughes** in Liverpool; UAER, Dubai **21.605** (Eng to Eur 1330-1355) SIO444 at 1330 by **Tom Smyth** in Co.Fermanagh; BBC via Cyprus **21.470** (Eng to E.Africa 1400-1700) 44433 at 1435 by **Stan Evans** in Herstmonceux; HCJB Quito, Ecuador **21.455** (Eng, u.s.b. + p.c.) 23433 at 1521 by **Richard Reynolds** in Guildford; WYFR via Okeechobee, USA **21.525** (Eng, Fr, Port to Eur, Africa 1600-2100?) SIO232 at 1616 by **John Eaton** in Woking.

The new **19MHz (15m)** broadcast band, which extends from **18.900** to **19.020MHz**, is now being used by R.Norway Int for an a.m. transmission to S.America on **18.950** (Norw 1000-1030). It was rated 54444 at 1000 in Scalloway. Later, they broadcast to W/S.Africa on **18.950** (Norw [Eng Sun] 1800-1830).

More extensive use is being made of the **17MHz (16m)** band by some broadcasters. During the morning China Nat. Radio **17.605** (Chin [CNR-1] 0100-1100) was rated 44444 at 0600 by **Bill Griffith** while in Damietta, N.Egypt; BBC via Masirah **17.790** (Eng to Asia 0600-0800) 45554 at 0605 in Cyprus; R.Australia via Shepparton **17.750** (Eng to Asia 0600-0900) 35543 at 0814 by **David Edwardson** in Wallsend; DW via Rwanda? **17.800** (Eng to Africa 0900-0950) 54444 at 0908 by **Chris Shorten** in Norwich; BSKSA via Riyadh **17.880** (Ar [Holy Quran] to SE.Asia 0900-1200) 43333 at 0940 in Truro; Israel R, Jerusalem **17.545** (Heb [Home Sce rly] to W.Eur, N.America 0700-1455) 43333 at 1015 in Stalbridge; R.Austria Int via Moosbrunn **17.870** (Eng, Ger to Australasia 0930-1030) SIO444 at 1030 in Co.Fermanagh; REE via Noblejas? **17.715/17.755** (Sp to S.America 0900-1900) 24432 at 1031 in Oxted; AIR via Bangalore **17.387** (Eng to Pacific areas 1000-1100) 44444 at 1040 in Kilkeel; R.Pakistan, Islamabad **17.835** (Eng to Eur 1100-1120) 44343 at 1105 in Newry; SRI via Schwarzenburg? **17.515** (Eng, Ger, Fr, It to Far East, SE.Asia 1100-1330) 55455 at 1140 in Liverpool.

After mid-day the BBC via Skelton & Woofferton, UK **17.640** (Eng to E.Eur, M.East, E.Africa 0700-1500) was 25432 at 1248 in E.Bristol; R.Romania Int **17.770** (Eng to Eur? 1300-1356) 45544 at 1300 in Galashiels; BBC via Ascension Is **17.830** (Eng to W/C.Africa 0730-2100) 54554 at 1305 by **Bill Griffith** while in NW Mauritius & 22222 at 1710 by **Ernest Wiles** in NE.Bedford; Israel R, Jerusalem **17.535** (Eng to Eur, N.America 1400-1430) 54444 at 1400 by **Sheila Hughes** in Morden; BBC via Antigua, W.Indies **17.840** (Eng to S/C.America 1400-1700) SIO323 at 1404 in Woking; VOA via Morocco **17.895** (Eng

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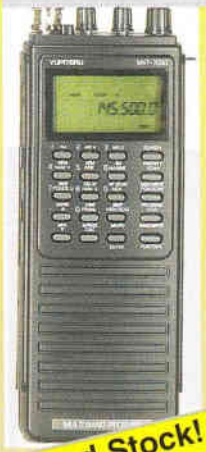

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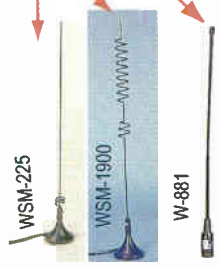

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to Africa 1600-1900) 44444 at 1739 by **Vera Brindley** in Woodhall Spa; WYFR via Okeechobee, USA **17.555** (Eng, Ger to Eur ?-2045?) SIO432 at 1815 in Macclesfield; Christian Science Monitor via WSHB **17.510** (Fr to Africa 1900-1955) 32233 at 1933 in Morpeth; WHRI South Bend, USA **17.655** (Eng to E.USA, Eur 1500-?) 25333 at 1847 in Storrington; R.Nederlands via Bonaire, Ned Antilles **17.605** (Eng to Africa 1830-2025) 45544 at 2005 in Bridgwater.

Broadcasts to many areas are scheduled in the **15MHz (19m)** band throughout the day. Before noon the Voice of Nigeria via Ikorodu **15.120** (Eng) was 35553 at 0635 in Cyprus & 33333 at 1030 in Stalbridge; R.Australia via Shepparton **15.415** (Eng to Asia 0100-0400, 0600-0900) 34434 at 0827 by **Tony Hall** in Freshwater Bay; also **15.510** (Eng to SW/C.Pacific 2200-0900) 44444 at 0835 in Herstmonceux; R.Norway Int **15.175** (Norw [Eng Sun] to Australia, S.America 0900-0930) 44444 at 0900 in Truro; BBC via Skelton & Rampisham, UK **15.565** (Eng to Eur, M.East, Africa 0600-1500) SIO333 at 0921 by **Francis Hearne** in N.Bristol; R.Oman via Thumrait **15.140** (Ar to M.East 0800-1600) 34232 at 1050 in Oxted; BBC via Antigua, W.Indies 15.220 (Eng to C/N.America 1100-1400) 34443 at 1100 in Kilkeel; VOIRI Tehran **15.260** (Eng to M.East, Asia 1100-1230) 32233 at 1130 in Morpeth.

During the afternoon RFI via Allouis? **15.155** (Eng to Eur, Africa 1200-1300) was 43343 at 1203 in Norwich; WWCR Nashville, USA **15.685** (Eng to N.America, Eur 1100-2200) 32232 at 1240 in Liverpool; WEWN via Vandiver, USA **15.745** (Eng to Eur, Africa? 1100?-2000?) 33333 at 1241 by **Tom Winzor** in Plymouth; BBC via Cyprus **15.575** (Eng to M.East, E.Eur 0900-1500) 24422 at 1255 in E.Bristol; BBC via Skelton, UK **15.485** (Eng to Eur, Africa 0700-2000) 33333 at 1256 by **Tim Allison** in Middlesbrough; RCI via Sines, Portugal **15.325** (Eng to Eur, M.East, Africa 1330-1400) SIO444 at 1330 in Co.Fermanagh; UAER, Dubai 15.395 (Eng to Eur 1330-1355) 31322 at 1330 in Newry; R.East Africa, Eq.Guinea **15.185** (Eng 0700-1700 Sat/Sun) 53433 at 1511 in Guildford; Africa No.1, Gabon **15.475** (Fr to W.Africa 1600-1900) 32442 at 1633 in Storrington; VOA via Botswana? **15.445** (Eng to Africa 1600-1800) 44444 at 1645 in NE.Bedford; WYFR via Okeechobee **15.695** (Eng to Eur, Africa 1600-2100?) 44444 at 1723 in Woodhall Spa.

Later, R.Sweden via Horby **15.735** (Eng to ? 1730-1758) was 34333 at 1755 in Scalloway; R.Norway Int **15.735** (Norw [Eng Sun] to Eur, C.Africa 1800-1830) 44444 at 1800 in Storrington; Channel Africa via Meyerton **15.240** (Eng to W.Africa 1800-1830) 45554 at 1803 in Wallsend; R.Denmark via RNI **15.735** (Da to ? 1830-1855) 44434 at 1830 in Storrington; AIR via Aligarh **15.075** (Eng to E.Africa 1745-1945) SIO111 at 1830 in Macclesfield; RNB Brazil **15.265** (Port, Eng, Ger to Eur 1630-2020) 25332 at 1820 in Bridgwater; BBC via Ascension Is **15.400** (Eng to Africa 1500-1930) 44423 at 1850 in Colyton; R.Nederlands via Bonaire, Ned.Antilles **15.315** (Eng to Africa 1830-2025) 44344 at 1932 in Woking; WRNO New Orleans, USA **15.420** (Eng to E.USA, Eur 1600-2300) 34433 at 2030 in Galashiels.

An improvement in reception from some areas has been noted in the **13MHz (22m)** band. The occupants include SRI via Sottens? **13.685** (Eng, It, Ger, Fr to Australasia 0830-1030), rated 33333 at 0835 in Truro; UAER, Dubai **13.675** (Eng to Eur 1030-1055) 34343 at 1037 in Middlesbrough; R.Austria Int via Moosbrunn **13.730** (Eng to Eur, N.America 1230-1300) 54444 at 1235 in Plymouth; R.Prague via Litomysl **13.580** (Eng to Africa 1300-1327) 44444 at 1300 in Morden; UAER, Dubai **13.675** (Eng to Eur 1330-1355) 44444 at 1330 in Storrington; R.Sweden via Horby **13.740** (Eng to Asia? 1330-1358) SIO444 at 1330 in Co.Fermanagh; UAER, Dubai **13.675** (Eng to Eur 1600-1640) 43444 at 1630 in Woking; also **13.630**, rated 44444 at 1635 in Norwich; AIR via Bangalore **13.620** (Ar to M.East 1730-1945) 43333 at 1745 in Colyton; WHRI South Bend, USA **13.760** (Eng to E.USA, Eur 1500-2100) 34233 at 1837 in Woodhall Spa; DW via Sri Lanka? **13.790** (Eng to W.Africa 1900-1950) 43333 at 1905 in Storrington; Vatican R, Italy **13.765** (Eng to W.Africa 2000-2030) 54454 at 2005 in Liverpool; Christian Science Monitor via WSHB Cyprus Creek, USA **13.770** (Various to Eur 2000-2157) 45344 at 2100 in Newry; R.Havana Cuba **13.715** (Eng to Eur [also **13.605** u.s.b.] 2030-2130) 35433 at 2101 in Bridgwater; RCI via Sackville **13.650** (Eng, Fr to Eur, Africa 2000-2200) 55545 at 2115 in E.Bristol; WWCR Nashville, USA **13.845** (Eng to Africa 1400-0000) 44444 at 2130 in Kilkeel; AWR Panamerica, Costa Rica **13.750** (Eng to C/N.America 2300?-0000?) 54434 at 2342 in Guildford.

LOCAL RADIO CHART

Freq (kHz)	Station	ILR BBC	e.m.r.p (kW)	Listener
558	Spectrum, London	I	0.80	C,D,H,I,K,L
585	R.Solway	B	2.00	B
603	Cheltenham R.	I	0.10	B,C,F,H,I,K
603	Capital G,Litt'brne	I	0.10	F,H,I,L,M
630	R.Bedfordshire(3CR)	B	0.20	B,C,D,F*,H,I,M
630	R.Cornwall	B	2.00	B,H,I,J,K,N
657	R.Clwyd	B	2.00	B,H,I,M
657	R.Cornwall	B	0.50	B,H,I,K
666	Gemini AM, Exeter	I	0.34	F*,H,I,K
666	R.York	B	0.80	B,C,F*,H,L,M
729	BBC Essex	B	0.20	D,F,H,I,L,M
738	Hereford/Worcester	B	0.037	C,H,I,M
756	R.Cumbria	B	1.00	B,H
756	R.Maldwyn, Powys	I	0.63	B,C,H,I,K,L
765	BBC Essex	B	0.50	D,F,H,I,L
774	R.Kent	B	0.70	F,H,I,L,M
774	R.Leeds	B	0.50	B,C,H
774	Cl.Gold 774, Glos	I	0.14	H,I
792	Cl.Gold 792,Bedford	I	0.27	H,I,L,M
792	R.Foyle	B	1.00	B,J
801	R.Devon & Dorset	B	2.00	B,C,H,I,K
828	Cl.Gold 828, Luton	I	0.20	H,L,M
828	Magic 828, Leeds	I	0.12	C
828	Asian Netwk Sedgley	B	0.20	C
828	2CR CG, Bournemouth	I	0.27	I,K
828	Townland R, Ulster	I	0.80	B,J
837	R.Cumbria/Furness	B	1.50	B
837	Asian Netwk Leics	B	0.45	C,D,H,I,K,L,M
855	R.Devon & Dorset	B	1.00	B,H,I
855	R.Lancashire	B	1.50	B,C
855	R.Norfolk, Postwick	B	1.50	H,L,M
855	Sunshine 855,Ludlow	I	0.15	H,K
873	R.Norfolk, W.Lynn	B	0.30	C,H,I,L,M
936	Brunel CG, W.Wilts	I	0.18	H,I,L
936	Yks Dales R, Howes	I	1.00	B,H
945	Derby (Gem AM)	I	0.20	A,C,H,L
945	S.Coast R, Bexhill	I	0.75	D,F,H,I,L,M
954	Gemini AM, Torquay	I	0.32	H,I,K
954	Cl.Gold 954, H'ford	I	0.16	C,E,H
963	Asian Sd,Manchester	I	0.80	A,B,C,H
963	Liberty R, Hackney	I	1.00	H,I,L
972	Liberty R, Southall	I	1.00	H,L
990	R.Devon & Dorset	B	1.00	B,H,I,K
990	Big Easy Magic AM	I	0.25	A,C
990	WABC, Wolverhampton	I	0.09	C,H
999	Gem AM, Nottingham	I	0.25	C,H,L
999	Red Rose 9-99 P'stn	I	0.80	A,B,C
999	R.Solent	B	1.00	H,I
999	Valleys R. Aberdare	I	0.300	K
1017	WABC, Shrewsbury	I	0.70	A,B,C,H
1026	R.Cambridgeshire	B	0.50	A,C,D,H,L,M
1026	Downtown, Belfast	I	1.70	B,J
1026	R.Jersey	B	1.00	H,I,K
1035	RTL Country 1035	I	1.00	C*,H,I,L
1035	R.Sheffield	B	1.00	B,C
1035	N.Sound 2, Aberdeen	I	0.78	A,B,H*
1116	R.Derby	B	1.20	A,B,C,H,L,M
1116	R.Guernsey	B	0.50	H,I
1116	Valleys R.Ebbw Vale	I	0.50	E,K
1152	Amber, Norwich	I	0.83	L
1152	LBC 1152	I	23.50	H,I
1152	Pic'ly 1152,Manch'r	I	1.50	B,C
1161	R.Bedfordshire(3CR)	B	0.10	F*,H,L,M
1161	Brunel CG, Swindon	I	0.16	H,I
1161	Big Easy Magic 1G	I	0.35	H
1161	Southern Counties R	B	1.00	H,I
1161	Tay AM, Dundee	I	1.40	H
1170	Amber SGR, Ipswich	I	0.28	L,M
1170	GNR, Stockton	I	0.32	B
1170	SCR, Portsmouth	I	0.50	H,I
1170	Signal 2,Stoke-on-T	I	0.20	C
1170	Swansea Snd,Swansea	I	0.58	K
1170	1170AM,High Wycombe	I	0.25	F,H,M
1242	Capital G,Maidstone	I	0.32	F,H,M
1242	IoW Radio, Wootton	I	0.50	H,I
1251	Amber SGR,Bury StEd	I	0.76	B,H,L,M
1260	Brunel CG, Bristol	I	1.60	H,I
1260	Marcher G, Wrexham	I	0.64	C
1260	SabrasSnd,Leicester	I	0.29	H,L
1260	R.York	B	0.50	B
1296	Radio XL,Birmingham	I	5.00	B,C,H,I,K*,L
1305	Big Easy Magic AM	I	0.15	B,C
1305	Premier via ?	I	0.50	D,H,I,L
1305	Touch AM, Newport	I	0.20	I
1323	S.Coast R,Southwick	I	0.50	F,H,I
1323	SomersetSnd,Bristol	B	0.63	K
1332	Premier, Battersea	I	1.00	D,H,I
1332	Cl.Gold 1332,Pt'bo	I	0.60	B,C,H,L
1359	The Breeze,Chelms'd	I	0.28	L
1359	Cl.Gold D9, C'try	I	0.27	H
1359	R.Solent	B	0.85	H,I
1359	Touch AM, Cardiff	I	0.20	K*
1368	R.Lincolnshire	B	2.00	A,H,L,M
1368	Southern Counties R	B	0.50	F*,H,I,M
1368	Wiltshire Sound	B	0.10	I
1377	Asian Sd, Rochdale	I	0.10	C
1413	Premier via ?	I	0.50	H,I,K*,L
1413	Yks Dales R,Skipton	I	0.10	B,C
1431	The Breeze,Southend	I	0.35	A*,G,H,L,M
1431	Cl.Gold, Reading	I	0.14	H,I,K*,L
1449	R.Peterboro/Cambs	B	0.15	B,H,I,L
1458	R.Cumbria	B	0.50	B
1458	R.Devon & Dorset	B	2.00	B,H,I
1458	1458 Lite AM Manch'	I	5.00	C
1458	Sunrise, London	I	50.00	C*,H,I,K*
1458	Asian Netwk Langley	B	5.00	L*
1476	CountySnd,Guildford	I	0.50	G,H,I
1485	Cl.Gold, Newbury	I	1.00	H
1485	R.Humberside (Hull)	B	1.00	L*
1485	R.Merseyside	B	1.20	B,C,F*,I,J
1485	Southern Counties R	B	1.00	H,I
1503	R.Stoke-on-Trent	B	1.00	B,C,H,I
1521	R.1521 Craigavon,NI	I	0.50	B,J
1521	Fame 1521, Reigate	I	0.64	H,I,M
1530	R.Essex	B	0.15	F,G,H,I,M
1530	Cl.Gold W.Yorks	I	0.74	B,C,H
1530	Cl.Gold Worcester	I	0.52	H,I
1548	R.Bristol	B	5.00	H,I,K
1548	Capital G, London	I	97.50	H,I,K*,L*
1548	Magic 1548 Liverp'l	I	4.40	B,C,H*
1548	Forth AM, Edinburgh	I	2.20	H*
1557	R.Lancashire	B	0.25	B,C
1557	Mellow, Clacton	I	0.125	A*,H
1557	Cl.Gold 1557,N.hant	I	0.76	H,K*,L*
1557	S.Coast R, So'ton	I	0.50	H,I
1584	KCBC, Kettering	I	0.04	C*,H,L*
1584	London Turkish R	I	0.20	D,G,H,I,K*
1584	R.Nottingham	B	1.00	H
1584	R.Shropshire	B	0.50	B,H
1584	Tay, Perth	I	0.21	H
1602	R.Kent	B	0.25	B,F,H,I,M

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

Listeners:-
(A)Tim Allison, Middlesbrough.
(B)Robert Connolly, Kilkeel.
(C)Martin Dale, Stockport.
(D)John Eaton, Woking.
(E)Simon Hockenhull, E.Bristol.
(F)Sheila Hughes, Morden.
(G)Rhoderick Illman, Dxted.
(H)Brian Keyte, Bookham.
(I)George Millmore, Wootton, IoW.
(J)Tom Smyth, Co.Fermanagh.
(K)David Stevenson, Swansea.
(L)Ernie Strong, Ramsey, Cambs.
(M)Phil Townsend, E.London.
(N)Tom Winzor, Plymouth.

There is much to interest the listener in the **11MHz (25m)** band throughout the day. Before noon, HCJB Quito, Ecuador **11.960** (Eng to Eur, America 0700-0855) was 43443 at 0600 in Morden; R.New Zealand Int on **11.905** (Eng to Pacific areas 0459-0800) 35533 at 0710 in Wallsend; R.Australia via Shepparton **11.880** (Eng to Pacific 0600-0830) 43333 at 0815 in Herstmonceux; R.Korea Int via Sackville, Canada **11.715** (Eng to S.America? 1030-1100) SIO322 at 1030 in Co.Fermanagh; R.Jordan via Al Karanah **11.690** (Eng to W.Eur, E.USA 1100-1730) SIO544 at 1130 in Macclesfield; REE via Noblejas **12.035** (Sp to Eur 0700-1700) 44444 at 1130 in Stalbridge.

During the afternoon ISBS Reykjavik **11.402** (Ic [u.s.b.+ p.c] to Eur 1215-1300) was 44333 at 1240 in Oxted; Voice of Vietnam, Hanoi **12.020** (Eng to F.East 1330-1350) 34333 at 1334 in Newry; R.Australia via Shepparton **11.660** (Eng to Asia 1330-1700) 44444 at 1500 by **Gerald Guest** in Dudley; R.Pakistan, Islamabad **11.570** (Eng to M.East 1600-1630) 54444 at 1620 in Norwich; R.Japan via Sri Lanka **11.880** (Eng to M.East, N.Africa 1700-1800) 33333 at 1700 in Scalloway; WWCR Nashville, USA **12.160** (Eng to N.America, Eur 1400?-2200) 33333 at 1700 in NE.Bedford; BBC via Skelton & Woofferton, UK 12.095 (Eng to Eur, N/W.Africa 0400-2000) 54554 at

1810 in NW.Mauritius.

Later, DW via Rwanda **11.810** (Eng to W.Africa 1900-1950) was rated 44444 at 1911 by **Martin Dale** in Stockport; R.Kuwait via Kabd **11.990** (Eng to Eur, N.America 1800-2100) was 44444 at 1920 in Galshiels; Voice of Russia **11.675** (Eng [WS]) 44434 at 1935 in Freshwater Bay; AIR via Bangalore **11.620** (Eng, Hi to Eur 1745-2230) 34243 at 2049 in Woking; BBC via Ascension Is **11.835** (Eng to W.Africa 1900-2300) 45434 at 2110 in E.Bristol; BBC via Ascension Is **12.095** (Eng to S.America 2000-0200), heard at 2234 by **Martin Cowin** in Kirkby Stephen; R.Nac da Amazonia, Brazil **11.780** (Port 0900-0200) 45344 at 2319 in Guildford; RAE Argentina **11.710** (Eng to N.America 0200-0300) 31133 at 0220 in Morpeth.

Noted in the **9MHz (31m)** band during the morning were R.Vilnius, Lithuania **9.710** (Eng to Eur 0930-1000), rated 33333 at 0935 in Plymouth; R.Vlaanderen Int, Belgium **9.925** (Eng to Eur 1030-1055) 44243 at 1030 in Newry; R.Nederlands via Nauen? **9.860** (Eng to Eur 1030-1225) 44444 at 1140 in Stalbridge; SRI via Sarnen **9.535** (Eng, Ger, Fr, It to SW.Europe 1000-1230) 44344 at 1141 in Oxted; RFI via Allouis? **9.805** (Eng to Eur, M.East, N.Africa 1200-1255) SIO444 at 1200 in Co.Fermanagh; R.Norway Int, Oslo **9.590** (Norw [Eng Sun] to Eur 1300-1330) heard at 1300 by **Clare Pinder** in Appleby.

During the evening the BBC via Skelton, UK **9.410** (Eng to Eur, N/C.Africa 0300-0830, 1130-2230) was 44444 at 1830 in Mauritius & 54455 at 2224 in Kirkby Stephen; DW via Sines **9.640** (Eng to W.Africa

MEDIUM WAVE CHART

Freq (kHz)	Station	Country	Power (kW)	Listener
520	Hof/Wurzburg (BR)	Germany	0.2	H*,M
526	Vatican R.	Italy	5	N*
531	Ain Beida	Algeria	600/300	C*,M*
531	Torshavn	Faeroe Is.	100	G,L*,O
531	Berg	Germany	20	B*,C*,H*,I*,M*
531	RNE5 via ?	Spain	?	C*,H*,I
531	Beromunster	Switzerland	500	B*,I,N*,O
540	Wavre	Belgium	150/50	B,C,E,H*,I,N*,O
540	Sidi Bennour	Morocco	600	B*,C*,H*,I*,M*,N*
549	Les Trembles	Algeria	600	B*,C*,E*,I*
549	Sasnovy	Belarus	1000	N*
549	Thumau (DLF)	Germany	200	B*,C,E*,H*,I,M,N*,O
558	Espoo	Finland	100	B*,I*,N*
558	RNE5 via ?	Spain	?	B*,H*,I*,M*,N*
567	Tullamore(RTE1)	Ireland (S)	500	B,C,D,E*,G,I,L,M*,N,O,Q
567	RNE5 via ?	Spain	?	B*,I*
576	Muhlacker(SDR)	Germany	500	B*,H*,N,O
576	Riga	Latvia	500	N*
576	Barcelona(RNE5)	Spain	50	B*,C*,I*,M*,N*
585	Paris(FIP)	France	8	C,I,N,O
585	Madrid(RNE1)	Spain	200	B*,C*,H*,I*,M*,N*
585	Dumfries(BBCScot)	UK	2	H*,I
594	Frankfurt(HR)	Germany	1000/400	B*,C*,E*,I*,N*,O
594	Oujda-1	Morocco	100	B*,C*,E*,I*
594	Muge	Portugal	100	B*,H*,I*
603	Lyon	France	300	M
603	Sevilla(RNE5)	Spain	50	B*,H*,I*
603	Newcastle(BBC)	UK	2	G,H*,N*
612	Athlone(RTE2)	Ireland (S)	100	B,C*,G,I,L,M,N,O
612	Sebaa Aiyun	Morocco	300	I*
612	RNE1 via ?	Spain	10	B*,I*,M*,N*
621	Wavre	Belgium	80	B,C,H*,I,N,O
621	RNE1 via ?	Spain	10	B*,M*,N*
621	Barcelona(QCR)	Spain	50	H*,I*
630	Dannenberg(NDR)	Germany	100	B*
630	Vigra	Norway	100	B*,H*,I*,M,N*
630	Tunis-Djedeida	Tunisia	600	B*,E*,H*,I*,N*
639	Praha(Liblice)	Czech	1500	B*,H*,I*
639	RNE1 via ?	Spain	?	B*,C,H*,I*,M*,N*
648	RNE1 via ?	Spain	10	B*,H*,I*
648	Orfordness(BBC)	UK	500	C,G,H*,I,L,N,O
657	Neubrandenburg(NDR)	Germany	250	H*,I*
657	Napoli	Italy	120	I*
657	Madrid(RNE5)	Spain	20	B*,C,E,H*,I*,M*,N*
657	Wrexham(BBCWales)	UK	2	B,E,G,H*,N
666	MesskirchRohrd(SWF)	Germany	150	B*,C,H*,M*,O
666	Sitkunai(R.Vilnius)	Lithuania	500	H*
666	Lisboa	Portugal	135	H*,N*
666	Barcelona(SER)	Spain	50	B*
675	Lopic(R10 Gold)	Holland	120	B,C,H*,I,N,O
684	Sevilla(RNE1)	Spain	500	B*,C,H*,I*,M*,N*
684	Avala(Beograd-1)	Yugoslavia	2000	B*,I*,O
693	Tortosa(RNE1)	Spain	2	B*
693	Droitwich(BBC5)	UK	150	B,I,M,N,O
693	Enniskillen(BBC5)	UK	1	L
693	Startpoint(BBC5)	UK	50	Q
702	Flensburg(NDR)	Germany	5	H*
702	Monte Carlo	Monaco	40	I*,N*
702	Zamora(RNE1)	Spain	10	B*
711	Rennes 1	France	300	C,H*,I,M*,N,O
711	Laayoune	Morocco	600	N
711	Murcia(COPE)	Spain	5	B*
720	Tayevad	Iran	400	I*
720	Lisnagarvey(BBC4)	Ireland (N)	10	I*
720	Norte	Portugal	100	B*,H*,I*
720	Lots Rd,Ldn(BBC4)	UK	0.5	B,C,G,I,L,M,N
729	Cork(RTE1)	Ireland (S)	10	B,E*,G,I,L,N
729	RNE1 via ?	Spain	?	B*,C*,E*,H*,I,M*,N
738	Paris	France	4	I
738	Poznan	Poland	300	I*
738	Barcelona(RNE1)	Spain	500	B*,C,H*,I*,N,Q
747	Las Palmas	Gran Canaria	20	B*
747	Flevo(Hilv2)	Holland	400	B,C,H*,I,N,O
756	Braunschweig(DLF)	Germany	800/200	B*,C*,H*,I*,M*,N*,O
758	Bilbao(EI)	Spain	5	B*,N*
758	Redruth(BBC)	UK	2	G,H*,I,L,M
765	Sottens	Switzerland	500	B*,C*,H*,I*
774	Abis	Egypt	500	I*
774	Enniskillen(BBC)	Ireland (N)	1	L
774	RNE1 via ?	Spain	?	B*,C*,H*,I*,N*
774	Plymouth(BBC)	UK	1	M
783	Leipzig(MDR)	Germany	100	B*,H*,I*,N*
783	Miramar(R.Porto)	Portugal	100	B*,I*
792	Limoges	France	300	B*,I,M*
792	Lingen(NDR)	Germany	5	H*,I*
792	Sevilla(SER)	Spain	20	B*,I*,M*
801	Munchen-Ismaning	Germany	300	B*,H*,O
801	Ajlun	Jordan	2000	N*
801	RNE1 via ?	Spain	?	B*,H*,I*,N*
810	Madrid(SER)	Spain	20	B*,C*,H*,I*,N*
810	Westerglen(BBCScot)	UK	100	B,G,I*,L,M*,O
819	Batra	Egypt	450	I*,N*
819	Warsaw	Poland	300	B*,H*,I*
819	S.Sebastian(EI)	Spain	5	C*
828	Hannover(NDR)	Germany	100/5	B*
828	Rotterdam	Holland	20	C*,H*,O
828	Barcelona(SER)	Spain	50	B*
837	Nancy	France	200	B*,L*,O
837	COPE via ?	Spain	?	B*,C*,H*,I*,M*,N*
846	Rome	Italy	540	B*,C*,I*,N*,O
855	Berlin	Germany	100	B*,H*
855	RNE1 via ?	Spain	?	B*,C*,H*,I*,M*,N*
864	Santah	Egypt	500	I*
864	Paris	France	300	B*,C,I,N,O
864	Socuellamos(RNE1)	Spain	2	I*
873	Frankfurt(AFN)	Germany	150	B*,C,E*,G,H*,I*
873	Zaragoza(SER)	Spain	20	B*,C*,E*,H*,I*
882	COPE via ?	Spain	?	B*,C*,H*,I*,N*
882	Washford(BBCWales)	UK	100	B,C,E,G,H*,I,M,N,O
891	Algiers	Algeria	600/300	B*,C*,E*,I*,N*
891	Huisberg	Netherlands	20	H*,I*,O
900	Brno(CRo2)	Czech Rep	25	H*,I*
900	Milan	Italy	600	B*,H*,I*,N*
900	Qurayyat	Saudi Arabia	1000	I*
909	B'mans Pk(BBC5)	UK	140	C,I,L,M,N
909	M'side Edge(BBC5)	UK	200	B
918	Domzale	Slovenia	600/100	B*,H*,I*,N*
918	Madrid(R.Int)	Spain	20	B*,H*,I*,M*
927	Wolvertem	Belgium	300	B,C,H*,I,M*,N,O
936	Bremen	Germany	100	B*,C,H*,I*,M,O
936	Venezia	Italy	20	I*
936	RNE5 via ?	Spain	?	H*,N*
945	Toulouse	France	300	B*,H*,N*,O
954	Brno (CRo2)	Czech Rep.	200	B*,H*,I*,N*
954	Madrid(CI)	Spain	20	B*,H*,I*,M*,N*,O
963	Pori	Finland	600	B*,H*,I*,J*,N*
963	Tir Chonaill	Ireland (S)	10	C,I*,M*
972	Hamburg(NDR)	Germany	300	B*,H*,I*,M,N*
981	Alger	Algeria	600/300	B*,C,E*,I*,M*,N*,O
990	Berlin	Germany	300	B*,H*,I*,N*
990	R.Bilbao(SER)	Spain	10	I*
990	Redmoss(BBC)	UK	1	H*,M
990	Tywyn(BBC)	UK	1	G
999	Schwerin (RIAS)	Germany	20	H*,M
999	Madrid(COPE)	Spain	50	B*,H*,M*,N*
1008	SER via ?	Canaries/Spain	?	B*,H*
1008	Flevo(Hily-5)	Holland	400	B,C,H*,I,M,N,O
1017	Rheinsender(SWF)	Germany	600	B*,C,H*,I*,N*,O
1017	RNE5 via ?	Spain	?	H*,I*
1026	SER via ?	Spain	?	B*,H*
1035	Lisbon(Prog3)	Portugal	120	B*,H*,I*
1044	Dresden(MDR)	Germany	20	B*,H*
1044	S.Sebastian(SER)	Spain	10	C,I*,N*
1053	Zarogoza(COPE)	Spain	10	H*
1053	Talk R.UK via ?	UK	?	B,C,I,K,M,N,O
1062	Kalundborg	Denmark	250	B*,C,H*,I*,M*,O
1062	R.Uno via ?	Italy	?	H*,I*
1071	R.France via ?	France	?	B*,I
1071	Riga	Latvia	50	H*,I
1071	Bilbao(EI)	Spain	5	B*,C,N*,O
1071	Talk Radio UK via ?	UK	?	B,O
1080	Katowice	Poland	1500	B*
1080	SER via ?	Spain	?	B*,C,H*,I*,N*
1089	Talk Radio UK via ?	UK	?	B,C,H*,I,L,M,N
1098	Nitra(Jarok)	Slovakia	1500	B*,C,H*,I*,N*,O
1098	RNE5 via ?	Spain	?	B*,I*
1107	AFN via ?	Germany	10	B*,G,H*,O
1107	Talk R.UK via ?	UK	?	I,M,N
1116	Bari	Italy	150	N*
1125	La Louviere	Belgium	20	B*,H*,I*,N*
1125	Deanovec	Croatia	100	Q
1125	RNE5 via ?	Spain	?	I*
1125	Llandrindod Wells	UK	1	G,M
1134	COPE via ?	Spain	2	B*,H*,I*
1134	Zadar(Croatian R)	Yugoslavia	600/1200	B*,H*,I*,M*,O
1143	AFN via ?	Germany	1	B*,E*,G,H*
1143	COPE via ?	Spain	2	B*,E*,H*,I*
1152	RNE5 via ?	Spain	10	B*
1161	Ain-Salah	Algeria	5	I*
1161	Strasbourg(Flnt)	France	200	B*
1179	SER via ?	Spain	?	B*
1179	Solvesborg	Sweden	600	B,H*,I*,J*,N*,O
1188	Kuume	Belgium	5	H*,I*,O
1188	Reichenbach(MDR)	Germany	5	B*
1188	Szolnok	Hungary	135	H*
1197	Munich(VOA)	Germany	300	H*
1197	Virgin via ?	UK	?	B,I,M,N,O
1206	Bordeaux	France	100	N*
1206	Wroclaw	Poland	200	B*
1215	Virgin via ?	UK	?	B,I,K,L,M,N
1224	Lelystad	Holland	50	H*,N
1233	Liege	Belgium	5	H*
1233	RFE via ?	Czech Rep.	40	O
1233	Virgin via ?	UK	?	B,N
1242	Virgin via ?	UK	?	B,N
1251	Marcali	Hungary	500	H*
1251	Huisberg	Netherlands	10	B*,H*,O
1260	SER via ?	Spain	?	B*,H*,M
1260	Guildford (V)	UK	0.5	H*,I,L,O
1269	Neumunster(DLF)	Germany	600	B,H*,I*,M,N*,O
1269	COPE via ?	Spain	?	B*,I*
1278	Strasbourg	France	300	H*
1278	Oublin/Cork(RTE2)	Ireland (S)	10	B,G,H*,I*,L,M
1287	RFE via ?	Czech Rep.	400	H*,I*,O
1287	Lerida(SER)	Spain	10	H*,I*,N*
1296	Valencia(COPE)	Spain	10	B*,M*,N*,O
1296	Orfordness(BBC)	UK	500	B,G,H*,L
1305	Rzeszow	Poland	100	H*,I*
1314	Kvitsoy	Norway	1200	B,D*,H*,I,M,N,O
1323	W'brunn (V.Russia)	Germany	1000/150	B*,H*,J,O
1332	Rome	Italy	300	D*,H*,I*
1341	Lisnagarvey(BBC)	Ireland (N)	100	B,D*,G,I*,L,M,O
1341	Tarrasa(SER)	Spain	2	I*,N*
1350	Nancy/Nice	France	100	I*
1350	Cesvaine/Kuldiga	Latvia	50	H*,I*
1359	Madrid(RNE)	Spain	600	B*,H*,M,N*
1368	Foxdale(Manx R)	I.O.M.	20	B,D*,E*,G,H*,I*,L,P
1377	Lille	France	300	H*,I,M*,O
1386	Bolshakovo	Russia	2500	A*,H*,I*,K,O
1395	TWR via Filake	Albania	500	B*,H*,K
1395	Lopic	Netherlands	120/40	C*,H*,I,K,M*,N,O
1404	Brest	France	20	C*,D*,H*,I,N,O
1413	RNE5 via ?	Spain	?	I*,M*,N
1422	Alger	Algeria	50/25	I*
1422	Heusweiler(DLF)	Germany	1200/600	B,C*,H*,I*,N,O
1431	Kopani	Ukraine	500	H*,N*
1440	Marnach(RTL)	Luxembourg	1200	B,H*,I,K,L,M*,N,O
1440	Qamman	Saudi Arabia	1600	H*
1449	Squinzano (RAI)	Italy	50	I*
1449	Redmoss(BBC)	UK	2	D*
1467	Monte Carlo(TWR)	Monaco	1000/400	F*,H*,I*,M*,N*
1476	Wien-Bisamberg	Austria	600	N*,O
1485	SER via ?	Spain	?	B*,C*,N*
1494	Clermont-Ferrand	France	20	B*,C*,I,M*,N*,O
1494	St.Petersburg	Russia	1000	D*,H*,I*,N*
1503	Stargard	Poland	300	C*,H*,I*
1512	Wolvertem	Belgium	300	B,C*,D*,E*,F*,H*,I,J,K,N*,O,P*
1521	Kosice(Cizatice)	Slovakia	600	B*,I*
1521	Duba	Saudi Arabia	2000	C*,I*
1530	Vatican R	Italy	150/450	A*,B*,C*,E*,F*,G,H*,I*,N*,O
1539	Mainflingen(ERF)	Germany	350(700)	B*,C*,H*,I*,M*,N*
1539	Valladolid(SER)	Spain	5	I*
1548	?(VOA)	Kuwait	600	G*,J*
1557	Nice	France	300	L,O
1566	Sarnen	Switzerland	300	B*
1575	Genova	Italy	50	C*,I*
1575	SER via ?	Spain	5	C*,F*,I*,M*
1584	SER via ?	Spain	2	C*,I*,M*
1593	Holzkirchen(VOA)	Germany	150	D*,H*,I*,K,M*
1602	SER via ?	Spain	?	F*,I*,M*
1602	Vitoria(EI)	Spain	10	B*,C,I*,M*,N*
1611	Vatican R	Italy	15	G,N*,O

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

Listeners:-

(A) Tim Allison, Middlesbrough.
(B) Martin Dale, Stockport.
(C) John Eaton, Woking.
(D) Simon Hockenhull, E.Bristol.
(E) Sheila Hughes, Morden.
(F) Rhoderick Illman, Oxted.
(G) Brian Keyte, Gt.Bookham.
(H) Eddie McKeown, Newry.
(I) George Millmore, Wootton IoW.
(J) Clare Pinder, while in Appleby.
(K) Harry Richards, Barton-on-Humber.
(L) Tom Smyth, Co.Fermanagh
(M) David Stevenson, Swansea.
(N) Ernie Strong, Ramsey, Cambs.
(O) Phil Townsend, E.London.
(P) Thomas Williams, Truro.
(Q) Tom Winzor, Plymouth.

TROPICAL BANDS CHART

Freq (MHz)	Station	Country	UTC	DXer
2.310	ABC Alice Springs	Australia	2040	H
2.325	ABC Tennant Creek	Australia	2050	H
2.485	ABC Katherine	Australia	1840	Q
3.200	TWR Manzini	Swaziland	1730	G
3.220	R.Kara, Lome	Togo	2205	C
3.223	AIR Simla	India	1705	T
3.240	TWR Shona	Swaziland	1830	G
3.245	AIR Lucknow	India	1726	N,T
3.255	BBC via Meyerton	S.Africa	2024	C,G,H,N,R,T,W
3.270	SWABC 1, Namibia	S.W.Africa	2040	C
3.290	Voice of Guyana	Guyana	0555	T
3.290	Namibian BC,Windhoek	S.W.Africa	2024	C,N,R
3.300	R.Cultural	Guatemala	0227	E,L,M,T
3.306	ZBC Prog 2	Zimbabwe	2017	G,N,T
3.315	AIR Bhopal	India	1724	C,N,T
3.316	SLBS Goderich	Sierra Leone	2110	C,N
3.320	SABC (RSG) Meyerton	S.Africa	2022	C,N,R,T
3.335	CBS Taipei	Taiwan	2127	R
3.345	AIR Jaipur	India	0055	C,D,N,T
3.365	GBC R-2	Ghana	2108	C,D,H,N,R
3.365	AIR Delhi	India	1730	D,N,T
3.375	R.Dourados	Brazil	2258	D
3.395	ZBC Gweru	Zimbabwe	1900	B
3.915	BBC via Kranji	Singapore	2155	C,I,J,M,R,V
3.955	BBC via Skelton	England	0400	C,D,I,J,K,M,Q,V,W,Y
3.960	Xinjiang PBS, Urumqi	China	2349	C,D,R
3.965	RFI Paris	France	2245	C,D,I,J,M
3.970	R.Korea via Skelton	England	2120	A,C,D,I,M,V,Y
3.975	R.Budapest	Hungary	2200	C,I,L,M,D,P,V,W
3.985	Nexus, Milan	Italy	0600	D,I,L,U,V
3.985	China R via SRI	Switzerland	2120	C,K,L,M,Q,S,Y
3.995	DW via Julich	Germany	2220	C,D,K,I,M,V,W,Y
4.005	Vatican R.	Italy	2140	C,I,J,K,L,M,P,V,W
4.735	Xinjiang, Urumqi	China	2323	C,M
4.750	Xizang BS, Lhasa	China	0120	C,D
4.755	R.Educ CP Grande	Brazil	0115	C
4.760	Yunnan PBS,Kunming	China	2225	C
4.760	AIR Port Blair	India	0135	C,R,T,X
4.770	Centinela del Sur	Ecuador	0040	C
4.770	FRCN Kaduna	Nigeria	2135	B,C,L,M,N,R,T,V,W,X
4.775	AIR Imphal	India	0140	C,T,X
4.775	TWR Manzini	Swaziland	0406	M
4.777	R.Gabon, Libreville	Gabon	2117	B,C,L,M,N,Q,R,V
4.783	RTM Bamako	Mali	2122	B,C,N,R,T,Y
4.785	Caiari Porto Velho	Brazil	0045	C,V
4.789	RRI Fak-Fak	Indonesia	2211	R
4.790	Azad Kashmir R.	Pakistan	0120	C,T,V
4.800	AIR Hyderabad	India	0033	I,M,T,V
4.800	LNBS Maseru	Lesotho	2112	R
4.815	R.Difusora, Londrina	Brazil	0115	C
4.815	R.diff TV Burkina	Duagadougou	2133	B,C,M,N,R
4.820	R.Botswana, Gaberone	Botswana	2124	B,H,N,R,W
4.820	AIR Calcutta	India	1920	X
4.822	R.Mauritanie	Mauritius	0000	C
4.828	ZBC R-4	Zimbabwe	2024	B,N,T
4.830	R.Botswana, Gaborone	Botswana	2056	R
4.830	R.Tachira	Venezuela	0400	C,E,M,T,V
4.832	R.Reloj	Costa Rica	0605	L,T
4.835	ABC-Alice Springs	Australia	2140	N
4.835	R.Tezulutlan, Coban	Guatemala	0110	C,V
4.835	RTM Bamako	Mali	2134	B,C,D,H,I,J,K,L,M,N,P,Q,R,T,W
4.840	AIR Bombay	India	1704	C,I,N,R,T,V
4.845	RTM Kuala Lumpur	Malaysia	1725	T
4.845	DRTM Nouakchott	Mauritania	2132	D,N
4.850	R.Yaounde	Cameroon	2100	B,C,D,M,N,R,T,W
4.860	EP da Lunda-Sul	Angola	2322	D
4.860	AIR Delhi	India	1733	D,N,T,V,W
4.865	R.Alvorada, Londrina	Brazil	0045	C
4.865	PBS Lanzhou	China	2215	C,D,L,P,R
4.870	R.Cotonou	Benin	2126	B,N,R,T
4.879	R.Bangladesh	Bangladesh	0055	C
4.880	AIR Lucknow	India	0057	V
4.885	R.Clube do Para	Brazil	0308	M,V
4.885	R.Difusora Acreana	Brazil	0313	C,M
4.885	KBC East Sce Nairobi	Kenya	2050	T,W
4.890	RFI Paris	via Gabon	0415	M,T
4.895	AIR Kurseong	India	2045	T
4.895	Pakistan BC	Pakistan	1845	W
4.905	R. La Droya	Peru	0115	C
4.910	Tennant Creek	Australia	2140	N
4.910	R.Zambia, Lusaka	Zambia	1936	B
4.915	R.Anhanguera	Brazil	0050	C,R,T,V
4.915	GBC-1, Accra	Ghana	2102	B,H,L,M,N,R
4.915	PakistanBC,Islamabad	Pakistan	0120	C
4.920	R.Quito, Quito	Ecuador	0215	E,H,T
4.920	AIR Madras	India	0050	C
4.927	RRI Jambi	Indonesia	2330	D
4.935	KBC Gen Sce Nairobi	Kenya	2103	B,D,H,M,N,R,T,V
4.940	AIR Guwahati	India	1656	C,D,N,V
4.950	AIR Srinagar	India	1656	C,N,T
4.950	VOA via Sao Tome	Sao Tome	2053	B,J,N,D,P,R,T,W
4.955	R.Nac. de Colombia	Colombia	0125	C,D,R,T
4.960	VOA via Sao Tome	Sao Tome	0300	M
4.965	R.Alvorada	Brazil	0055	C,D
4.965	Christian Voice	Zambia	1720	G
4.970	PBS Xinjiang	China	1630	C,N
4.975	R.Uganda, Kampala	Uganda	2054	B,F,H,I,L,M,N,P,R,T,W
4.980	PBS Xinjiang, Urumqi	China	1632	C,N
4.980	Ecos del Torbes	Venezuela	0034	C,D,E,H,L,M,R,V
4.985	R.Brazil Central	Brazil	2355	B,C,V
5.005	R.Nacional, Bata	Eq.Guinea	1921	N
5.009	R.TV Malagasy	Madagascar	1743	N
5.010	R.Garoua	Cameroon	2115	B,T,V
5.010	AIR Thiru'puram	India	0130	C
5.012	R.Cristal Int	Dominican Rep	0013	R
5.015	R.Copacabana, Rio	Brazil	2314	D
5.020	PBS-Jiangxi Nanchang	China	0000	B
5.020	La V du Sahel,Niamey	Niger	2022	F,L,N,R,T
5.025	ABC Katherine	Australia	2132	H,K,N
5.025	R.Parakou	Benin	1920	B,M,N,R,T
5.025	R.Rebelde, Habana	Cuba	0145	C,R,T
5.025	R.Uganda, Kampala	Uganda	1920	M,N,T
5.030	AWR Latin America	Costa Rica	0258	C,H,K,M,R,T,V
5.030	RTM Kuching	Sarawak	2134	N
5.035	R.Educacao Rural	Brazil	0135	C
5.035	R.Bangui	C.Africa	0412	M
5.045	R.Cultura do Para	Brazil	0115	C
5.047	R.Togo, Lome	Togo	2024	B,N,T
5.050	R.Tanzania	Tanzania	1743	B,M,N,T
5.055	RFD Cayenne(Matoury)	French Guiana	0620	T
5.060	PBS Xinjiang, Urumqi	China	0020	C,R,V
5.075	Caracol Bogata	Colombia	0425	C,H,R
5.100	R.Liberia, Totota	Liberia	1923	N,T

DXers:-

(A) Tim Allison, Middlesbrough.
(B) Darren Beasley, Bridgwater.
(C) Robert Connolly, Kilkeel.
(D) John Eaton, Woking.
(E) David Edwardson, Wallsend.
(F) Bill Griffith, while in N.Egypt.
(G) Bill Griffith, while in NW.Mauritius.
(H) David Hall, Morpeth.
(I) Brian Heath, Stapleton.
(J) Simon Hockenhull, E.Bristol.
(K) Robert Hughes, Liverpool.
(L) Sheila Hughes, Morden.
(M) Eddie McKeown, Newry.
(N) Fred Pallant, Storrington.
(O) Clare Pinder, while in Appleby.
(P) Peter Pollard, Rugby.
(Q) Vic Prier, Colyton.
(R) Richard Reynolds, Guildford.
(S) Chris Shorten, Norwich.
(T) John Slater, Scalloway.
(U) Tom Smyth, Co.Fermanagh.
(V) Ernie Strong, Ramsey, Cambs.
(W) Phil Townsend, E.London.
(X) Ernest Wiles, N.E.Bedford.
(Y) Thomas Williams, Truro.

1900-1950) 44444 at 1912 in Stockport; VOA via Morocco? **9.760** (Eng to Eur, M.East, N.Africa 1700-2200) 33222 at 1930 in Middlesbrough; Israel R, Jerusalem **9.390** (Heb [Home Sce relay] to Eur, N.America 1600-2300) 44434 at 1935 in Colyton; Polish R, Warsaw **9.525** (Eng to Eur 1930-2030) 43333 at 1955 in Morden; Vatican R, Italy **9.645** (Eng to Africa 1950-2010) 55455 at 1955 in Liverpool; VOIRI Tehran, Iran **9.022** (Eng to Eur 1930-2030) 44444 at 1957 in Bridgwater; R.Australia via Shepparton **9.500** (Eng to Asia, Pacific 1430-2200) 43333 at 2001 in Truro; China R.Int **9.635** (Eng to W/N.Africa 2000-2057) 32432 at 2043 in Storrington; AIR via Aligarh **9.910** (Eng to Australasia 2045-2230) 33322 at 2140 in Kilkeel; R.Nac del Paraguay **9.735** (Sp 0800-0400) 44344 at 2046 in Woking; R.Bulgaria, Sofia **9.700** (Eng to Eur 2100-2200) 54444 at 2114 in Freshwater Bay.

Later, R.Universo, Curitiba, Brazil **9.565** (Port 24hrs) was 24433 at 0001 in Guildford; RCI via Sackville **9.755** (Eng [CBC progs] to USA, Caribbean 2200-0300) 44444 at 0005 by **Peter Pollard** in Rugby; VOA via ? **9.575** (Eng to Africa 0300-0500) SIO333 at 0322 in N.Bristol; CBC via Sackville **9.625** (Eng, Fr & others to N.Quebec 1155-0610) 35533 at 0406 in Wallsend.

Many of the broadcasts in the congested **7MHz (41m)** band are intended for listeners in Europe. Those noted came from R.Japan via Woofferton, UK **7.230** (Jap, Eng 0500-0700), rated 33333 at 0615 in Stalbridge; R.Norway Int **7.485** (Norw [Eng Sun] 1800-1830) SIO544 at 1725 in Macclesfield; Voice of Greece **7.450** (Eng 1900-1910, Gr 1910-?) 43333 at 1900 in Morden; R.Budapest, Hungary **7.170** (Eng 1900-1930) 33333 at 1905 in Stockport; R.Minsk, Belarus **7.210** (Various 1900-2100, 0400-0600 [Eng Tues 1930 & 2030, Thurs 2030]) heard by Gordon Cleator in Douglas, IoM; R.Thailand via Udon Thani **7.210** (Eng 1900-1958) 45343 at 1936 in Bridgwater; R.Romania Int, Bucharest **7.195** (Eng 2100-2156) heard at 2100 in Appleby; BBC via Skelton, UK **7.325** (Eng 2000-2230) 32232 at 2107 in Colyton; AIR via Aligarh? **7.410** (Hi, Eng 1745-2230) 44333 at 2116 in Middlesbrough; R.Ukraine Int, Kiev **7.380** (Eng 2100-2200) 53444 at 2134 in Freshwater Bay; BBC via Skelton **7.325** (Eng 2000-2230) 44444 at 2205 in N.Egypt; China R.Int via Russia **7.170** (Eng 2200-2257) 34443 at 2255 in Kilkeel.

Also mentioned in the reports were the Voice of Nigeria, Ikorodu **7.255** (Eng to W.Africa 1900-2100), rated 33353 at 2000 in Storrington; VOA via Selebi-Phikwe, Botswana **7.415** (Eng to Africa 1800-2230) 44434 at 2211 in Kirkby Stephen; Vatican R, Italy **7.305** (Eng to Asia, Pacific 2250?-2310?) SIO444 at 2253 in N.Bristol; BBC via Kranji, Singapore **7.110** (Eng to Asia 2200-0045) 32343 at 2340 in Woking; R.Corp of Singapore **7.170** (Tam 2100-1800) 44433 at 2341 in Guildford; VOA via ? **7.200** (Eng to S.Asia 0100-0300) 44434 at 0110 in Woodhall Spa.

In the **6MHz (49m)** band WWCR Nashville, USA **5.935** (Eng to USA 0100-1400) was 32222 at 0910 in NE.Bedford; WEWN Birmingham, USA **5.825** (Eng to USA, Eur 2100?-1000?) SIO433 at 0945 in Macclesfield; Deutschland R. Berlin **6.005** (Ger to Eur 24hrs) 34433 at 1020 in Oxted; SRI via Lenk **6.165** (Eng, Fr, Ger, It to Eur 0400-1930) 43333 at 1205 in Stalbridge; Vatican R, Italy **5.883** (Various to Eur) SIO222 at 1600 in Co.Fermanagh; R.Prague, Czech Rep **5.930** (Eng to Eur, M.East, Africa 1700-1727) SIO444 at 1700 in Co.Fermanagh; China R.Int via Russia ? **6.950** (Ger, Eng to Eur 1900-2157) 44434 at 1940 in Colyton; RAI Rome **6.015** (Eng to Eur 1935-1955) 43343 at 1942 in Newry; R.Prague, Czech Rep. **5.930** (Eng to Eur, USA 2000-2030) 43333 at 2010 in Morden; RCI via Skelton, UK **5.995** (Fr, Eng to Eur, N.Africa, M.East 1900-2100) 33333 at 2020 in Rugby; BBC via Rampisham & Skelton, UK **6.195** (Eng to Eur, N.Africa 0200-0730, 1530-2230) 43333 at 2038 in Kirkby Stephen; R.Austria Int via Moosbrunn **6.155** (Eng to Eur 2230-2300) 33233 at 2230 in Appleby; WHRI South Bend, USA **5.745** (Eng to E.USA, Eur 2200-0400) 24322 at 2305 in Woodhall Spa; La Voz del Llano, Villavicencio, Columbia **6.115** (Sp 0900-0400) 24443 at 2318 in Guildford; R.Gaucha, Porto Alegre, Brazil **6.020** (Port 0900-0400) 44343 at 2321 in Woking; BBC via Antigua, W.Indies **5.975** (Eng to C/N.America 2100-0800) 34544 at 0050 in E.Bristol.

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Very few of us are fortunate enough to own a country estate with enough land to raise a full-size low-band antenna. I must admit having dreamed of it on occasion, and one time got a look at how the 'other one percent' live. It was with more than a hint of jealousy that I visited an eccentric life-long friend who lived in Texas. He lived in a double-width house trailer, and had a couple of derelict cars stowed in the high grass a few score metres out (they made good homes for rattlesnakes).[1]

Despite his eccentricity, however, he had an antenna builder's dream. Fourty three acres of prime, flat, rich Texas farmland. He bought the farm specifically to design and erect antennas. He never farmed the property, in the normal sense, unless you count the vegetable garden he kept for his kitchen and (I suspect) a cannabis plant or three.

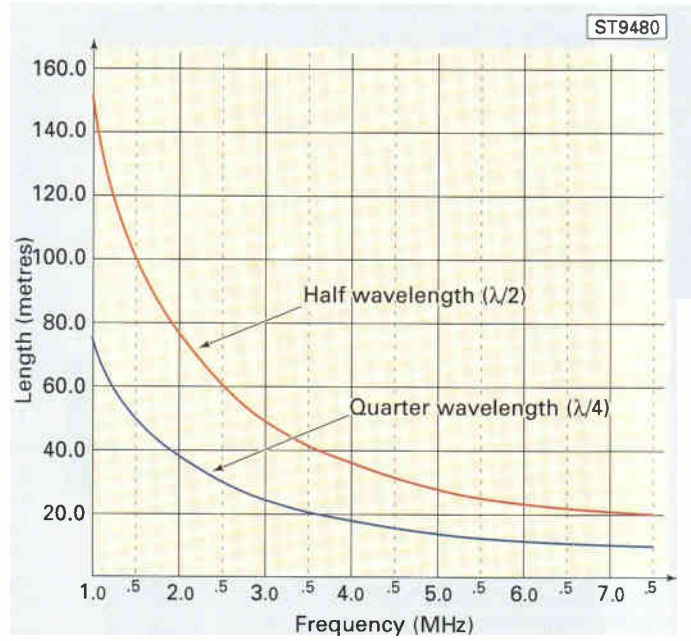

Fig. 1: Antenna lengths as a function of frequency.

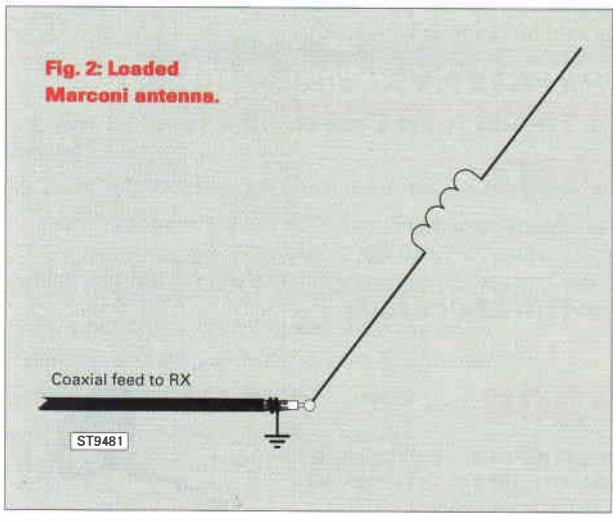

Fig. 2: Loaded Marconi antenna.

The knee-high grass (not the smoking variety) on his antenna farm concealed some real or imagined terrors for me, but my friend soothed my nervousness by pointing that Texas rattlesnakes are Western Diamondbacks, and as an Easterner, I was essentially safe...apparently his theory was that Easterners are bitten only by Eastern Diamondbacks (which is one big honkin' snake!).

My friend's largest antenna was a 1000m long horizontal wire that could be configured as either a longwire or a Beverage antenna. My eyes fixed on that antenna wire and row of telephone poles stretch across the Texas plain, I am ashamed to admit, were tinged with a bit of green.

But what do the rest of us do? My own plot is large by some standards, but the longest dimension is only 32m. If you take safety issues into consideration, then about 22m is about right - damn power lines! So how does this affect low frequency operation. Consider **Fig. 1** which plots both quarter wavelength and half wavelength against frequency. A half wavelength antenna at 1MHz is 150m long, while a quarter wavelength antenna is 75m long. Around 4MHz, the half wavelength antenna is 38m long and the quarter wavelength is 19m long. Those lengths basically wipe out the space I have for antennas...low frequency or otherwise.

Of course, one could always go vertical. The

'footprint' of a vertical antenna is quite small, and it will fit nicely in your backyard regardless of the frequency of operation. Of course, can you imagine trying to convince the mechanical and electrical inspectors from the local government or planning office that your 38m high pipe is safe?

Low frequency antennas on small plots of land are always a problem, but the problem can be solved to the satisfaction of most people. All of the antennas discussed here are basically compensation designs. They do not work as well as a half wavelength horizontal dipole installed at an optimal height above ground, but they work well enough to be considered over tossing 10m of wire out the garden window. It's a matter of a trade-off: size-Vs-effectiveness.

All of the antennas discussed in this article are variants on the Marconi theme. A Marconi antenna is one that is unbalanced with respect to ground (e.g. a quarter wavelength vertical), i.e. one side of the feed line is grounded. A Hertzian antenna, on the other hand, is balanced with respect to ground (e.g. a half wavelength horizontal dipole).

Loaded Marconi

Figure 2 shows a centre-loaded Marconi antenna. The radiator element is two lengths of 16-12s.w.g. stranded antenna wire (copper clad steel wire considered the best), totalling about one-eighth wavelength at the frequency of operation. These two sections of wire are connected in the centre of the run by an inductor or 'loading coil'. The exact value of the coil is found experimentally, but a starting point is the inductance that produces a reactance of about 800Ω at the centre frequency. The inductance is:

$$L_{\mu H} = \frac{8 \times 10^8}{2 \pi F_{Hz}} \quad (1)$$

Where:
$L_{\mu H}$ is the inductance in micro henrys (μH)
F_{Hz} is the frequency in Hertz (Hz)

From this starting point the actual correct value can be found empirically by finding the value that produces the lowest v.s.w.r. or noise bridge reading. Once the correct value is found, the final coil can be constructed and installed.

The typical coil does not have sufficient strength to withstand the stress of being installed in-line with the antenna. The solution is to use an end-insulator as a strain relief - **Fig. 3**. The antenna wires are passed through the holes in the insulator, and then wrapped around itself five to seven times. The wire leads from the coil are attached to the antenna wires at points close to the wrapped portion of the antenna wire. The wrapped antenna wire and coil wire are then solder tinned to prevent corrosion from the weather. Some people build this whole assembly inside a weatherproof container in order to extend the life of the coil and joints.

As with all loaded antennas, the *Q* is higher than ordinary resonant antennas, so the bandwidth is narrower than, say, a half wavelength dipole.

Random Length Marconi

One the most common forms of odd-length antenna is the Random Length Marconi shown in **Fig. 4**. This antenna might be shorter than quarter wavelength, exactly quarter wavelength or longer than quarter wavelength, depending on the frequency. The overall length of the antenna should be as long as possible for low-band DXing, but is designed primarily to fit the space available.

This antenna enjoys the advantage of being multi-band. If connected directly to the antenna connectors on the receiver, then it is simply a random length antenna, and will work after a fashion. But if an antenna tuning unit (a.t.u.) is used, then the antenna can be tuned for better efficiency on specific frequencies. Different forms of antenna tuner circuit are shown in the inset to **Fig. 4**. Which to use depends on the operating frequency and the length of the wire.

If the antenna is longer than quarter wavelength, then use a single variable capacitor in series with the antenna wire ('A'). The capacitance effectively electrically shortens the antenna wire, bringing it into resonance (longer than resonance antennas are inductive).

If the antenna is shorter than quarter wavelength, then place an inductor in series with the wire ('B' in **Fig. 4**). Electrically short antennas are

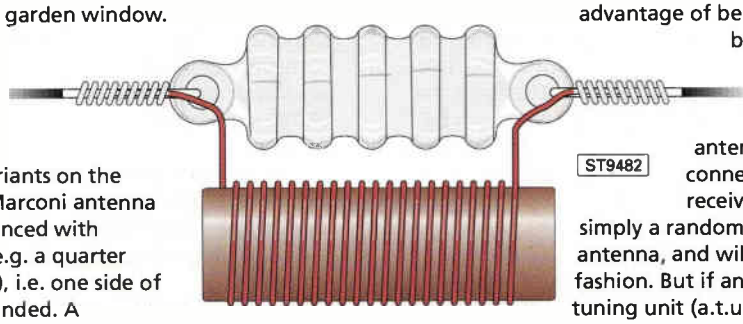

Fig. 3: Installation scheme for the inductor.

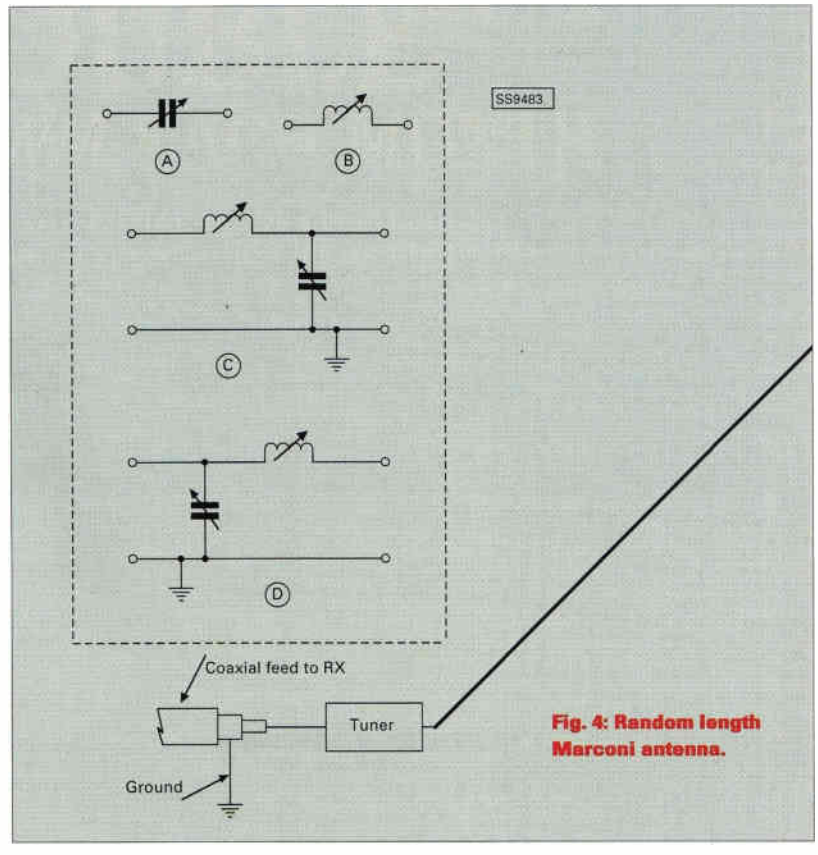

Fig. 4: Random length Marconi antenna.

capacitive, so require a series inductance to bring them to resonance.

Two forms of L-section antenna tuner are shown at 'C' and 'D' in **Fig. 4**. Which to use depends on the relationship between operating frequency and length. In some tuners, a single-pole-double-throw (s.p.d.t.) switch is placed so that its common connection is to the capacitor, and the two switched connections are wired to opposite ends of the inductor. That way, the tuner can be rigged as needed for the specific operating frequency. Note: This trick is not for transmitting situations unless the switch is of an appropriate high power r.f. type (one that can withstand high r.f. voltages as well as high power levels).

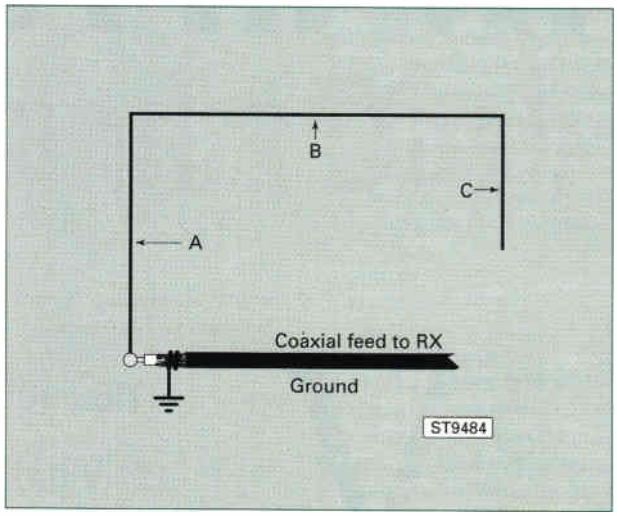

Fig. 5: Crooked Monopole Marconi antenna.

The Crooked Monopole Marconi

Figure 5 shows the Crooked Monopole Marconi, also sometimes called the 'Round Robin Marconi'. It is similar to the random length wire antenna discussed above, but has three sections (A, B and C). Section 'A' is vertical, section 'B' is horizontal or slightly sloped, and section 'C' is also vertical but descends from the horizontal section. The overall length (A + B + C) is quarter wavelength, more or less:

$$A + B + C = \frac{75}{F_{MHZ}} \qquad (2)$$

The actual length may be found experimentally using the minimum v.s.w.r. or noise bridge method.

The ratios of A, B and C depend entirely on the local installation section. That is not to say that some configurations won't work better than others, but that's irrelevant. After all, the chief problem is that you didn't have any antenna at all before. In general, it is more useful to make 'A' and 'B' somewhat longer than 'C'. Of course, if the situation is such that C = 0, then all the better.

Like the random length Marconi antenna, an antenna tuning unit can be used between the coaxial cable and the antenna wire for adjusting the antenna to work at other frequencies.

The Monopole-Vee Antenna

The Monopole-Vee antenna is shown in **Fig. 6**. This antenna consists of a vertical section ('L1') and a horizontal or sloping section ('L2'). If L2 is installed as a sloper, then it should have an angle of less than 60-70° relative to horizontal, with about 45° being optimum.

The vertical section (L1) is made of parallel wire line. Various types of line can be used: 500Ω or 600Ω parallel open-wire transmission line, 300Ω TV twin-lead, 450Ω twin-lead, or even parallel conductor lamp cord.

One of the best forms of construction for vertical section L1 is to use 150mm long × 10mm diameter insulating spacers (**Fig. 7**) to spread wires and keep them parallel. The wires can be the same as the antenna wire. The wires are passed through holes drilled near the ends of the spacers, and then secured with short tie wires. Each end of each tie wire is wrapped five to seven times for strength, and then solder tinned for corrosion control.

The two wires of L1 and the single wire of L2 are joined together at the top of the vertical section, and then soldered. An end insulator and rope are used for support at the connection point and another at the far end of the L2 section.

At the bottom end of the vertical section the coaxial connection is made. The centre conductor of the coaxial cable is connected to one conductor of the vertical section, while the coax shield and the ground wire are connected to the other vertical wire.

The overall length of the antenna (L1 + L2) is quarter wavelength, so Equation [2] can be used to calculate the lengths. For low-band work, the vertical section is normally about 10 to 15m high, and the rest of the required length being made up in the horizontal or sloper section.

A 'Good Ground'

All Marconi antennas, including those in this article, require a 'good ground' to function properly. So what is a 'good ground'? **Figure 8** shows the elements of a good ground. The ground rod should be 2 to 2.5m long, and thick enough to withstand being driven into the ground. The steel type of electrical ground rod used at the mains service entry point of some buildings, or on the distribution pole, are nearly ideal for this

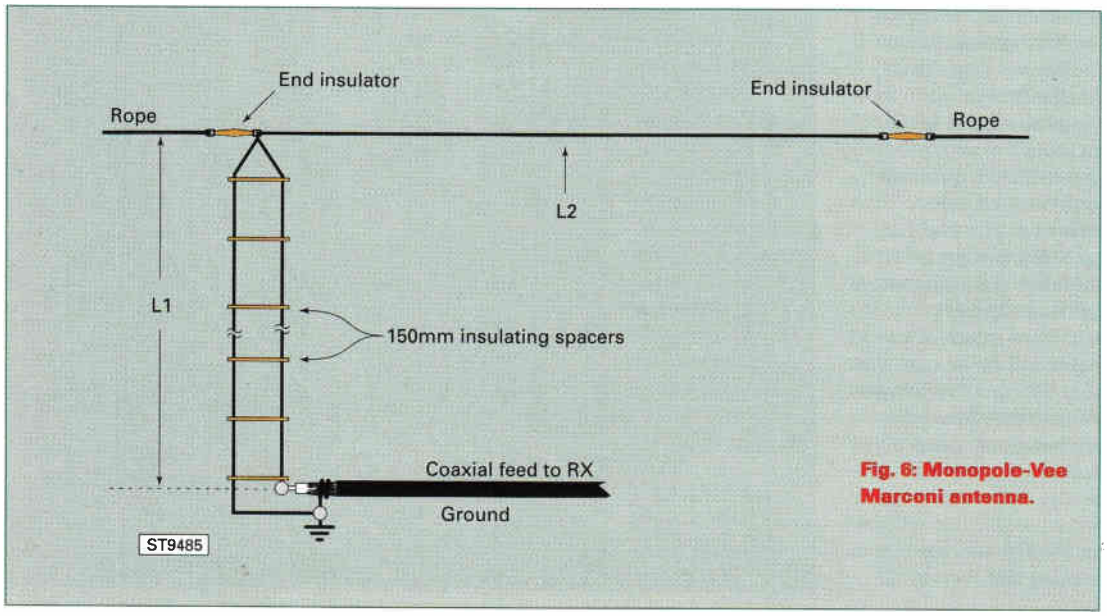

Fig. 6: Monopole-Vee Marconi antenna.

Aside

[1] In the USA 'Red Neck' jokes are popular. My friend could identify with two: 1) "You might be a 'Red Neck' if your house has tyres but your car doesn't, and 2) You might be a 'Red Neck' if you cut the grass and find a car.

purpose. The copper clad steel ground rods are best, but are not always available at a decent price.

The other element of the 'good ground' is a system of radials. If the radials are installed above the ground, then they should be quarter wavelength. But if installed a few centimetres below the surface, make them as long as possible. As a general rule, the more radials the better. However, empirical studies show a decreasing effect above 14 to 16 radials per band. Even two radials per band will show improvement, however, so use them unless there is absolutely no way to accomplish the task.

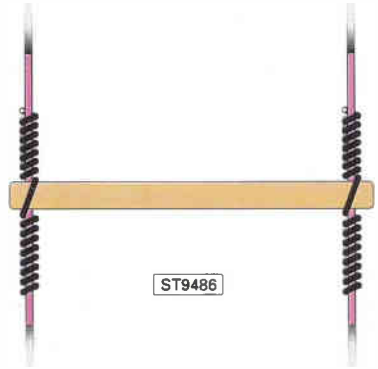

Fig. 7: Spreader installation detail.

Safety Notes

Radials above ground. I am not normally in favour of above ground radials. If the radials are laid on the surface, then they will impede or endanger foot traffic, and may possibly lead to injury of yourself or others. There may also be an issue of civil liability if your installation injures others.

Avoiding a.c. power lines. Wire antennas can be very hazardous! Do not install this antenna in any location where it can contact the electrical power lines. Even if both the antenna and the power line wires are insulated, it is highly probable that the antenna wire will cut into the power line wiring and cause a short. If this happens while you are holding it, then **you will be killed**. Even if you are not killed, there is a high probability of severe damage to the power lines, and the possibility of starting a fire. Do not toss the wire over the power lines. Do not install the antenna such that it can contact the power lines if it falls or breaks, or flails about in the wind.

SWM

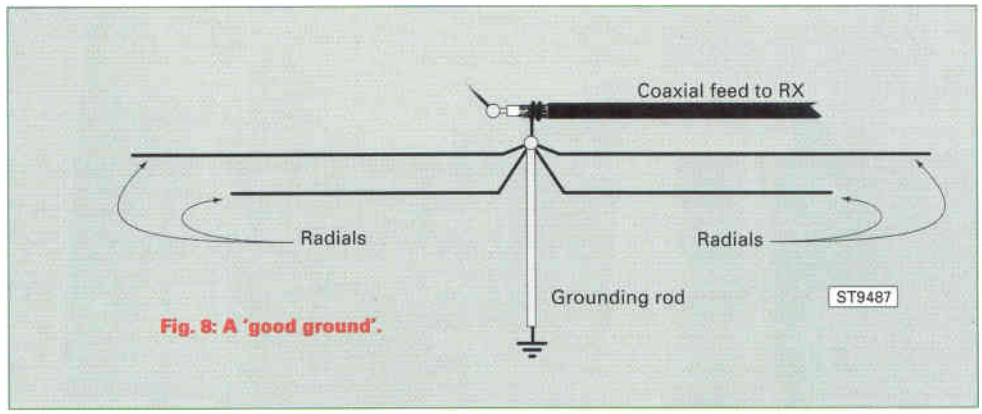

Fig. 8: A 'good ground'.

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Amateur Radio Astronomy For SWLs & Amateurs

There's no doubt about it, Radio Astronomy is an interesting area of the hobby. Christopher MacLeod GM6TYX says its amazing just what you can hear!

Radio Astronomy is a fascinating science. It allows man to probe the boundaries of the universe. Although not the first activity to come to mind when one thinks of short wave listening, it is an interesting facet of the hobby, particularly if the listener already has an interest in optical astronomy. Beginning Radio Astronomy is not difficult since the s.w.l. generally has the equipment necessary to make simple observations of stronger sources such as the sun.

Apart from the satisfaction of receiving the signals themselves, another useful aspect of the hobby is that it allows you to test the sensitivity of receiving equipment and the directionality of antennas. The receivable sources have all been carefully measured by professional astronomers to find their intensity, so the operator can learn a lot about equipment from what can (and cannot) be received. Specially built radio astronomy equipment can also be used to improve normal short wave listening. The aim of this article is to introduce some of the ideas and techniques to the interested s.w.l. and amateur.

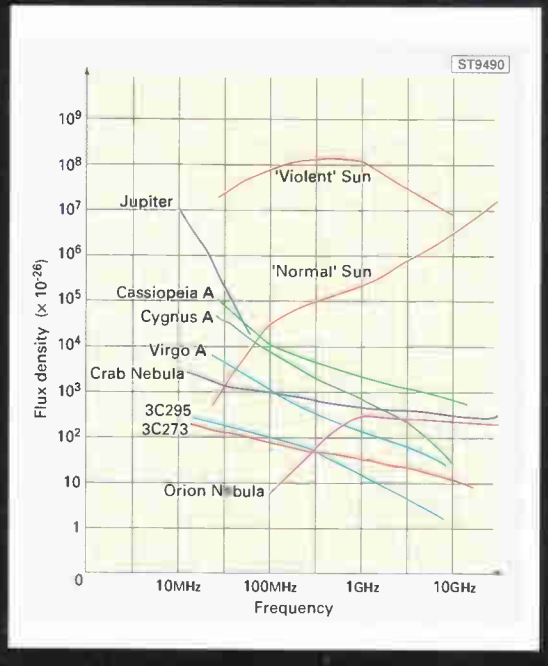

Fig. 1.

A Short History

In 1932 K.G. Jansky was working for Bell Telephone Labs. He was engaged in a project to find the cause of noise which was limiting the performance of radio systems operating on 15m.

Jansky used a large steerable antenna to pin-point the direction of a strong source of noise. He found that its position coincided with the direction of the centre of the Milky Way.

Following Jansky's research, no one followed up the discovery until 1940 when G. Reber, using his own equipment, mapped the sky at 460MHz. Later, during the Second World War it was discovered that the sun was a powerful emitter and could occasionally jam radar transmissions.

Following the war, many discoveries were made including pulsars, quasars and radio galaxies. Today much of the research is focused on higher frequencies, using equipment such as the James Clark Maxwell mm-wave telescope, and on connecting many telescopes together to give better angular resolution of the source.

Typical Sources

All objects at a finite temperature emit radio waves. Typical sources which the amateur may observe are:

1. The Sun

The Sun is one of the strongest emitters receivable on earth. Under normal circumstances the emission is low level and is termed *quiet*, but it can erupt in violent events which may effect communications on earth.

Some of the emissions are strong enough to pick up on a sensitive f.m. broadcast receiver with a simple directional antenna. It should be noted that the sun is not as 'bright' at radio wavelengths as at visible light wavelengths.

An interesting project for the amateur involves trying to correlate the suns activity with h.f. propagation on earth.

2. Planets

Although several of the planets are detectable radio

emitters, Jupiter is the strongest, modest equipment (such as a sensitive receiver and a directional antenna) will pick up its emissions.

3. Other Stars & Galaxies

Sweeping an antenna across the plane of our own galaxy, radio emission is observed to be strongest in the direction of the centre. This emission is the combination of hot gas and stars in their billions.

Individual objects within our own Galaxy are also emitters, for example the crab and orion nebulae (these are great clouds of interstellar gas, one left over from an exploding star, the other a birth place of stars).

Some of the strongest emitters in the sky are other, unusual galaxies called radio galaxies. These are very active, violent objects; a good example is the strong radio source known as Cassiopeia A, which optically is very faint, but at radio wavelengths shines like a beacon.

4. Pulsars

Pulsars are fast spinning neuron stars (remnants of exploded stars), discovered in the 1960s, they produce regular pulses each time they spin. So regular are these pulses that the discoverers seriously considered the possibility that they were of intelligent origin.

With suitable sensitive equipment and a large antenna the serious amateur can 'hear' several pulsars.

5. Quasars

These are very powerful radio sources, which appear to be at the edge of the known universe, around 10 to 15 billion light years away. They are now believed to be the centres of extremely active galaxies (more active and much further away than radio galaxies).

Signals

We usually measure the intensity of a radio source at the receiver in terms of watts per meter squared. That is the power in watts falling on an area of a square meter of receiving surface.

Because of the bandwidth of extra-terrestrial radio sources, a better unit is the Watt per Meter Squared per Hertz ($Wm^{-2}Hz^{-1}$). So 10^{-22} $Wm^{-2}Hz^{-1}$ means that in a 1 Hz bandwidth there are 10^{-22} watts of signal falling on each square meter of surface. This is called the *flux density* of the signal.

Two other units commonly mentioned in literature are the *radio brightness* (B), which is the flux per unit solid angle ($Wm^{-2}Hz^{-1}sterad^{-1}$) and the Jansky (J) or flux unit which is introduced to give more conveniently sized numbers when quoting flux densities and is defined as 10^{-26} $Wm^{-2}Hz^{-1}$. **Figure 1** gives the flux densities of several of the most important extra-terrestrial sources. Cygnus A is a radio galaxy and 3C273 is a quasar.

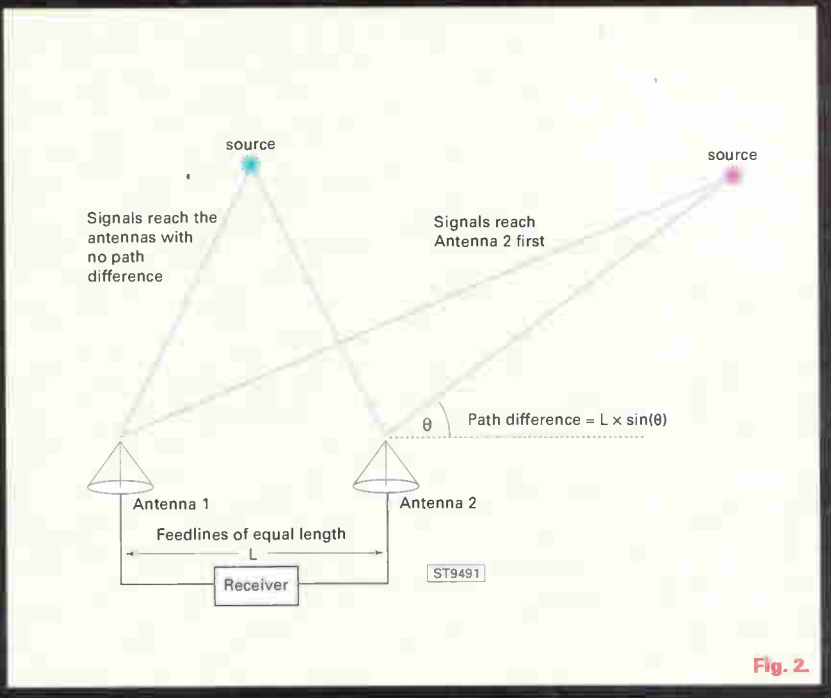

Fig. 2.

Receivers

The basic requirement for the receiving system is good sensitivity. However, even a broadcast receiver will pick up some extra-terrestrial signals.

For more interesting work a low noise setup is required. This usually consists of a sensitive receiver and a very low noise preamplifier situated as close to the antenna as possible.

It may be shown that for a high gain front-end amplifier the noise performance of the receiver is dominated by this front-end. For the serious observer operating above 1GHz, amplifiers worth considering are: MESFET amp (good), Parametric amplifiers (excellent) or HEMT amplifiers (best).

Such systems will, of course, provide excellent results in your normal listening. You may also consider cooling the front-end amplifier as this will also improve performance (for more information on this aspect see my forthcoming article on the subject in *Practical Wireless*). Many amateurs start observing between 100 - 600MHz, then move to higher frequencies.

Further down the receiver chain, a signal

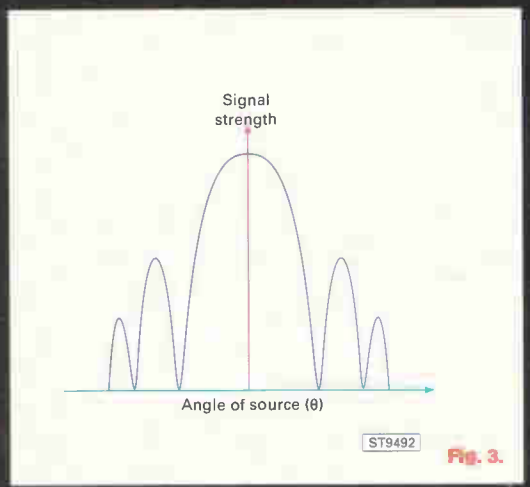

Fig. 3.

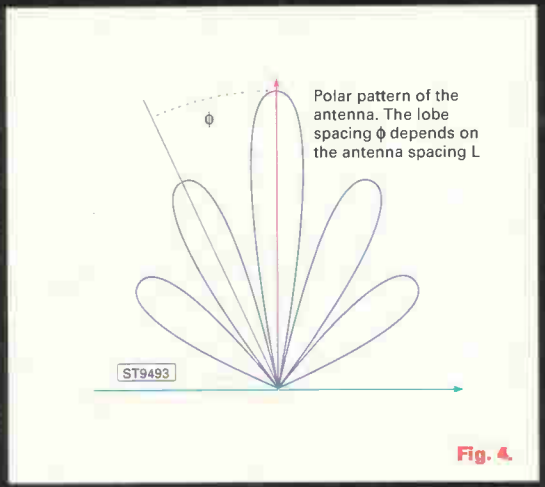

Fig. 4.

processing or noise reduction system such as auto correlation or integration will make faint source 'spring' out of the noise. Using techniques like these is possible because generally we don't care about the time constant of the receiving system (since the signal contains no 'intelligence') and therefore we can afford to build up a picture of the signal over time. If you are using two antennas then cross correlation is also possible.

It is also important to keep terrestrial interference to a minimum, and to this end observations are usually best done at night, rural sites also provide better results than urban setups. Computers and other noisy equipment are best switched off or screened. A number of frequencies are assigned for Radio Astronomy research, these are keep quiet to make listening easier.

Antennas

Single

For maximum sensitivity use a single antenna of the largest size possible. Working at higher frequencies is usually preferable because you get more aperture at shorter wavelengths with a particular size of antenna. The antenna is normally set up to 'look' at a particular area of the sky and the source allowed to drift in front of the antenna aperture as the sky moves.

Interferometer

When we wish to resolve a small source (that is pin point its exact direction) we need a narrow antenna beam width, this requires a large antenna. An antenna aperture of 3000 wavelengths gives a resolution of about 1 minute of arc.

At lower frequencies this is a **large** antenna. Alternatively, we can use two smaller antennas separated by 3000 wavelengths to give the same result. Systems which use two or more antennas are known as interferometers. Consider **Fig. 2**.

When the source is positioned such that the signal reaches the antenna with a path difference of $\lambda/2$ the signals cancel out, leading to no reception. On the other hand, if the signals reach the antenna with a path difference of λ or a multiple thereof they are in phase and the signal is received.

Figure 3 shows this effect. This means that the antenna has a beam pattern looking like that in **Fig. 4**.

Interferometers are much less sensitive than a single antenna of the same effective size, their sole use is as a method of resolving small sources.

ET Phone Home

SETI is the Search for Extra Terrestrial intelligence and is considered a respectable study in 'real' science. Believe it or not amateur radio astronomers also conduct SETI searches.

It is a matter of hot debate whether amateur equipment is sensitive enough to receive a SETI signal. Several amateurs think it is.

If you wish to have a go, you will need the largest antenna you can get your hands on and the most sensitive receiver you can find. Most professional searches concentrate on near stars which are similar enough to the sun to harbour life.

No definite signal has ever been received, (although an interesting candidate was picked up in 1977, and is now known as the WOW! signal). Because of the coverage of professional searches it is probably more profitable (If an escapade like this could be termed profitable) to concentrate on the regions of the sky where large the radio telescopes are not looking.

Conclusion

You will find that Radio Astronomy is an interesting area of the hobby, its really quite amazing just what you can hear (no little green men so far!). It also has another useful purpose, in that it can help you to work out the sensitivity and limitations of your setup and develop it for other areas of short wave listening such as chasing weak DX signals.

Those seriously interested should consider contacting SARA - Society of Amateur Radio Astronomy.

SWM

Want To Know More ?

It can be difficult to find information on amateur radio astronomy. Here is a list of books, addresses and Internet sites of interest. For a simple introduction read the chapter in Gerald Norths book: *Advanced Amateur Astronomy* (Cambridge).

The address for Society for Amateur Radio Astronomers (SARA) is:
Vincent Caracci (Secretary), 247 N Linden St., Massapequa NY 11758, USA or contact **Hal Braschwitz (President) at 3623 W 139th St., Cleveland, Ohio 44111, USA.**

Some interesting Internet sites are as follows:

SARA
http://wbs.net/sara.html

Taunton school amateur radio telescope
http://www.rmplc.co.uk/eduweb/sites/trao/index.html

For a discussion on whether an amateur set up could receive a SETI signal
http://seti1.setileague.org/articles/calibwow.htm

Construction and operation of an Amateur SETI telescope **http://www.irsociety.com/sara/bambi.htm**

SETI and the WOW! signal
http://www.bigear.org/

Professional SETI search
http://www.seti-inst.edu/

Professional radio telescopes
http://info.gd.nrao.edu/ or **http://www.jb.man.ac.uk**

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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.

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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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.

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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.

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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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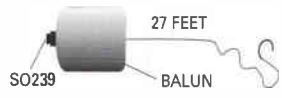

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Ay - Oh - AR8200 The World

Alan Gardener gets his mits on the latest offering from the 'Authorities on Radio'. So new - the paint's barely dry.

I've been waiting some time to get my hands on this new model from AOR. When I originally heard about some of it's features I was sworn to secrecy, and told that it would "blow the opposition out of the water" - So having set the scene, let's take a look at the new AOR AR8200.

This model is really going to appeal to all the gadget freaks out there, you can be assured that if there's nothing to actually listen to, you can still usefully spend your time just fiddling with all the various option modules, 'secret' compartments and 'short cut' key combinations.

What Does It Do?

The basic specification is very comprehensive with frequency coverage ranging from 530kHz to 2.040GHz, with selectable tuning step sizes variable right down to 50Hz, including 8.33kHz ready for the new v.h.f. airband allocations.

Reception modes include w.b.f.m., n.b.f.m., a.m., u.s.b., l.s.b., c.w. and an automatic mode and tuning step selection, which is based on an internally stored bandplan. There are 1000 memory channels and 40 search banks which can be used in a variety of ways, and more search and scan options than you will possibly ever need.

The AR8200 looks (and feels) like a piece of 21st century military hardware. The front panel is dominated by a large liquid crystal display which is capable of indicating just about every function under the sun, including receiver status, v.f.o. frequencies, band scope and option module functions. The keyboard occupies the middle portion of the panel and loudspeaker grille the bottom quarter. So it's pretty much like any other hand-held so far - apart from the colour of course! A nice touch was the way in which AOR have placed the three most used function buttons for Search, Scan and v.f.o. operation separate from, and above, the rest of the keyboard. This makes them very easy to find, especially in the dark until the first key press initiates the display and keyboard back-light. The top of the unit has the usual BNC mounted flexible antenna, volume and squelch controls and a sliding 'secret' panel which facilitates a plug-in medium wave ferrite rod antenna. This was already attached when I received the radio and initially didn't appear to

AaRh! 's First Review

make much difference to reception, until I realised that it had been fitted incorrectly, turning it round made a huge difference with lots of broadcast stations suddenly appearing out of the background noise (*photographers eh! - what do they know about radio? -* ***KN***). I think it would have been a good idea to make it a bit more difficult to fit it the wrong way round, but once you have realised your mistake it's unlikely that you will repeat it a second time. Why have AOR made it external to the main body of the radio? Well I guess it is to get it a bit further away from electrically noisy internal control circuits, but it made me wonder if it would be possible for keen medium wave listeners to experiment with larger plug-in loop antennas?

So Where Is The Tuning Knob?

Everyone else puts the tuning knob on the top panel, but not AOR. On the AR8200 it's edge mounted on the left-hand side panel, looking a bit like the thumb wheel you used to find on 1960s vintage transistor radios. Also on the side panel is a second function button, monitor button, tiny key lock button and a four way cursor bar, which can be used to scroll through various menus or tune the radio at varying rates depending upon how it is pressed. I found both the sideways mounted tuning knob and the cursor key to be very effective but I would personally have preferred them to have been mounted on the other side panel, so that I could have used my right hand thumb to operate them, but I guess that's just personal taste. On the right-hand panel are sockets for earphone (not wired for headphones with stereo connectors though), external 12V supply, external ancillary connector and a loop for the supplied wrist strap. All of the sockets are protected by very neat moulded dustcaps which should help to prevent dirt getting in.

On the underside of the unit there is another 'secret' panel which opens to reveal an option module slot, which is used in conjunction with a small 'eject' button on the left-hand side of the case. The slot can accept a single option module from a range including, digital record and playback, CTCSS decoder, tone eliminator, voice inverter, and backup memory store - but more of that later! Finally looking at the rear panel we find the battery compartment, which takes four AA size NiCads and two screw holes for the belt clip. The case size is approximately 61(W) x 143(H) x 39(D) making it

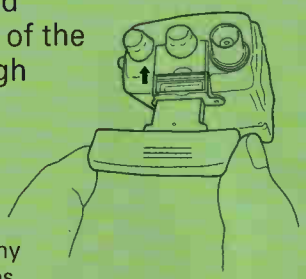
"...you can be assured that if there's nothing to actually listen to, you can still usefully spend your time just fiddling with all the various option modules, 'secret' compartments and 'short cut' key combinations."

This is what came in the box containing the review radio. A full compliment of accessories.

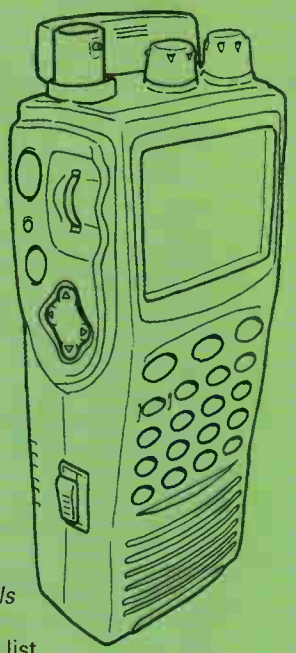
NEW AR8200 The Superior Concept

AOR®

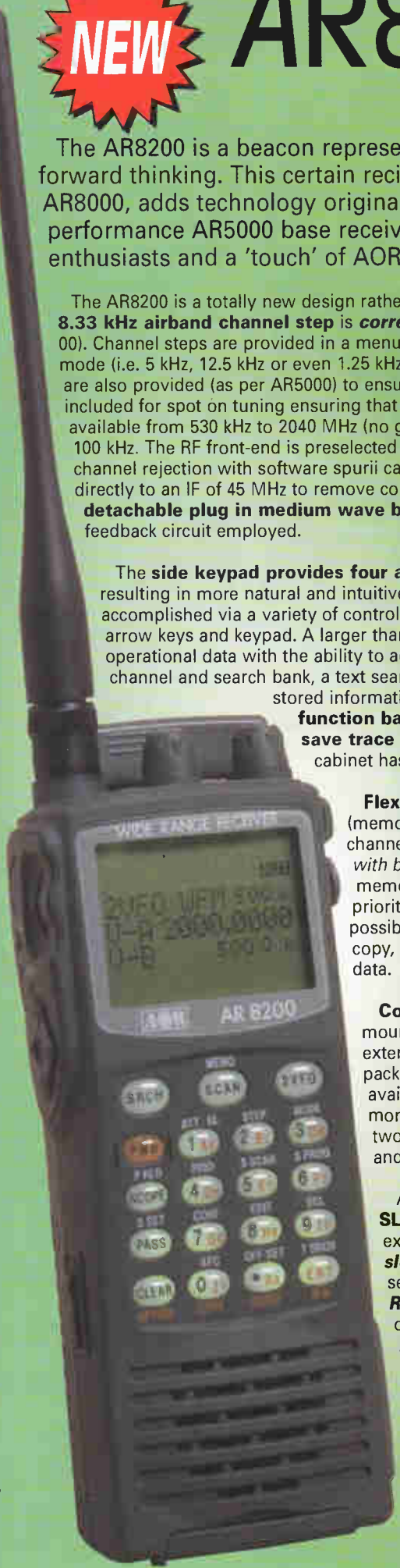
The AR8200 is a beacon representing a new approach, new features and forward thinking. This certain recipe for success builds on the popularity of the AR8000, adds technology originally developed for the award winning high performance AR5000 base receiver, ideas from listening to the needs of enthusiasts and a 'touch' of AOR design & innovative magic.



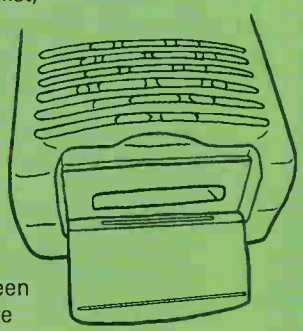
The AR8200 is a totally new design rather than simply an updated model. The all important **8.33 kHz airband channel step** is ***correctly implemented*** (eight-and-one-third, 33, 66, 00). Channel steps are provided in a menu and may be programmed in multiples of 50 Hz in any mode (i.e. 5 kHz, 12.5 kHz or even 1.25 kHz). Extensive step-adjust and frequency offset facilities are also provided (as per AR5000) to ensure tracking of the most obscure band plans, AFC is included for spot on tuning ensuring that nothing is missed. A wide frequency coverage is available from 530 kHz to 2040 MHz (no gaps) with actual minimum acceptable frequency of 100 kHz. The RF front-end is preselected around VHF to ensure the highest levels of adjacent channel rejection with software spurii cancellation. The short wave bands are converted directly to an IF of 45 MHz to remove compromise and the AR8200 is supplied with a **detachable plug in medium wave bar aerial** for localised monitoring with a negative feedback circuit employed.



The **side keypad provides four arrow keys presented as a single 'rocker'** resulting in more natural and intuitive navigation through the on-screen menus. Tuning is accomplished via a variety of controls including a side panel indented main tuning dial, arrow keys and keypad. A larger than average back lit LCD with contrast control provides operational data with the ability to add **12 character text comments** to each memory channel and search bank, a text search feature simplifies identification and recall of stored information. A high resolution signal meter and **multi-function band scope** is provided with adjustable width and **save trace functions.** The scratch resistant "military green" cabinet has a quality feel.



Flexible dynamic memory bank layout is provided (memory banks may be varied in size between 10 and 90 channels each *i.e. bank 'A' 80 channels / bank 'a' 20 channels with bank 'B' 40 channels / bank 'b' 60 channels etc*). 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.



Computer control is available via a metallic side mounted robust connector and optional lead, an extensive RS232 command list is supported. A software package is under development which will be made available as an internet **free** download over the coming months. This connector also supports clone of data between two AR8200 along with tape output, detector output, mute and AGC.

As if this was not enough, **optional internal SLOT CARDS** (which fit into the AR8200 base) extend the AR8200 capability even further: ***Memory slot card*** (increase storage to 4,000 memories, 160 search banks). ***CTCSS slot card*** squelch & search. ***Record chip slot card*** (records up to 20 seconds of audio). ***Tone eliminator slot card, Voice inverter card.***

All this in a cabinet which weighs less than 200g *(excl. NiCads & aerial) with dimensions of* 61(W) x 143(H) x 39(D) mm (excl. projections).

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HAWK5000 is a PC Windows based software package for control of the SDU5000. A virtual display is provided with AVI recording to disk and many more features. Receivers supported by the SDU5000 will interface, this includes the AR5000, AR3000A, ICR9000, ICR8500, ICR7100 & ICR7000. ***Lower price £49***

ARD-2 ACARS & NAVTEX decoder and display unit. Very simple to use, only one audio connection is required from a suitable receiver. Can be used portable from internal batteries or external 12V. A computer port is provided for enhancement but is not required for operation. **£295**

Price changes: Due to the current exchange rate trends, the strength of Sterling has enabled us to review prices DOWNWARD and pass on the benefit of reduced cost, the changes are significant. We will continue to review exchange rates, whichever way they shift!

"I did enjoy using the radio and think that the very extensive facilities offered will certainly worry the competition"

fairly chunky when compared to some of the competition but it is slightly smaller in bulk than the AR8000.

Driving Lessons

Well that's the physical layout taken care of, so let's try pressing a few buttons and see what happens. Starting with the v.f.o. mode first, a quick press of the v.f.o. button toggles between the v.f.o. frequencies and other permutations of button presses allowing you to search between v.f.o. limits, or set-up duplex splits so that when the main v.f.o. frequency becomes inactive the secondary v.f.o. is checked for signals. You can also offset tuning steps by non-standard step sizes to compensate for odd band plans, this is particularly useful in the UK where 12.5kHz channels offset by 6.25kHz are frequently used. A quick press of the 'ENT' key dumps the current v.f.o. settings to one of ten 'Quick memories' which can be likened to a short term 'note pad' facility. These memories can then be quickly scrolled through by means of the cursor key, which I found to be a very handy function. One other useful function is the ability to programme v.f.o. memories and search functions with an offset, for example 0.6 or 1.6MHz so that you can quickly monitor both sides of a duplex or twin frequency transmission. A total of 20 user programmable and 26 pre-programmed offsets being available.

Pressing the Search key not surprisingly, activates the search function which can provide up to ten linked search bands. Various search parameters can be set and these include delay time, signal level, voice level, resume time, and activation of the automatic search and store function. Unwanted frequencies can be locked-out from searches by use of the pass key and interestingly enough this also locks out any other signals within ±10kHz of the original frequency, another nice touch. The scan function has similar facilities to search in that you can set up the parameters of groups including delay time, signal level, voice level, resume time, and mode scan. One other interesting feature is the ability to vary scan bank size. Each bank is split into two blocks of 50 but the ratio between the two banks can be varied to give a 10/90, 20/80, 30/70 or 40/60 split. Very handy if you wish to keep a few specials such as emergency frequencies in a small group. Search and scan speeds of up to 37 channels per second are possible which is very respectable.

Search banks and memory channels can be labelled with up to 12 alpha-numeric characters, via a rather tortuous method involving use of the cursor key, keypad and tuning knob. This is not a pleasant exercise, mainly because of the way in which the character you are trying to edit is obscured by a very slowly blinking cursor. You have to turn the knob and then wait about half a second before you can see which character has been selected. As Japanese character sets have also been included this can take a very long time. Another control method that takes some getting used to is the selection of the various upper and lower case memory banks. This too involves pressing several permutations of function and keypad buttons in order to select the appropriate bank. I really didn't get on too well with this initially, but by the end of the review period I was starting to get the hang of it. Perhaps if I was a bit younger or Japanese I wouldn't have a problem. I also understand from the handbook that you can perform a text search of memory titles, but I quit whilst I was ahead!

The AR8200, plug-in modules.

More Filters

In my opinion one of the most welcome new features is the ability to select different bandwidth settings of 12, 9 and 3kHz for a.m. and 150, 12 and 9kHz for f.m. reception. Reducing the i.f. filter bandwidth dramatically improves the performance in crowded bands and can additionally increase the receive sensitivity. For example, when it is used in conjunction with the a.f.c. facility to ensure spot-on tuning for say, v.h.f. airband reception it can provide about 2dB improvement in sensitivity. The a.f.c. can correct for frequency errors of up to ±25kHz and so will easily compensate for transmissions such as VOLMET which are transmitted from multiple sites with frequency offsets. The noise limiter function can also provide a bit of welcome help in reducing the background noise level on both the v.h.f. and short wave bands especially if the receiver is being used in a mobile environment.

Bandscope

As is common with most hand-held scanners these days the AR8200 has a bandscope function.

However, unlike some of its competitors, it is actually of some use, although you cannot listen to signals when it is running. The maximum useable span is 10MHz which is variable down to 100kHz. The bit that makes it useful is the peak-hold function, which allows you to leave the bandscope running to build-up a record of band usage over a period of time. You can move a marker cursor to indicate the frequency of peaks on the display or quickly monitor activity with a couple of other button presses.

Option Modules

Other things to get excited about are the wide range of options available as add-ons to the receiver. A number of plug-in option modules have been produced which are :-

The VI8200 Analogue voice inverter, which allows simple frequency inversion scrambling systems to be made intelligible. I can't see this option being too popular in the UK as most scrambling systems used here are much more sophisticated than this is capable of dealing with.

Another option with limited appeal in the UK is the TE8200 Tone eliminator. This is designed to prevent searches or scans stopping on channels with continuous audio tones and would seem to only really be of use in Japan where I understand the railways make extensive use of tone signalling on their radio networks.

Partly protected by captive moulded bungs, the multiway interconnection socket, which provides RS-232 signals, 4.2V supply, mute status, a.g.c. voltage, discriminator output and receive audio.

Moving on to more useful options, the RU8200 audio record and playback module provides approximately 20 seconds worth of digital audio recording. You really need to be clairvoyant to get the most from this unit as it will only start recording if you have set it up to do so. I wish AOR had thought this option through a bit more. It would have been nice if it had been designed to run continuously, so that you could review any transmissions that you had just caught the tail end of, or why didn't they link this module in to the auto memory store function, making it possible to hear a short audio 'snapshot' of whatever had been captured. Oh well, perhaps next time?

Next is the CT8200 CTCSS tone squelch and search module. CTCSS is a low frequency audio signalling system which permits several different groups of users to share common frequencies without hearing every conversation. You can either select one of the 50 standard tones available if you already know the tone frequency in use, or you can select the search function which will tell you the frequency of any CTCSS coded signal it detects. This is very useful if you wish to monitor individual groups of users on common base stations or short range business radio allocations and I can see this option being very popular.

Finally the EM8200 extended memory module, which should really be considered as an external memory back-up device. It provides the equivalent storage capacity of four AR8200s, allowing you to save completely different receiver configurations including bandscope displays if you wish. Very useful if you don't want to use a PC to back-up memory contents.

PCs

Did I say PC, yes the AR8200 has got an RS-232 interface and an incredibly comprehensive command set of over one hundred main instructions. Including, I am told, the ability to edit the internal bandplan. Well thank goodness for that, factory programmed bandplans never seem correct to me, so the ability to edit it is very welcome. In addition AOR also tell me that they intend to make available a freeware control package which will permit memory management, so keep your eyes open for this goody. However, some the internal frequency blocking and timing commands which were available in the AR8000 are now no longer externally programmable.

"It would have been nice if it had been designed to run continuously, so that you could review any transmissions that you had just caught the tail end of"

Cassette interface.

The RS-232 connection is via a high quality miniature connector-mounted level converter, which plugs into a socket on the side of the radio. This can also provide a regulated 4.2V 20mA supply, mute status, a.g.c. voltage, receive audio and discriminator signals, which I am sure many of you experimenters out there will find very useful. Connection to a tape recorder is possible by means of a special lead which can also provide a stop/start control signal. Oh, and I almost forgot, you should be able to plug an Opto-Scout into this socket for reaction tuning, more good news!

OK, now for the technical specification. Unlike most other wideband continuous coverage hand-held scanners, the AR8200 has nine switched r.f. band pass filters covering the ranges: 0.1-1.9, 1.9-30, 30-75, 75-118 (Tuned), 118-174 (Tuned), 174-240, 240-470, 470-820 and 820-2040MHz (High pass). Which coupled with the choices of i.f. frequencies used, should really make the strong signal handling performance and sensitivity similar to that of models normally specified for base station use.

Uh Oh!

Unfortunately the review model was a pre-production version and did not perform as well as it should have done. The most obvious sign of which was a very average result for measurements of intermodulation free dynamic range.

Electronic audio recorder

Extensive conversations with AOR UK confirmed that there was indeed a problem, which put paid to the detailed r.f. performance measurements that I would like to have made. However, AOR assure me that production versions will be much better. So I can't really comment on the performance, other than to give an indication of the measured receive sensitivity for n.b.f.m with the 12kHz filter selected. Which gave a reading of -119dBm for 12dB SINAD at 450MHz and -117dBm for 12dB SINAD at 150MHz which is in-line with most of the other hand-helds currently available.

Note that the slightly worse figure at 150MHz is likely to be due to the tuned bandpass filter stage used for this frequency band. However, the slight loss of sensitivity should be compensated for by the huge improvement in the rejection of very strong Band II f.m. broadcast stations and 138/153MHz paging transmissions. Those that can otherwise cause problems with reception in the adjacent amateur and aircraft bands which the filter should provide.

Like most other extended frequency hand-helds the performance fell off by about 10dB at 1700MHz making reception of METEOSAT on 1691MHz with a 1m dish just about possible (with u.s.b. selected) but reception of Inmarsat at 1537MHz was not possible. No doubt a good quality low noise pre-amplifier would make a big difference here.

One other slight criticism was the squelch action, which I found to be a bit 'spluttery' when set near the threshold point. There is always a bit of a trade-off between search and scan speed and squelch detection speed. Make it too slow and you miss signals, or too fast and you have 'choppy' reception. Having said this, the ability to programme individual squelch settings for search and scan functions can improve the situation.

Summary

Well that's it, I must admit I had quite a job in reviewing the AR8200. The draft instruction manual runs to over a hundred pages, taking quite a bit of reading, which combined with all the additional facilities provided by the various option modules made it a struggle to try everything out within the review period. The technical problems didn't help either.

I did enjoy using the radio and think that the very extensive facilities offered will certainly worry the competition and maybe "blow them out of the water". Only the sales figures will answer that question.

Now, let me see, how many days are there left until it's Christmas?

Exact prices are not known at the time of writing, but I would estimate that the cost of the radio is likely to be in the region of £390 or so and option modules start at about £50.

My thanks to **AOR (UK) Ltd., 4E East Mill, Bridgefoot, Belper, Derbyshire DE56 2UA**. Tel: **(01773) 880788**, FAX: **(01773) 880780**, E-mail: **info@aor.co.uk** web: **www.demon.co.uk/aor** for providing the radio and especially Richard Hillier for his invaluable assistance during the review period.

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The optional RS-232 cable.

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GPS12	As GPS12 but with no ext ant input	£180.00	**£140.00**
ASK clearance sale			
GPS120	Fixed large screen display	£429.95	**£199.95**
GPS65	Fixed large screen display with keypad	£429.95	**£199.95**
Eagle GPS Explorer	12 ch h/held rcvr	£249.95	**£199.95**
GPS Antenna			
GPS150	Watson active ant (mag mount)		**£39.95**
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GA26	Garmin active ant for		**£74.95**

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Reach

Our 'SSB Utilities' columnist, Graham Tanner examines the source of one of the most commonly heard utility signals on h.f.

Over the years I must have heard literally thousands of 'MAC' and 'Reach' callsigns on h.f., usually on USAF GHFS frequencies, but also on international Aeronautical ATC frequencies such as Shanwick. It also happens to be another interest of mine, so I thought that I would put together this article to explain how some of their callsigns come about. There is a lot of background information about the aircraft concerned, but stick with it, as it does show how to easily work out just 'what' you are listening to when you hear a 'Reach' callsign. You can see what the main 'Reach' aircraft look like by looking at Figs. 1 to 4.

First, the radio bit. The best place to hear 'Reach' callsigns is on any of the USAF GHFS frequencies, and the most active of these must be 11.175MHz. The USAF GHFS (Global High Frequency System) is a network of 13 high-powered h.f. stations spread around the world in strategic locations, which provide air/ground h.f. communications between ground agencies and US ships and aircraft. The GHFS was created in June 1992 by consolidating a number of other USAF networks, including the USAF GCCS (Global Command & Control System) and the Strategic Air Command 'Giant Talk' system. See the chart on this page which lists the GHFS locations and frequencies, and also the map, **Fig. 5**, showing the locations of the GHFS sites.

As I mentioned, the busiest frequency is almost certainly 11.175MHz. Just sit on this frequency for a few hours, and you'll hear all sorts of aircraft and callsigns, including a large number of 'Reach' callsigns. A lot of the radio communications heard on the GHFS frequencies relates to aircraft flying 'from A to B' and wanting to let 'B' know what time they are due to arrive and if they have any special requirements. This may seem to be either mundane or wasteful, but commercial aircraft do it also, but you tend not to see so many of those flights reported.

When you hear a USAF flight in contact with a ground station (such as 'Hilda' or any other Command Post), they are often asked to give their 'tail-number'. This allows the ground party to find the flight in their computer. I was quite surprised to hear that the USAF computer records flight details against an aircraft's tail-number, rather than its flight number. This is good news (for we listeners, at least), because a busy ground station will always need to know the tail-number of an aircraft, and the crew of these aircraft get so used to passing their tail-number that now they almost always give it whether it is asked for or not. I have heard several occasions where a flight has passed its tail-number a number of times, and the ground-party still cannot find the flight details in their computer; when the pilot says that they are a replacement aircraft for one that has gone unserviceable, the ground party soon finds the flight details.

Other information that is passed to the ground station includes the aircraft status (how much maintenance is required, if any, before the aircraft can fly again), the number of people on board (so accommodation can be organised), cargo load (so the right trucks to off load the cargo can be

Fig. 1: A USAF C-5B Galaxy just before touch-down. *G. Tanner*

ing out

prepared), and the amount of fuel required to top-up the aircraft for its next flight. There are many other kinds of information that could be passed, but it would probably take many pages to list and explain them all.

Why 'Reach'

In the 1960s, the USAF had dozens of small and medium sized units operating transport aircraft. As part of a modernisation program, they were all combined into one huge organisation known as 'Military Airlift Command' (MAC). MAC operated with several Wings, each containing three or four Squadrons, with each operating a single aircraft type. This existed until middle of 1991, when MAC was replaced by AMC - Air Mobility Command. One of the goals of AMC was to be the 'global reach' of US forces around the world, so the callsign 'Reach' replaced the callsign 'MAC'. It took a while for everyone to get used to the new callsign, and about one year after the change-over everyone was using 'Reach'. The official three-letter code used on flight-plans for these flights is 'RCH'.

Tail-number Layout & Presentation

The USAF tail-number system comprises two parts - a Fiscal Year (FY) and a sequential serial number. These are presented on the tail and/or fuselage of an aircraft in a number of different ways. On most aircraft, it is on the vertical tail where it may be shortened or altered so that just the 'last five' digits are displayed. It is also displayed somewhere at the front of the aircraft usually on the left side (sorry, make that 'port side'); here, it may be shortened to just the final four digits. Another place where the full tail-number is displayed is a small stencil just beneath the cockpit; this is known as the 'Technical Data Block' (TDB), and it contains the full serial, full manufacturers type designation, and details of what kind of fuel the aircraft requires. A typical example of this is shown in **Fig. 6**, before you all rush-off and check, I made this one up by combining the data from photographs of the TDB on two different aircraft! The first two lines are from one aircraft, and the last three are from another.

The principle behind this, is so that 'Joe Airman' does not maintain the wrong aircraft, or fill it with the wrong fuel. It could also be argued that it prevents the flight-crew from flying-off in the wrong aircraft - believe me, both of these events have happened! These stencils are usually quite small and usually rather worn; how is Joe Airman supposed to read this information when its 10m up in the air under the wind-shield of a C-5A Galaxy or KC-10A Extender? The TDB is not just on transport aircraft, it is supposed to be on every USAF aircraft and helicopter, from the humblest single-engined prop-trainer up to the mighty B-52H. It's also on all US Army helicopters and fixed-wing aircraft. For many years, it was 'conveniently forgotten' on reconnaissance aircraft such as the U-2/TR-1 series and SR-71 *Blackbird* (especially when operating overseas), but they seem to be re-appearing on these aircraft. In the 1960s and 1970s most of the USAF transport fleet were painted in a smart white and grey colour scheme. The last four digits of the tail-number were painted in a yellow hexagon near the crew-entry door. At the start of the 1980s, a few

"The best place to hear 'Reach' callsigns is on any of the USAF GHFS frequencies, and the most active of these must be 11.175MHz."

Fig. 2: A USAF KC-135 tanker aircraft with special markings. *G. Tanner*

Fig. 3: A USAF C-17A Globemaster III making a slow flypast. *G. Tanner*

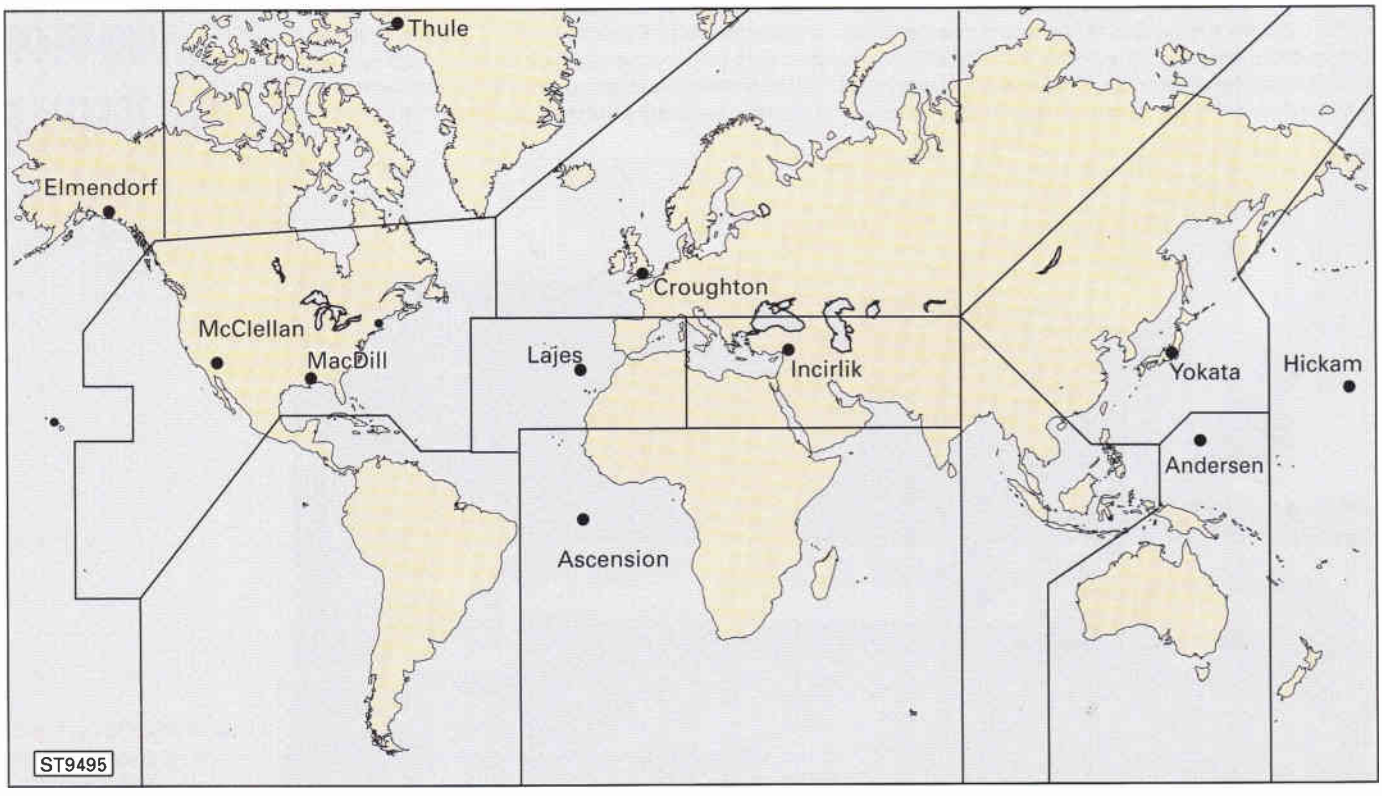
aircraft started to appear in 'experimental' colours; there were two-tone blue C-130 Hercules, and even sandy-coloured ones. Eventually they settled on a scheme where most of the transport fleet were re-painted in a dreadful dark-green/slate-grey colour with black markings; almost all the bright markings were removed. This colour-scheme was known as 'European 1', and all the unit markings and tail-number were in black, making identification almost impossible. Fortunately, since the start of the 1990s, many aircraft are now being re-painted in a medium grey colour scheme, sometimes with coloured bands across the tail fin. Now, it is much easier to see the markings on individual aircraft, and the 'last-4 in a yellow hexagon' is steadily being replaced by just the last four digits in black along with details of the unit(s) operating the aircraft.

Fiscal Year

The Fiscal Year represents the year that the aircraft was budgeted - this is never the year in which it first flies! Today, aircraft production is spread over many years, and it takes quite a few years for budgeted aircraft to take to the skies. I personally remember seeing the second C-17 having just rolled-off the production line at Long Beach; this was in March 1992, but it is a 1988 Fiscal aircraft. For example, here we are in 1998, and the 1996 C-17A aircraft are just starting to appear more regularly; the first of the five '1995' C-17A aircraft was logged by listeners in late 1996, nearly two years after its tail-number was allocated.

The rest of the tail-number is a sequential series which restarts at '0001' every year; the first aircraft of 1996 was '96-0001', the first of 1997 is '97-0001', and so on. They are allocated in batches by the US Department of Defence. I don't know which department is responsible for this, but I sure wish that they had a web-page detailing what the new allocations are! Students of the development of military technology are able to determine a nations military priorities by studying the way that aircraft are ordered and serial blocks are allocated. In some years, fighter-aircraft are top priority, so each Fiscal-

Fig. 5: Locations of the GHFS sites.



GHFS Stations	Frequencies (all MHz u.s.b.)
Andersen, Guam	6.739, 8.968, 11.175, 13.200.
Andrews, NE USA	4.724, 6.712, 8.968, 11.175, 15.016, 17.976.
Ascension, S Atlantic	6.739, 8.992, 11.175, 15.016.
Croughton, UK	4.724, 6.712, 8.992, 11.175, 13.200, 15.016, 17.976.
Elmendorf, Alaska	4.724, 6.739, 8.968, 11.175, 13.200, 15.016, 17.976.
Hickam, Hawaii	6.739, 8.968, 11.175, 13.200.
Incirlik, Turkey	4.724, 6.739, 11.175, 15.016, 17.976.
Lazes, Azores	6.739, 8.968, 15.016.
MacDill, Florida	6.739, 8.992, 11.175, 15.016.
McClellan, California	4.724, 6.739, 8.968, 11.175, 13.200, 15.016, 17.976.
Offutt, central USA	6.739, 8.968, 11.175, 17.976.
Thule, Greenland	4.724, 6.739, 8.968, 11.175, 13.200.
Yokota, Japan	4.724, 6.739, 8.968, 11.175, 13.200, 15.016, 17.976.

Fig. 6:

U.S. AIR FORCE C-141B A.F. SERIAL NO. 64-0612 SERVICE THIS AIRCRAFT WITH GRADE JP-4 FUEL OR TYPE B PER MILSTD-D-1553

Lockheed C-SA/B/C Galaxy

66-8303 - 66-8307	(6303-6307)
67-0167 - 67-0174	(7167-7174)
68-0211 - 68-0228	(8211-8228)
69-0001 - 69-0027	(9001-9027)
70-0445 - 70-0467	(0445-0467)
83-1285	(3285)
84-0059 - 84-0062	(4059-4062)
85-0001 - 85-0010	(5001-5010)
86-0011 - 86-0026	(6011-6026)
87-0027 - 87-0045	(7027-7045)

Aircraft from 83-1285 onwards are all C-5B aircraft, while 68-0213 and 68-0216 are C-5C's. Aircraft that have been written-off are 66-8303 (17.10.70), 67-0172 (25.07.70), 68-0218 (04.04.75), 68-0227 (27.09.74) and 68-0228 (29.08.90).

Operating Units:
60th AMW (AMC), 21st AS/22nd AS - Travis AFB, California
436th AMW (AMC), 3rd AS/9th AS - Dover AFB, Delaware
97th AMW (AETC), 56th AS - Altus AFB, Oklahoma
433rd AW (AFRC), 68th AS - Kelly AFB, Texas
439th AW (AFRC), 337th AS - Westover ARB, Massachussetts
105th AW (NY ANG), 137th AS - Stewart Field, New York

McDonnell-Douglas KC-10A Extender

79-0433 - 79-0434	(9433-9434)
79-1710 - 79-1713	(9710-9713)
79-1946 - 79-1951	(9946-9951)
82-0190 - 82-0193	(2190-2193)
83-0075 - 83-0082	(3075-3082)
84-0185 - 84-0192	(4185-4192)
85-0027 - 85-0034	(5027-5034)
86-0027 - 86-0038	(6027-6038)
87-0117 - 87-0124	(7117-7124)

Just one aircraft has been written off - 82-0190 (17.9.87).

Operating Units:
60th AMW (AMC), 6th ARS/9th ARS - Travis AFB, California
305th AMW (AMC), 2nd ARS/32nd ARS - McGuire AFB, New Jersey

McDonnell-Douglas C-17A Globemaster III

87-0025	(7025)
88-0265 - 88-0266	(8265-8266)
89-1189 - 89-1192	(9189-9192)
90-0532 - 90-0535	(0532-0535)
92-3291 - 92-3294	(2291-2294)
93-0599 - 93-0604	(3599-3604)
94-0065 - 94-0070	(4065-4070)
95-0102 - 95-0107	(5102-5107)
96-0001 - 96-0008	(6001-6008)

with about another 80 aircraft to follow in the next ten years.

Operating Units:
97th AMW (AETC), 57th AS - Altus AFB, Oklahoma
412thTW (AFMC), 417th FLTS - Edwards AFB, California
437th AMW (AMC), 14th AS/17th AS - Charleston AFB, South Carolina

Boeing C-135 Stratotanker
(including KC-135, EC-135, RC-135 variants)

55-3118 - 55-3146
56-3591 - 56-3657
57-1418 - 57-1514
57-2589 - 57-2609
58-0001 - 58-0130
59-1443 - 59-1523
60-0313 - 60-0378
61-0261 - 61-0332
61-2662 - 61-2674
62-3497 - 62-3585
62-4125 - 62-4139
63-7976 - 63-8061
63-8871 - 63-8888
63-9792
64-14828 - 64-14849

Operating Units:
There are far too many operating units to list here. Most of them are Tanker units, but there are many smaller units with just a few aircraft each, or specialist units with special roles. I have not listed the callsign blocks as there are so few in each batch of aircraft that would use 'Reach' callsigns.

Lockheed C-141A/B Starlifter

61-2775 - 61-2779	(1775-1779)
63-8075 - 63-8090	(3075-3090)
64-0609 - 64-0653	(4609-4653)
65-0217 - 65-0281	(5217-5281)
65-9397 - 65-9414	(5397-5414)
66-0126 - 66-0209	(6126-6209)
66-7944 - 66-7959	(6944-6959)
67-0001 - 67-0031	(7001-7031)
67-0164 - 67-0166	(7164-7166)

All aircraft are C-141Bs except for 61-2775 to 61-2778 inclusive which are NC-141A.
Aircraft which have been written-off are as follows: 63-8077 (28.08.73), 64-0641 (20.03.75), 65-0274 (19.08.74), 65-0281 (07.09.66), 65-9407 (23.03.67), 66-0127 (13.04.67), 67-0006 (28.08.76), 67-0008 (28.08.76), (all as C-141A's), and 64-0624 (12.07.84), 64-0647 (18.09.79), 64-0652 (31.08.82), 65-0253 (07.10.93), 65-0255 (30.11.92), 65-9405 (13.09.97), 66-0142 (30.11.92), 66-0150 (29.02.89), 66-0173 (23.03.94), 67-0017 (07.03.82), 67-0030 (12.11.80), (all as C-141B's).
Those in storage at AMARC comprise (as of February 1998) 61-2777, 63-8078, 63-8083, 63-8086, 63-8089, 63-8090, 64-0609, 64-0613, 64-0617, 64-0625, 64-0634, 64-0635, 64-0636, 64-0639, 64-0648, 64-0650, 64-0651, 65-0247, 65-0262, 65-0264, 65-0265, 65-0268, 65-0270, 65-0278, 65-9397, 65-9398, 65-9399, 65-9402, 65-9404, 65-9410, 66-0129, 66-0135, 66-0138, 66-0141, 66-0143, 66-0145, 66-0170, 66-0179, 66-0188, 66-0203, 66-0204, 66-0205, 66-0207, 66-0208, 66-7945, 67-0005, 67-0023 and 67-0025.
Finally, a number of aircraft have been grounded or preserved as follows: NC-141A 61-2779 (at Edwards AFB), 63-8075 (at Travis AFB), 63-8079 (at Charleston AFB), 64-0626 (at Dover AFB), 64-0642, 65-0228 (at Sheppard AFB), 65-0236 (at Scott AFB), 65-0246, 65-9400, 65-9406, 66-0126 (at Sheppard AFB), 66-0154, 66-0176 (at Sheppard AFB), 66-0180 (at Robins AFB), 66-0186 (at Marietta), 66-0189 (at Sheppard AFB).
One other C-141A exists. It is operated by NASA from its Ames Research Facility in California, and carries the NASA registration N714NA.

Operating Units:
60th AMW (AMC), 19th AS/20th AS - Travis AFB, California
62nd AMW (AMC), 4th AS/7th AS/8th AS - McChord AFB, Washington
97th AMW (AETC), 57th AS - Altus AFB, Oklahoma
305th AMW (AMC), 6th AS/13th AS - McGuire AFB, New Jersey
437th AW (AMC), 15th AS/16th AS - Charleston AFB, South Carolina
445th AW (AFRC), 89th AS/356th AS - Wright-Patterson AFB, Ohio
452nd AMW (AFRC), 729th AS/730th AS - March AFB, California
459th AW (AFRC), 756th AS - Andrews AFB, Maryland
164th AW (TN ANG), 155th AS - Memphis, Tennessee
172nd AW (MS ANG), 183rd AS - Jackson, Mississippi
412th TW (AFMC), 453rd FLTS - Edwards AFB, California.

(Abbreviations used:)

AETC	Air Education & Training Command
AFB	Air Force Base
AFMC	Air Force Material Command
AFRC	Air Force Reserve Command
AMC	Air Mobility Command
AMW	Air Mobility Wing
ANG	Air National Guard
ARS	Air Refuelling Squadron
AS	Airlift Squadron
AW	Airlift Wing
FLTS	Flight Test Squadron
TW	Test Wing

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Fig. 4: A USAF KC-10 Extender refuelling aircraft climbing steeply after take-off. *G. Tanner*

Year allocation starts with vast blocks of fighters. In other years, transport aircraft prevail (usually in lesser numbers), and just occasionally, specialist types such as the E-3 AWACS come first. In the last two decades, when large-scale purchases of aircraft have been involved, their tail-number allocations have been spread across successive years - the Fiscal Year changes each year, but the individual aircraft number runs in an unbroken sequence. There are some notable exceptions in displaying the TDB; the following aircraft do not wear their TDB for one reason or another - USAF VIP aircraft including 'Air Force 1' and 'Air Force 2', the Thunderbirds display team, some reconnaissance aircraft such as the SR-71 and U-2, and the four E-4 'Nightwatch' aircraft.

The Callsigns

In recent years, the USAF has adopted a very easy system for generating most of its AMC callsigns. They are using some digits from the aircraft tail-number (see below). What is painted on the tail of an aircraft is a contraction of the full 'Tail Number', but it is also known as the 'last-5'. The USAF are using the last digit of the Fiscal Year and the final three digits of the tail-number. In the lists of batches of serial numbers I have listed (in brackets) these 'made-up' numbers, so that you can easily find them when you hear a 'Reach' callsign on h.f. Not all 'Reach' flights uses these kind of callsign numbers, but if you hear a four-digit number as part of a 'Reach' callsign, there is a very good chance that the aircraft you are hearing can be found contained in this article.

There are still plenty of flights which use a combination of numbers and letters to form their callsign. Obviously, these cannot be easily found in the lists. The secret with these flights is to listen to their phone-patches to a ground station, and if they give their tail-number, then you can check in the lists to see what kind of aircraft you are listening to. For these flights, the flight-number part of the callsign is the last few digits of the full AMC mission number, which is twelve-character combination of numbers and letters. If you know how to decode these mission numbers, then you can work out where the flight comes from, where it is going to, and what kind of flight it is.

Another category of 'Reach' flight is those that are really charter flights on behalf of AMC. These flights generally use a 'Reach' callsign with several letters and numbers. One sure-fire give-away that a flight is an AMC Charter is that they keep asking for a selcal check. If you are listening to a GHFS station, they do not have selcal capability, but that doesn't stop the pilot asking for a selcal check. None of the AMC transport aircraft listed in this article are equipped with selcal equipment, so an aircraft with a selcal is not really an AMC aircraft. If you are listening to the trans-Atlantic h.f. nets, there are several flights each day which are flown by AMC Charter aircraft, so they are quite easy to pick out. A few of the airlines operating AMC Charter flights are American Transair, Flying Tiger, Polar Cargo and Southern Air Transport. I did see some comments a few years ago about being able to identify the Airline from a 'Reach' callsign, as various airlines always used the same second-digit in their 'Reach' callsign, but I am not sure if this still happens.

Tail-number Allocations

In the listings accompanying this article, I have detailed the 'first' and 'last' in each batch of tail-numbers allocated to various types. I have chosen these types as they are the ones most widely reported but there are many more types worth considering. In each entry, the numbers are inclusive. I have also listed those aircraft that have crashed (w/o - written-off) or have been withdrawn from use, so you should never hear these tail-numbers. Aircraft that are withdrawn are generally in open storage in the desert at Davis-Monthan AFB in Tucson, AZ, but there is a possibility that one or two may fly again. This information is based upon reports up until early 1998. These are the official allocations of the tail-numbers, however what appears on the tail of any given aircraft may vary. In almost every case, the aircraft will wear the 'last 5' on its tail (e.g., 68303) and will quote that as its tail-number if asked; sometimes they quote the full fiscal-year and serial (66-8303) when asked by a Command Post or 'Hilda'.

Duplicates

Looking through the details of the batches of aircraft, you will probably have noticed that certain 'last-4s' appear on different aircraft. This first became a problem when the C-5B Galaxy came on the scene; the 1985/86/87 aircraft shared the last-4 digits with the penultimate batch of C-141Bs. Just to complicate things further, there are also a few KC-10 aircraft which have the same 'last-4s' as some C-5Bs and C-141Bs. For a few months there was complete chaos whenever 'Reach 0027' called-up on the GHFS frequencies - was it a C-5A (69-0027), a C-5B (87-0027), or one of the KC-10s (85-0027 or 86-0027). This has been solved with the new callsign system - these four aircraft now use 9027, 7027, 5027 and 6027 respectively.

So, next time you hear an aircraft on a GHFS frequency passing its tail-number and aircraft type, you can cross-check the details in the above lists. Good luck. SWM

"Just to complicate things further, there are also a few KC-10 aircraft which have the same 'last-4s' as some C-5Bs and C-141Bs."

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SSB Utilities

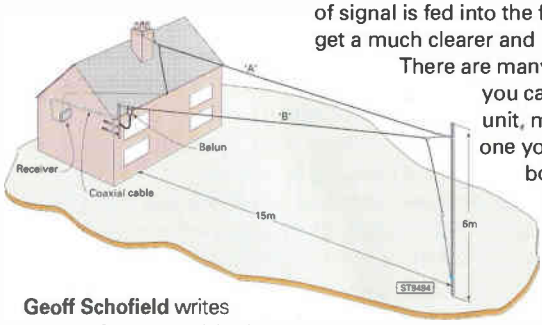
Beacons

Paul Churchill writes to ask if there are any good publications that will give information about aircraft reporting points world-wide or any web sites relating to this aspect of h.f. airband listening, Paul says it is frustrating when he hears a Malaysian Airlines jumbo-jet telling Colombo ATC on 5.658MHz that he is 410km SW of a particular three-letter reporting point, and then finding that most airband guides only cover the UK airspace.

Well Paul, I do not know of a single publication that lists them all worldwide, and the lists that I have are just a few pages as an appendix in a series of books. I would imagine that such a book would be instantly 'out of date' as soon as it was published, as their are always plenty of changes to beacons listed in NOTAMS. The books that I have are the RAF En-Route Supplements, but even they do not cover the entire world.

The latest version of the AirNav software claims to have a database of 32000 beacons and waypoints, but I'm not sure if it would contain the ones that you are looking for. As we go to press I am expecting to receive a copy of this software, so I'll let you know what I find.

In the meanwhile, if anyone knows of a single publication (or web-page) which contains lists of beacons and reporting points, then please get in touch.



Geoff Schofield writes to ask for some advice in connecting his external long-wire to his receiver.

Geoff has a DX-394 receiver and has two wire antennas strung from his house to the end of the garden. One is a 'pure' end-fed, in that it leads straight into the high-impedance socket on the rear of the receiver. The second is slightly shorter, but has a balun with 50Ω coaxial cable to feed the signal into the low-impedance SO-239 socket. See the diagram to give you an idea of his setup.

Geoff says that the receiver seems to be OK, but he is still confused about which antenna is the better of the two, and whether they are connected correctly to his receiver.

Well, from the diagram (below) and the written description, I can confirm that both antennas are connected to the correct sockets on the rear of the receiver. However, any fixed length of wire will present a low impedance to your receiver at a specific frequency, but will show a high impedance just a few MHz away. Now, you cannot simply adjust the length of your antenna as you change your operating frequency, so the 'front-end' circuitry of you receiver must be able to cope with a wide variation in impedance. The outcome of this is that your receiver will seem to pick-up signals better on certain frequencies, and other frequencies will be lost amongst the background noise.

However, all is not lost. Geoff asks if an a.t.u. would be a worthwhile investment. My answer is an emphatic "Yes!". The purpose of an antenna tuning unit (a.t.u.) is to vary the antenna impedance so that it matches the required impedance of your receiver (usually either 50Ω or 300Ω). When the impedance matches that of your receiver, the maximum amount of signal is fed into the front-end circuitry, and you get a much clearer and louder signal.

There are many a.t.u. designs out there, and you can either buy a ready-made unit, make one from a kit, or make one yourself from a design in a book or magazine. The one that I use was a kit which I made one Christmas a few years ago, and it has never let me down. It is quite amazing to see the signal meter rise as the a.t.u. is adjusted for maximum signal strength. Signals that were once barely audible can be altered into S9 signals within a few seconds. Now, I can't claim that your chosen a.t.u. would achieve the same results on every frequency, but an improvement in signal strength is almost guaranteed. So, to answer Geoff's question, "Yes, get an a.t.u." and see how much it improves reception.

Nat Tracks

Some more information for those of you who follow aircraft operating across the Atlantic on the NAT Tracks. **Duncan Croucher** writes to say that he has found a web-page which regularly gives details of the eastbound and westbound tracks across the Atlantic. The web-page address is: **http://dave83.simplenet.com/747/html/natracks.html** The list is not updated every day, so check the date at the top of the listing; the date is in American format, so 1st May 1998 is given as 05/01/98.

5.680 Warbler

Anyone who has spent time listening to 5.680MHz over the past year will have noticed the terrible problems caused by illegal broadcast transmissions, and the 'bubble jammer' being used to suppress the broadcast. It has caused problems for Kinloss Rescue on several occasions, and they have been moving to other frequencies to enable them to continue their operations.

The jammer is sitting on 5.680MHz because of a broadcast transmitter located on that frequency. From all the reports that I have seen, it seems that the Iranians are hosting an anti-Iraqi broadcast called 'The Voice of the Moyahed'. The Iraqi authorities do not like the content of this broadcast and have been jamming these station for several years.

The use of 5.680MHz for these broadcasts is quite a new phenomenon, but the radio station is not. The transmitter jumps around in frequency for many hours, with the jammer following soon after.

Sometimes it only takes a few seconds for the Iraqi jammer to return on top of it, but sometimes the broadcast can be heard for about a minute before once again, it is blocked by the jammer. The jammer is a much higher power transmission, so it is not easy to hear the broadcasts from the 'Voice of the Moyahed' underneath it.

It has turned into a real cat-and-mouse game. The jammer follows the broadcast station as it changes frequency between the 4.5-6MHz band all afternoon and evening. At times, the broadcast station will go off air, making the Iraqi authorities think it has jumped off somewhere up or down the band, so they turn off the jamming signal. However, in reality the broadcaster is still on the same frequency, and promptly will come back on again. This must be 'fun' for the engineers at the two stations as they continually try to outwit each other. It must be terrible for the listeners in the intended audience!!

There is an article about the jamming of various Iraqi frequencies on the 'BBC Monitoring' web page. I could not access it directly, but I was able to search for 'jamming' in their search-engine, and found several articles relating to this subject. The web-page address is:**http://news.bbc.co.uk/hi/english/world/monitoring/** The jamming of 5.680MHz and surrounding frequencies has been going on since early Autumn 1997, and during the first few months of 1998 there were dozens of jamming signals found between 4 and 6MHz.

More Concorde

Frank Taylor writes to ask about the recent items concerning *Concorde* in this column. He is considering creating a web-page about *Concorde* flights and frequencies, and is wondering about the legal aspects of this.

Well Frank, I'm no legal expert, but so long as you stick to using publicly available information, and don't criticise the aircraft operators you should be OK.

I would suggest that you try to give details of the flight departure times from both Paris and London, their routes to the Oceanic boundary, and the v.h.f. frequencies that they are most likely to use. Godfrey Mannings *Airband Factsheet* will be useful for this.

Maybe you can also give an idea of the times that each flight is likely to appear on h.f., along with their flight numbers (which I gave a few months ago), so that listeners will know that they are listening to *Concorde*. Airline timetables (or even the *ABC*) will provide details of departure times from New York and other regular locations in the USA. If you can also work out what time they will appear on h.f. and v.h.f. as they fly eastwards, that will be a good guide for listeners. Of course, your web-page will need some photographs of *Concorde* itself, so maybe you could contact British Airways and Air France.

WIDEBAND

Past, Present & Future?

Peter Bond take a journey into recent history with a nostalgic look-back at the advent of scanning receivers.

Various things prompted me to write this article not least of which was the chance to indulge in a bit of nostalgia. My original idea was to write a single article in three parts which would include some nostalgia, a comment on the current state of affairs and a plea to radio manufacturers for their specifications of the future. The more I typed the more I realised that this could well expand beyond a single issue of the magazine. Consequently, this month I present a trip into the past and I hope to include the present and future elements of the original story in a future issue.

I am confident that most radio enthusiasts, who read this magazine, will have their own fond memories of special moments in their listening career. In my eyes this would not only include the interception of that sought after transmission, but also that special moment when you first become aware of the radio of your dreams. The airbands have always been my particular interest and I have two particular memories that stand out. One is the main subject of this article, the other was when I picked up my first Australian Air Force C130 Hercules, on h.f. routing from Honolulu to Sydney. When I started listening to h.f., the propagation conditions were not ideal and it was over two years, (plus several changes of antenna), before I could hear signals from the far side of the world.

I sometimes wonder how many people decide to take up h.f. listening in times of poor propagation and then become disheartened and give up the hobby when they cannot immediately receive transmissions from all four-corners of the globe? To anyone reading this article, who is relatively new to the world of h.f., all I would say is have patience. The next two years will see much improved propagation, and hopefully the reception of those elusive signals. Anyway, I digress.

1984 - And All That

To set the scene - In 1984 the Iron Curtain was still in place, the Berlin Wall was still a symbol of the barrier between east and west and security at UK military airfields was quite rightly, vigilant. For many years, aircraft enthusiasts had regularly visited bases around the country, and whilst photography was generally tolerated, it was not uncommon to get a

RECEIVERS

visit from the military or local police who would politely check out what you were up to. It's hard to believe that just 14 years later, military airfields are now providing viewing enclosures for the public. With security and other factors in mind, most aviation enthusiasts would have been rather cautious about owning a radio that was capable of receiving u.h.f. airband transmissions. It was not an uncommon view that owning such a radio, (should one be available), might actually be illegal.

In early 1984, airband radios were still fairly basic analogue units with the ability to receive v.h.f. signals only. Whilst h.f. and amateur radio's had progressed significantly, the days of digital readouts and multiple scanning channels were only just about to arrive in the airband world. At that time I used three radios, an ATC720, which was a small hand-held radio, which had a rotary thumb-wheel controls to select the frequency. I think it might have been called a 'Skyvoice' or something similar. My other hand-held was a Signal 517, this had an analogue rotary tuning control and had sockets for three, fixed frequency, plug in crystals. My third radio which I kept as a standby, was an old Bush VTR-178, (don't laugh!), which I had originally bought in 1973.

Nostalgia!

It was a bright, sunny but cool early spring morning, I remember the date exactly it was the 5th March 1984. I had just finished a night shift at Heathrow and I had decided to take advantage of the good weather and travel to RAF Mildenhall to take some photographs - for 9 years I had worked in my spare time as a freelance aviation photo-journalist. It was an ideal morning for photography, not only was there glorious spring sunshine but there was a gentle breeze blowing from the Northeast. Whilst the North-easterly wind kept the temperature down, it did mean that Mildenhall was landing on runway 11 and Lakenheath was on runway 06. To me, this was ideal, as I could base myself in Pollards Lane, which was one of my favourite viewing points on the South side of the airfield. This location was excellent for photographs of aircraft landing at Mildenhall, plus it had the bonus that you could also view the inbounds for Lakenheath, as they passed almost directly overhead.

I arrived just after 0930 to find the lane empty. I parked up on the grass verge, set up my camera

The secretive SR-71A Blackbird first intercepted, radio-wise, with my newly acquired AR2001.

and tuned each of the hand-held radios to the v.h.f. tower frequency for the two airfields. I then sat back, tucked into my ham rolls and waited to see what the day would bring. I didn't know it then, but this was to be a day that in some ways would change my life! Airband listening at military airfields could be a frustrating experience. Whilst some transport aircraft did use v.h.f. for communications, much of the radio-activity would be on u.h.f. Consequently, if the controllers v.h.f./u.h.f. slave link was switched off, the first indication you would get of a pending arrival would be the noise of the aircraft's engines on final approach! Even with the link on, hearing only one side of a two-way conversation can also be a very frustrating experience.

After an hour or so a car pulled up in front of me.

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SRP TR

(COM213)
100 CHANNEL SCANNER

A high-specification scanner offering 100 channels in 10 banks, with 1 Priority Channel in each bank. For speed and ease of use it offers Jetscan, which can scan 100 channels per second, and also Jetsearch, which can search at up to 100 steps per second. It also features progammable band search, lock-out for up to 10 frequencies, channel look-out, 2 second scan delay, data noise/birdies skip, a key lock and a green back-lit display. 66-88, 108-174, 406-512, 806-956.

£119.99 + £5 P&P.

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10 CHANNEL SCANNER

This state of the art 10 channel scanner is fully programmable and can receive a variety of PMR communications. It is robustly designed and offers a full frequency LCD display for ease of use. Also features an in-built circuit for recharging Nicad batteries. 66-88, 137-174, 380-512.

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(COM205)
400 CHANNEL SCANNER

The B111 is the last word in programmable scanners. A free standing desk top unit covering nine radio bands in the 25-512MHz and 806-1300MHz ranges. Operates from AC mains or car cigar lighter via suitable adaptor. It incorporates a microprocessor avoiding the need to change crystals and gives special functions such as scan delay, memory back-up, priority channels and many more.

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(COM215)
200 CHANNEL SCANNER

A highly-featured desktop scanner offering 200 channels arranged in 10 scanning banks, with one Priority Channel in each bank. For ease of use it offers Turbo Scan at 100 channels per second max with Autosort for maximum scan speed and Turbo Search at up to 100 steps per second. Other features include direct search programmable band search, auto station program mode, lock-out for up to 10 frequencies, manual frequency sort, programmable auto-recording and optional CTCSS tone squelch. The unit is powered by AC mains or 13.8Vdc. 66-88, 108-174, 216-512, 806-956.

£219.99 + £5 P&P.

SANGEAN ATS 909 FM-Stereo/MW/LW/SW PLL Synthesized receiver

The ATS-909 is a continuously tunable receiver from 153kHz-29999kHz. This receiver is capable of receiving and tuning all the short wave bands and any stations in between

- 307 memories (261 in SW, 18 each in MW/FM, 9 in LW plus priority station)
- Five tuning methods – direct frequency tuning, auto scan, manual tuning, memory recall and rotary tuning
- ATS (auto tuning system) – auto scan and preset in priority of signal strength in FM/MW/LW bands
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- FM stereo via earphones
- 29 pages SW stations name memory, 9 memories in every page
- Automatic search strongest signal station within SW station pages
- SSB (USB/LSB) 40Hz/step on fine tuning
- AM RF gain control
- Built-in 42 world cities time plus D.S.T. device
- 3 individual timers
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- Alarmed by radio or HWS (Humane Wake System) buzzer
- Battery and signal strength indicator
- Direct key to recall favourite station in one button
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- AM wide/narrow filter and FM mono/stereo selector
- Optional features for European market
- RDS (Radio Data System) on PI, PS and CT for station name and clock time
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★ Free SW frequency book
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ADING

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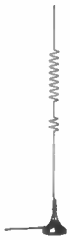
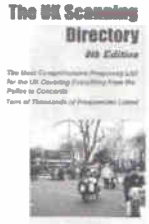
Super Syncro 1100 – 1100mAH Nickel Metal Hydride (NiMH) AA size rechargeable cells. No memory effect. Twice the capacity of NiCds. **£3.00** inc P&P.

Skyscan DX-V1300 base disconne – Most disconnes only have horizontal elements and this is the reason that they are not ideal for use with a scanner. Most of the transmissions that you are likely to receive on your scanner are transmitted from vertically mounted antennas. The DX-V1300 has both vertical and horizontal elements for maximum reception. Constructed from best quality stainless steel and aluminium and comes complete with mounting pole. **£49.95** + £3 P&P.



Wideband mini-mag antenna – Wideband (25-1300MHz) receive antenna featuring super strong miniature magnet and coax cable terminated in BNC connector. **£29.95** + £3 P&P.



NEW 6th edition UK Scanning Directory

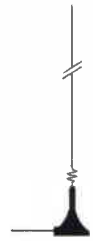
£18.50

+ £1.50 P&P

Uniden Bearcat 9000 XLT – AM/FM/WFM switchable base station HF/VHF/UHF scanning receiver. Covers 25-550 and 760-1300MHz. Features 500 memories, auto sorting, backlit orange LCD display. Scan rate of 100/300 channels/sec. **£259.95** + £10 P&P.

Yupiteru MVT-7100 – All mode switchable handheld HF/VHF/UHF scanning receiver. Covers 0.5-1650MHz. Features 1000 memories, over 500 pass memories, 10 limit search banks, 12 step sizes. Comes complete with earpiece, belt clip, wrist strap, rechargeable batteries, PSU, in-car adaptor and telescopic antenna. **RING FOR THIS MONTH'S SPECIAL OFFER**

Skyscan Desktop Antenna Model Desk 1300 disconne – Built and designed for use with scanners. Coverage: 25 to 1300MHz. Total height 36" and 18" wide at widest point. Comes complete with 4m of RG58 coax cable and BNC connector. High performance antenna, ideal indoor or as a car antenna when vehicle is stationary. **£49.00** + £3 P&P.



Airband mini-mag antenna – Civil (108-137MHz) and military (225-400MHz) dual band receive antenna featuring super strong miniature magnet and coax cable terminated in BNC connector. **£24.95** + £3 P&P

AOR AR-8000 Best seller, 0.5 to 1900MHz. All mode. **Price match**

Radio shack DX-394 communications receiver – 150kHz to 30MHz base station AM, CW, USB, LSB communications receiver. Features include clock and timer, signal meter, 100+ memories, RF gain control and direct frequency entry. A steal at **£179.95** + £7 P&P.

Yupiteru MVT-3300 – Latest Yupiteru scanner AM/FM switchable. Limited stock at **£149.95** + £5 P&P.

Commtel COM 206 – AM/FM handheld VHF/UHF scanning receiver. Covers 66-88MHz (FM), 108-137MHz (AM), 137-174MHz (FM), 380-512MHz (FM). Full civil airband coverage, comes complete with free case and rechargeable batteries. **£129.95** + £5 P&P.

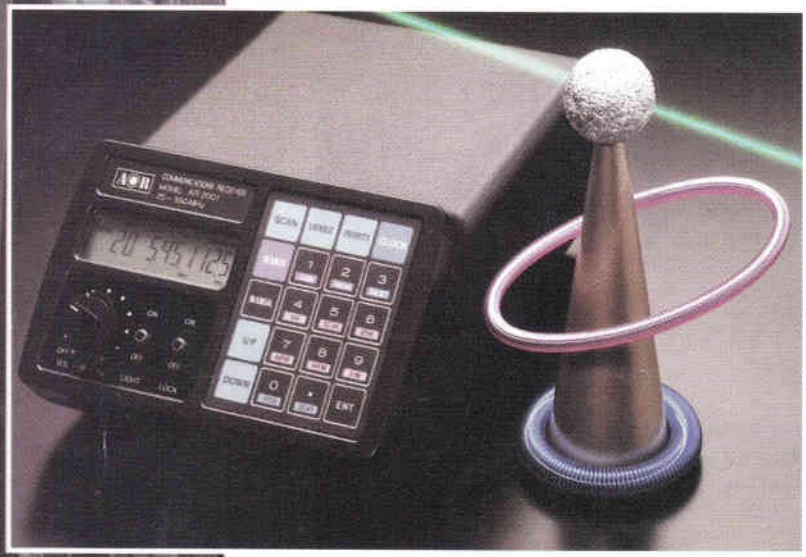
Realistic PRO-2042 – AM/FM/WFM switchable base station HF/VHF/UHF scanning receiver. Covers 25-520 and 760-1300MHz. Features 1000 memories, 100 monitor channels, backlit orange LCD display. Scan rate of 50 channels/sec. **£249.95** + £10 P&P.

WE ALSO HOLD A LARGE RANGE OF SECOND USERS SHORTWAVE AND SCANNING RECEIVERS. PLEASE CALL WITH YOUR REQUIREMENTS

WIDEBAND RECEIVERS

Past, Present & Future

A man climbed out, nodded a greeting and then placed his camera in readiness on the roof of the car, his intentions were obviously the same as mine. From the muffled sounds in his car it was also apparent that he had an airband radio in operation. Having worked a night shift, I must admit that the warm sunshine had me nodding off in my chair and my attention to the job in hand was not 100%. By now Lakenheath was quite busy and F-111Fs were regularly making approaches over the top of us. They were mainly operating on u.h.f. and consequently my radios were more or less silent.



The AOR sales brochure for the fantastic AR2001, wide band scanner.

The Black Box

Even though I was dozing, I was still half listening to the radio. Something then happened which had me awake in a flash. I suddenly realised that I could hear a two-way conversation between the radar controller and two aircraft. 'CASH 11 and 12' reported on a nine mile final to runway 06 for a Ground Controlled Approach (GCA), at Lakenheath. The aircraft, which turned out to be a pair of Phantoms visiting from Ramstein, were in contact with radar down to two miles and were then told to call the tower. Once again, two-way contact was established on the tower frequency.

For a second I thought that my radios had miraculously developed u.h.f. capability but then I realised that the transmissions were coming from the car behind me! He had plugged in an external speaker and the muffled audio could now be heard quite clearly. I listened for about 10 minutes and became more and more astounded and not a little puzzled. All of the conversations were two-way and this could possibly mean just one thing, he had a u.h.f. airband radio. It wasn't long before curiosity got the better of me and I wandered over to strike up a conversation. As I said before, people were rather cautious in those days and as I approached the car he surreptitiously placed a book over a small black box on the passenger seat.

After chatting for a few minutes and hopefully convincing him that I was not from a clandestine government department, I eventually posed the vital question, what type of radio was he using. He reluctantly moved the book and there in all its glory was the mysterious black box, an AOR AR2001. (Incidentally, AOR stands for Authority On Radio). The more questions I asked the more excited I became. Things like digital readout, memory channels, scanning and searching, were all more or less, unfamiliar to me. It was then that I noticed the frequency range on the front panel, an amazing 25-550MHz. Both of the airbands plus much, much more!

Perhaps to the present day enthusiast, my excitement may seem rather extreme but it must be put into context. We now take for granted 1000s of memories, hyper scans, massive receiving ranges and all the various facilities a modern scanner can offer. The 2001, was not just an enormous technological advance, it was the first wide-band receiver of its type available in the UK, (on sale to the public). Not only did this radio open up the u.h.f. airband but it also gave access to other parts of the radio spectrum that people had only dreamed of before. This coupled with the fact that it had keyboard entry, digital display and the various scanning facilities made it such a major step forward for the v.h.f./u.h.f. listener. If you ignored all the other facilities, just the fact that you could punch in a frequency in a couple of seconds instead of constantly fiddling with an analogue dial, was a godsend in itself.

I Just Had To Have One

I was allowed a short period of 'hands-on', and after just a few minutes of using the 2001, I knew I was in love. This was one of those few occasions in life where all logic and financial sense goes out the window, I just had to have one! I enquired as to the source of the radio but caution took over and he politely refrained to comment, although he did tell me that he knew there were very few in the country. I thanked the chap, quickly packed up and headed into town to the nearest newsagent. Armed with a copy of *Short Wave Magazine* and *Practical Wireless*, I sorted out a pile of coins and headed for the telephone box. Numerous 'phone calls later, my hopes were starting to sink as all the leading firms told the same story, they had never heard of AOR or the AR2001. Eventually, after about 15 'phone calls

and a trip to get some more coins, I eventually tried a small firm in Essex. To my amazement they told me that they had one in stock which had arrived about two weeks earlier. They were very vague and did not seem to know much about the radio. All thoughts of photography forgotten, I headed down the A11 as fast as my old Cortina would take me and went in search of an AR2001.

Upon arrival, I mentioned my earlier 'phone call, and from below the desk came a box containing my dream machine. As it was the very early days of wide-band radios, I don't think they really knew what this radio was capable of. This was very much an amateur radio shop and it appeared to me that they thought that they might have stocked a piece of equipment, which wouldn't sell. Using my long suffering credit card, I bought it for £299. This actually turned out to be a bargain as several months later when the AR2001 started to be advertised regularly, the price was around £350. To this day I do not understand why a small shop would have stock of a single AR2001, when much larger companies had not even heard of it. Still, I wasn't complaining, I had a radio in my possession the likes of which I had often thought would never exist.

A Bird In The Hand - Or In The Radio

I dashed back up the A11 to Mildenhall, (perhaps dashed is not quite the right word for my ageing Cortina). I arrived back at the lane to find the original chap gone but about ten new cars had arrived. This was unusual for a weekday and so I asked some of the other enthusiasts what was happening. The news was excellent, the SR-71A Blackbird was in the final stages of preparation for a flight and they thought it would be departing within the hour. For those of you who are unaware, the Blackbird was the jet black American spy-plane that could exceed three times the speed of sound. I hurriedly got out my toolbox and put together a 'Heath Robinson' wiring system so that I could power the AR2001 from the car radio's leads. With this done, and the radio fired up, I frantically started pushing buttons to see how you entered frequencies into the memory. (Reading the manual was of course the last option). I was fortunate that I had with me a list of both v.h.f. and u.h.f. frequencies, so after a bit of experimentation I managed to enter the main Approach, Ground and Tower frequencies. A quick prod of the scan button and I was in business!

This was where the problems started, or so I thought! Almost immediately, the Blackbird started its engines and then taxied from its hanger towards the holding point of the runway - there was just one problem, the AR2001 had not uttered a dickey-bird. I began to fret, it would be just my luck to find the only AR2001 in the country and it turned out to be a dud. The aircraft reached Runway 11, completed the pre-flight checks, lined up and performed its usual three full power engine runs. By now I was tearing my hair out, the Blackbird was sitting right in front of me, I hadn't taken any photos and I had a new radio that didn't work. I just was about to have a nervous breakdown when a deep gravely Texan voice said, "Tower this is PYRO 21 we're ready for take-off", "PYRO 21 you are clear for take-off, the wind is zero eight zero, ten knots". The relief was enormous! - I had a two-way conversation on u.h.f. on Mildenhall Tower on 243.3 and to top it all, my first call was the Blackbird. The aircraft wound up those magnificent engines and with familiar shock waves of orange flame streaming from the engines' afterburners, it powered down the runway and gracefully climbed into the eastern sky. No further call on the radio was heard.

Of course what I know now and I didn't know then was that the Blackbird regularly used a discrete frequency up until the moment of take-off, when it would then sometimes call the tower. Once airborne, it would also regularly use discrete frequencies with London Military so on occasions the aircraft could perform a complete mission without ever being heard. This was still the case in years to come, even when enthusiasts had a much better knowledge of the u.h.f. frequencies in use.

Brave New World

I spent the rest of the day familiarising myself with the radio and its operation and marvelling at the fact that a whole new listening world had been opened to me. I stayed with a friend in Mildenhall overnight, and then spent the next two days travelling around the airfields of Lincolnshire and East Anglia. This was the main purpose of my trip as a major UK Air Defence Exercise, called Elder Forest was taking place over three days.

The weather unfortunately changed for the worst and was by no means ideal for photography. Normally, I would have been more than fed-up with the persistent rain but with my new black box to play with the dismal weather just didn't seem to matter! The tale of those two days with my new radio would make another story in itself and perhaps I'll write about that another day. The one memory that does stand out was the effect of the '2001 on others, their reactions were identical to mine. Despite my efforts to use the radio with discretion, wherever I went it wasn't long before I had a group of disbelieving enthusiasts surrounding my car. This was not only a day that probably changed my life, it was quite definitely the day that many aircraft enthusiasts also became radio enthusiasts!

And so my career using digital wideband receivers had started. Although I owned many other radios over the next decade, I still kept my trusty AR2001. It was with me mobile for about four years and then spent the remaining years as part of my base station set-up. After 11 years of sterling work and not a single technical problem, I sold the trusty AR2001 to a friend in 1995. He still uses it today and after 14 years service it still works as well as the day I first bought it. If I am completely honest, I have to admit that I now regret selling it. Pure sentiment has twice made me offer to buy it back, but he won't part with it - Oh well, never mind - I wonder if anyone out there has an AR2001 in good condition they want to sell?

To Be Continued...

SWM

Club Nights

AVON

Bristol International RC: Tuesdays, 2000. The Little Thatch Country Club, 684 Wells Road, Whitchurch, Bristol. All visitors are welcome. The club has been formed so that all radio enthusiasts, whether they be Licensed Amateurs, s.w.l.s or CBers can get together and have a good natter and do things that you do in radio clubs. PO Box 28, Bristol BS99 1GL.

RSGB City of Bristol Group: last Tuesdays, 1900. Avon Combined Services Club, St Pauls Road, Clifton. Bristol. Robin Thompson G3TKF on (01225) 420442.

South Bristol ARC: Wednesdays, 1930. Whitchurch Folkhouse Assoc., Bridge Farm House, East Dundry Rd, Whitchurch. June 4 - 80m activity evening, 10th - Digital evening, 17th - Training for National Field Day, 24th - Preparation for Longleat Rally. For more information ring (01275) 834282 on a Wednesday evening.

Andy G8KVN (right) works on a power transformer during a club night. *Picture by Harold McIntyre.*

BEDFORDSHIRE

Dunstable Downs RC: Fridays 2000. Chews House, High Street South, Dunstable, Bedfordshire. June 5 - Library night, 12th - Junk sale. New members and visitors welcome, just drop in or call Paul G7TSJ on (01582) 861936.

BUCKINGHAMSHIRE

Aylesbury Vale RS: Wednesday evenings, 2000. Hardwick Village Hall, (Hardwick is situated off the A413 between Aylesbury and Buckingham). June 3 - RSGB video evening with James M1BXQ, 17th - Discussion evening. Gerry Somers G7VFV on (01296) 432234.

DERBYSHIRE

Nunsfield House Amateur Radio Group: Fridays at 7.30pm. Group HQ is located at The Nunsfield House Community Association, Boulton Lane (off Harvey Road), Alvaston in Derby. May 29 - Quiz night, June 5 - Fox hunt around the area, 12th - Rally preparation evening, 19th - rally post mortem. Bill Smith G7PJJ on (01332) 573174.

DEVON

Exmouth ARC: Alternate Wednesdays at the Scout Hut, Marlpool Hill, Exmouth. June 3 - TCP/IP evening, 17th - Talk on 12.5kHz channel spacing. D. Fox G0NRR on (01395) 271880.

Torbay ARS: Fridays, 1930. ECC Social Club, Highweek, Newton Abbot. June 19 - Watts On The Radio - demonstration, etc. with Peter G4VFG. Peter G4UTO. (01803) 864528.

DORSET

Christchurch ARS: Thursday evenings, 2000. The Radio Club Room, behind the Sports & Social Club, Grange Road, Somerford, Christchurch. Visitors welcome. (01202) 484892 (evenings).

EAST SUSSEX

Hastings Electronics & RC: 3rd Wednesdays, 1930. West Hill Community Centre, Croft Road, Hastings. The club runs courses for the RAE and Novices and is approved as an Examination Centre for City & Guilds exams. Doug Mepham G4ERA, 8 The Close, Fairlight, E. Sussex TN35 4AQ or 'phone on (01424) 812350.

EDINBURGH

Three members of the Southampton Amateur Radio Club work on their various projects. *Picture by Harold McIntyre.*

Lothians RS: 2nd & 4th Wednesdays, 1930. Orwell Lodge Hotel, Polworth Terrace, Edinburgh. May 30 - Lothian's Challenge 1998, June 10 - AGM, 24th - Social evening. Tommy Main GM4DCL, QTHR on 0131-663 8501 day and evening.
Idon, Essex. Doris. (01268) 552606.

GREATER LONDON

Wimbledon & DARS: 2nd & last Fridays, 1930. St Andrews Church Hall, Herbert Road SW19. May 29 - Desert Island Radio, June 12 - Digital radio. J. Gale G4WYJ on (01737) 356745.

HAMPSHIRE

Horndean & DARC: 1st & 4th Tuesdays, 1930. Lovedean Village Hall, Lovedean Lane, Lovedean, Hants. June 2 - Club social evening, 13-14th - Special Event Station at Clanfield Carnival, 23rd - Vintage Radio by Douglas Byrne G3KPO. Stuart Swain G0FYX on (01705) 472846.

Southampton ARC: 1st & 3rd Mondays, 1900 in the CDT block at Cantell School, Violet Road, Southampton. This club is now up-and-running after some years of inactivity. New members welcome. Harold McIntyre on (01703) 737715.

HEREFORD & WORCESTER

Bromsgrove ARS: 2nd & 4th Tuesdays. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. June 9 - Construction evening, 23rd - Outside event, mobile d.f. hunt. Barry Taylor. (01527) 542266.

Malvern Hills RAC: 2nd Tuesdays. Town Club, Worcester Road, Malvern. June 9 - Night on the air. Dave Hobro G4IDF on (01905) 351568 evenings and weekends.

HERTFORDSHIRE

Hoddesdon RC: Alternate Thursdays, 2000. Conservative Club, Rye Road, Hoddesdon. May 28 - Video evening. May 28 - Video evening, June 11 - Talk on the joys of gliding by Mike Hodgson, 25th - BBQ at Tolmers Scout Camp, Cuffley. Don G3JNJ on 0181-292 3678.

LINCOLNSHIRE

Lincoln SW Club: Wednesdays, 1945. The Railway Sports & Social Club, Ropewalk, Lincoln. June 17 - Visit to Humber Radio - GKZ. Cliff G3EBH on (01522) 750637.

MIDDLESEX

The Radio Society of Harrow: Fridays, 8pm. The Harrow Arts Centre, Uxbridge Road, Hatch End, Middlesex. June 5 - Alternative therapies - talk by Nurse Katie Eachus on reflexology, aromatheraphy and other lesser known cures. (01895) 476933 home no., or 0171-278 6421 daytime.

NORFOLK

Norfolk ARC: Wednesdays, 1930. Formal and informal meetings at the Ugly Bug Public House, Colton. June 3 - Night on the air, construction QRP and Morse practice, 6/7th - CW National Field Day, 10th - Radio team quiz, 17th - Night on the air, construction QRP and Morse practice, 24th - Annual fox hunt. Mike G4EOL. (01603) 789792.

WARWICKSHIRE

Stratford-upon-Avon & DRS: 2nd & 4th Mondays, 1930pm. Home Guard Club, Main Street, Tiddington, Stratford-upon-Avon. June 8 - Members QRP equipment display and demonstration, 22nd - Visit. The Society are again organising a course of instruction for the Radio Amateur Examination of the City & Guilds of London Institute and further details can be obtained by writing to the Chairman of the Society, Mr J. Harris G8HJS, enclosing a stamped addressed envelope. The address to write to is: 57 Evesham Road, Stratford-upon-Avon, Warks CV31 2PB.

Nigel G7POC (left) with Andy G4MYS (centre) examine equipment for as proposed repeater while Peter G8RNT looks on. *Picture by Harold McIntyre.*

WEST MIDLANDS

Coventry ARS: Fridays, 2000, Binley Church Hall, Brinklow Road, Coventry. May 29 - Quiz Night, June 5 - Night on the air, 12th - Talk, 19th - Night on the air. Robin Tew G4JDO on (01203) 673999.

South Birmingham RS: West Heath Community Association, Hamstead House, Fairfax Road, West Heath, Birmingham. June 3 - Rig check and getting ready for Field Day. Don Keeling on 0121-458 1603.

WEST SUSSEX

Horsham ARC: 1st Thursdays, 2000. Guide Hall, Denne Road, Horsham, West Sussex. June 4 - Quiz night against Crawley ARC. More details from David Miller G4JHI on (01403) 252101.

WILTSHIRE

Trowbridge & DARC: 1st & 3rd Wednesdays, 2000. The Southwick Village Hall, Southwick, Trowbridge. June 3 - 144MHz DF fox hunt. Ian G0GRI on (01225) 864698.

SWM

Book Review

Wireless for the Warrior Volume 2.

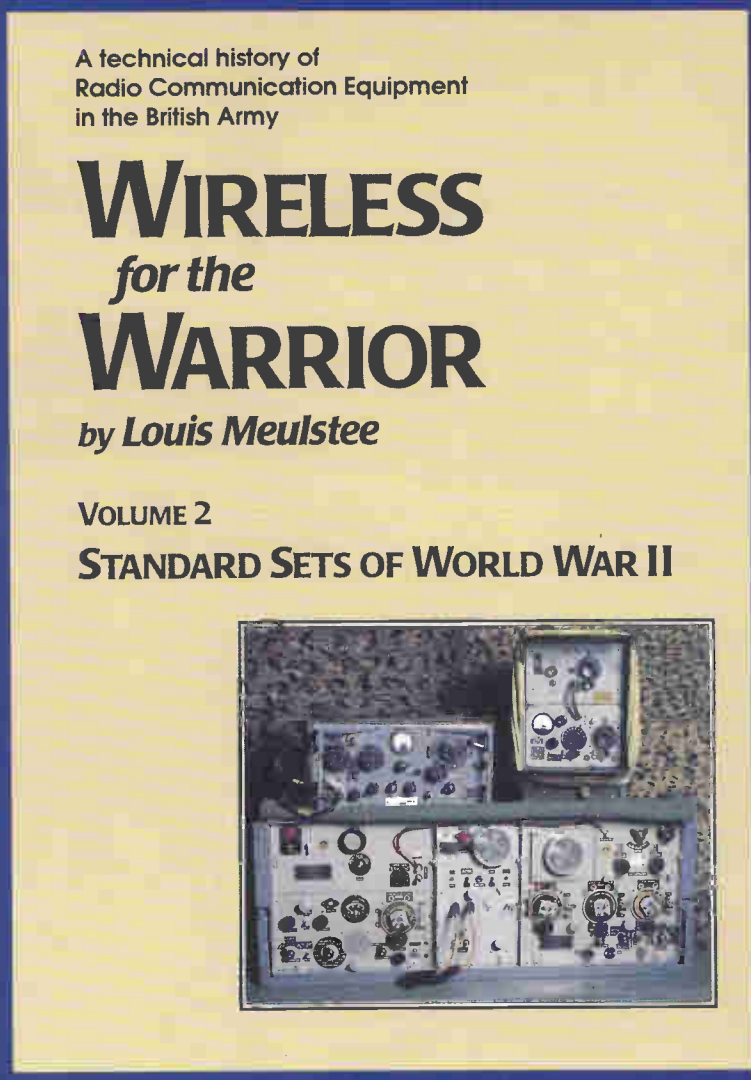
This is the eagerly awaited second volume in Louis Meulstee's definitive series on the history of radio communication equipment in the British Army. Volume 1 ended by teasing the reader with the data summary of the Wireless Set No. 88 (1947), leaving the detailed technical and historical information to be dealt with in Volume 2. Interestingly, Volume 2 also ends with the Wireless Set No. 88, but this time in full detail!

Although this volume deals primarily with those standard sets manufactured and used in large quantities during World War II, it also provides information on equipment on which development had started during the war years and which was produced after 1945. Descriptions are given of those sets which were initially given a 'Wireless Set' designation, but never reached the development stage. Also included is further data on sets, originally covered in Volume 1, that has surfaced since it was printed. Scattered throughout the book are reproductions of cartoons, warning notices and actual photographs of the equipment in real battlefield use, taken from the period covered. These help to convey the flavour of wartime conditions.

The standard of reproduction of the various drawings and halftones is very good, particularly considering the age of the originals from which the information and illustrations are taken. Circuit diagrams, alignment instructions, full setting-up details, installation pictures - it's all in this book.

If you are into collecting and restoring British military radio equipment, or you are one of the growing band of military vehicle restorers, Volume 2 of *Wireless for the Warrior* will be an indispensable addition to your reference library. I suppose that now we will all be eagerly awaiting the appearance of Volume 3!

Dick Ganderton



Wireless for the Warrior Volume 2.
Standard Sets of World War II
by Louis Meulstee
Published by GC Arnold Partners
ISBN 1898805 10 5
722 pages hardback.

£36.00 from the *SWM* Book Store.

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Book Profiles

This month, among our Book Profiles, we've chosen three titles to help you make the best of weather data you can receive...

Klingenfuss 1997/1998 Guide To World-Wide Weather Services

This guide, now in its 17th Edition, contains the most comprehensive and up-to-date information on topics such as Internet locations, NAVTEX stations, Radiofax stations, Radiotelex stations, Meteorological data, Satellite images, Weather charts and hundreds of sample charts, images and web pages.

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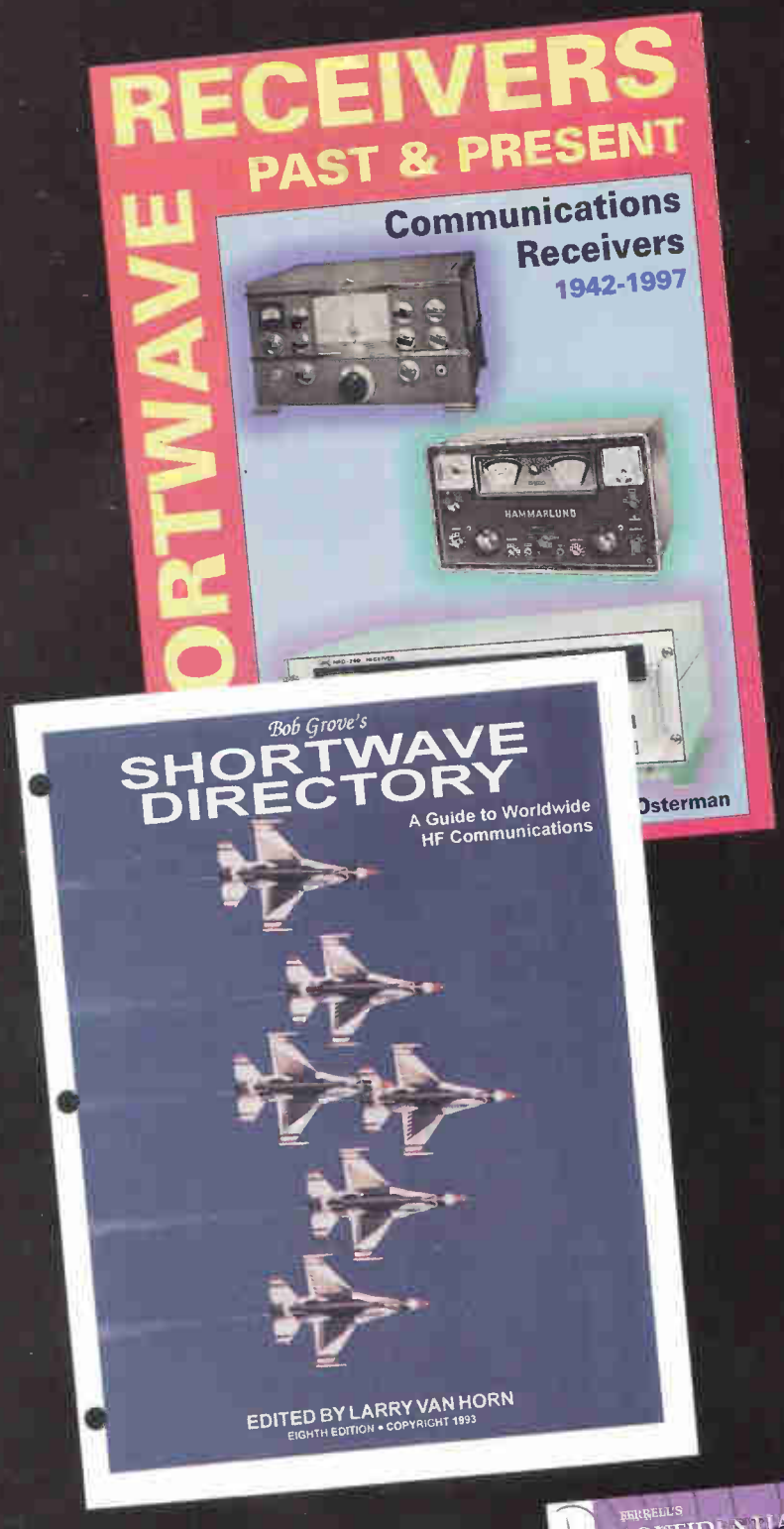

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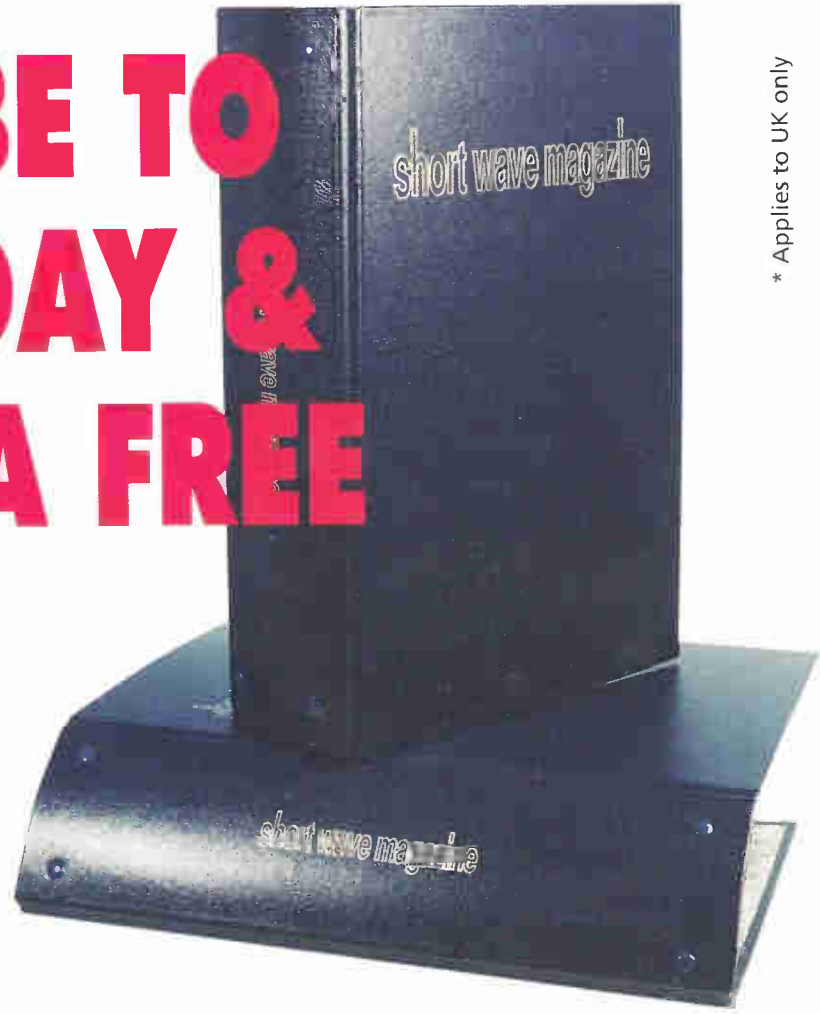

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■ PETER BOND c/o EDITORIAL OFFICES, BROADSTONE ■ E-mail:milair@pwpub.demon.co.uk

Mil Air

Dutch Trip

In a reply to **Bob** from Cheltenham, who wanted to know about using an airband scanner in Holland, (*SWM* April 98). Two of our Dutch readers have kindly sent me E-mails regarding this subject. It seems that there is no restriction on the use of these radios and you can listen to just about anything. So in answer to Bob's question, this means he is free to listen to both the v.h.f. and u.h.f. airbands. One of my correspondents is a police officer and he states that the public listen in to their frequencies and then call them with information if they can help solve a crime! I wonder if we could persuade our authorities to adopt their methods? My thanks go to Piet and Bob.

Table 1:

Country	Callsign	Site
Belgium	Efflux	Glons CRC
Denmark	Bluelight	Skagen CRC
	Clipper	Skrydstrup CRC
	Marktime	Vedbaek CRC
	Windshield	Finderup Ops Centre
Holland	Bandbox "	Nieuw Milligen CRC
Germany (North)	Bugle	Brekendorf CRC
	Mindreader	Colpin CRC
	Roundup	Brockzetel CRC
	Disbound	Kalkar Ops Centre
	Limelight	Kalkar Ops Centre
Germany (Central)	Loneship	Erndtebruck CRC
	Sunrise	Schonewalde CRC
Germany (South)	Batman	Lauda CRC
	Coldtrack	Freising CRC
	Highlander	Messtetten CRC
	Sweetapple	Messtetten CRC

Letters & E-mails

A couple of readers have sent me stamped addressed envelopes for replies to their questions. I am sorry but I must emphasise that all correspondence will be answered within the 'MilAir' column. I cannot answer letters or E-mails personally. It should also be noted that there is at least a six week, lead time for information for 'MilAir', so replies in the magazine may sometimes take at least a couple of months.

This month's picture is XV241, Nimrod MR.2 from RAF Kinloss. This aircraft was painted in special 206 squadron markings during the 1997 display season.

Two readers write to me with reference to my comments regarding the alert status of UK aircraft. The 'Quick reaction alert' or 'Q' as it is usually known has been downgraded twice in the past few years, the last change was in January 1992. Since then, just two aircraft remain on alert at RAF Leuchars in Scotland, these aircraft are Tornado F.3s, which are taken from either 43 or 111 Squadrons. They are supported by a tanker, which remains on alert at Brize Norton. Thanks to David S and Steve.

Air Defence Radar

I am in debt to **Bill L., Graham, Tracey, Andy, Roy D., Fred S., Steve F., Keith G., Brian T., David, Roy, Chameleon** plus several Anons, who all sent in a wide selection of information on this subject. It's amazing how many people spotted the slip of the pen relating to Machrihanish and Benbecula! Some, of the more historical information I hope to include in the future in perhaps a more substantial article, other letters I can answer now.

Back to the subject of the legendary Tactical Air Designators, (TADS). In the previous ADR article, I mentioned that main UK air defence frequencies are designated to channels 1 to 148, the story doesn't end there though. A couple of readers have suggested that I should point out that the designators do not stop at 148. How many actual channels are allocated throughout the European NATO countries, is open to speculation, several people have suggested that there could be as many as 2048 or 2560. As far as I am aware the channel numbers seem to run as far as 1000 and possibly 1024.

There are several theories as to what is allocated to some of the channels between 149 to 399. I understand that some of the UK discrete h.f. frequencies may well be allocated in this range. Perhaps some of our readers can make further educated suggestions? (Thanks Graham). Channels in the 400 range appear to be used for Royal Navy Operations including AWACS liaison plus some European ADR stations. The 500 range is used for AWACS 'Magic' operations in the UK, plus the 500 and 600 range is in use by further European ADR stations. The 700 range contains many of the USAF, 'Have Quick' and other discrete frequencies. Your comments would be welcome on the 800 range and finally the 900 range is mainly used for a variety of NATO AWACS operations.

The European Air Defence Radar stations, like the UK stations have a primary roll working with AWACS aircraft for Air to Ground and Air to Air interceptions. The primary European Control and Reporting Centre's (CRC), and their callsigns are as per **Table 1**.

Roy writes to ask about my comments on the ADR matrix system used for identifying areas of UK airspace. He points out that I omitted to mention the GEOREF system in the article. As I understand it, the ADR matrix is a 15 by 15 square grid which overlays on top of the GEOREF grid. GEOREF is a series of squares which builds up in a symmetrical pattern/grid starting at the Greenwich Meridian. Each square is given a two-letter reference, which can then be used to identify a piece of airspace. This works in a similar way to the position reference given for an ordinance survey map. Each of these squares is then split into a series of smaller squares so that a position can be given with an accuracy of less that half a mile. Roy also points out that the GEOREF system was originally intended to cover the whole globe. Some of this information comes from an article written in 1995 and so I am uncertain if this system has changed, especially in the light of the introduction of modern GPS systems? Thanks Roy - any comments anyone?

Mildenhall

Thanks to Photavia Press, news has reached me of a couple of changes at Mildenhall. The based European Tanker Task Force which includes the based 100th Air Refuelling Wing, has for many years had a primary mission callsign. In the eighties it was 'DOBBY', according to my records this then changed in early 1988 to 'QUID' and now reports indicate that from early March, the callsign 'BOOM' is being used, (ten years since the last change). At present this does not seem to have replaced 'QUID', but appears that it is being used in conjunction with it.

One new item of frequency news for Mildenhall - Air Mobility Command (AMC), who use **370.95** as their u.h.f. operations frequency, seem to now be using **131.975** for v.h.f. operations. My correspondent has noted this frequency in use, a couple of times since the last week of March.

■ PAUL ESSERY GW3KFE, NEWTOWN, POWYS SY16 1ZZ ■ E-mail: gw3kfe@pwpub.demon.co.uk

Amateur Bands

Spring is the time to do some work on the antenna systems. Some of us can't do much with the antenna itself - but the earth connection is also part of the antenna. Over the sort of ground most of us have - what the Yanks call a 'city lot' - the difference between using a short spike for an earth and a good set of radial wires can be as much as a couple of 'S-points'; and adding a decent antenna-tuner can add a couple more.

The profit is not just louder signals. The signal that was weak enough to be, say, an 'S-point' below the receiver noise will now be three S-points *above* noise. The extra input may make your receiver want to overload, but the input attenuator and/or the 'RF Gain' control take care of this. Every improvement to the antenna/earth/tuner system pays dividends, but there is **no** way a decent receiver can be made much more sensitive. As for the 'nut between the headphones' - well now, the only mod. we can make there is to practice and increase our skills!

International Listeners Association

The latest issue of the group's *Just Listening* magazine was in the mail, and is always a good read. They cover all the forms of short wave listening, so there is something for everyone. Details from the **International Listeners Association, 1 Jersey Street, Hafod, Swansea SA1 2HF**.

In the amateur bands context the ILA Awards are of interest. The *Amateur Prefix Awards* programme has certificates to be obtained for hearing 250, 500, 1000 and 2000 different amateur prefixes, single or multi-band, single or mixed modes. Then there are the *Continental Awards*, for hearing at least 100 different amateur stations on one continent. The continents are, for the purposes of this award, Europe, Africa, N. America, S. America, Oceania, and Eastern Europe (the former USSR states). The *QRP Award* is for logging 100 amateur stations using 5W or less, and finally the *British Isles Award*, for logging one amateur radio station in each of the counties of the British Isles, including Eire.

The Ugly Expedition Group will be on the island of Barra in WAB square IO66HX and also in IO67. The v.h.f. station will be GS7UEG/P and for h.f. the new club call MS0BPG/P. Operation will be between July 5 to July 12 1998. If you send a QSL card, please enclose an s.a.e. or IRCs, and address, to G7DKX.

ILA are thinking of holding a proper full-blown Convention for s.w.l.s in early 1999, at a central venue such as Birmingham. If you like the idea, please drop ILA a line at the Jersey Street address above and indicate whether you would support them - while they'd like to fill the event with members, practically speaking they want to hear from non-members, too, so they can gauge if the proposal is 'on' or not.

Charlie-Whisky

This is the favourite mode - indeed nowadays the only mode - used by **Ted Trowell** on the Isle of Sheppey. Ted reports that the bands are picking up somewhat, and mentions Top Band where at 0600 WA3HQK and W8JL were logged; at 2000 A45XR, and at 2200K1RX, 9M0C, and W3LPL. 3.5MHz loggings were VP5FXB and K3LR at 2200; at 7MHz 0600 saw 8P6FR and ZL4AW, at 2000 9K2ZZ, 5B4ADA, VE9CB, 9M0C, EA8LP, ZA1AM, 5W0SZ, 3A/DJ7RJ, 9G5SW, 4Z5JU, VU2TES, 4X50SF; and at 2300 YV5DTJ, VO1T, 9G5ZM, 7X2RD, EA6ADU, 9H3ZV, 8P9IF, v26XK. On 10MHz 9M0C was noted at 1900 and 9H1AL at 2200. Most things happen on 14MHz and Ted demonstrated with such as VE9CB, 9H3ZV, VE3EJ at 1100, plus at 1600 JX7DFA, BV7WB, N7WX, JA3KM, VR2KF, BV7FF, VE7BKL, VE7NH, 5B4ADA, 9M2EU, HS0/G0HSF, VE7MQ, W6THN, W6OV, W6TZD, VE7XR; at 2000 VE6JO, 9J2BO, VE7UZ, V26XX, R0DJG, VP5/KB4IRS, and ZB2ED. On 18MHz at noon DL7DF/HI3, and at 1500 5A2IPA, 9H1ZA, 9K2RR. Up again to 21MHz for (0800) 5B4AGC, (1200 VQ9JC), (1600) LU7DMG, 4Z5AO, W0IAK (Minn), KG4ZK, 5N3CPR, IX5AA (really!!), 7Z1AB, W6OV, XE2/NR7O, 5B4ADA, ZF1WD, and 7Z5OO. Higher yet again, and 24MHz showed 5N3CPR, ZS4XJ, KP2J, ZD9BV, CO2OR, J8/EA2BP, 3DA0CA, HF0POL (Polish base, South Shetlands) Finally ever 28MHz for A45ZN, 9K2RR, 4Z4UT, around noon, plus(1600) 4X1OM, LU8DW, KP3R, PU2LCD, ZP5MGR, 9J2BO, PY2LEI, and ZS6AJS. All times of course are UTC - or GMT to we old 'uns!

Back to sideband. Oxford is home to **Paul Goodhall** who often works a split duty shift, so he can listen during the day while the youngsters are at school and the XYL at work. Paul uses a G5RV antenna, an MFJ-948 tuner, and Icom R71E receiver. At 3.5MHz, Paul went up to the DX portion of the band to hear GI4VKS knocking off VY2ROB, W1RZF, K1LZ working EUs, VY2ROB again a couple of weeks later adding VA2FJ, N2ZX, and GI4VKS tackling K3FLY and VY2ROB. At 7MHz VE2QR was heard in QSO with various other VEs, YU4EBL working 3C1GS , plus Europeans. Paul's favourite 14MHz showed strings of VKs in the mornings, Ws in the afternoon, and on evening W1BVQ/M was working much of the USA and also the odd European contact J2/W1IM was working J73JT, KB0WUK and K9MJ were on to IS0ZCV, WA4JTK had TU2ML, 5N3ALE, YV5EL, I1APQ in succession; W3PP found WH6X/P, OE5LCO, I5GTR, OH1KD while a little higher in the band W6PK, W2URE, VE3ROB, K8RW, WB2KHD, WO1N, K4SO, DU3BBY RA9SP, W2KSW, W2NBX, UA9ASR, 5H3RB, W0TM, WB2XJS, K5RX, W8RBE, NT8CP, AD4TR,, KE8GG, KL7AC TA2DX, W1GOW, W8CEP, WA7SNW, 9K2ZZ peeling 'em off at a rate of knots, 4X4JC, ZL1ALE, VK3DAKB6SX, VU2PAI, VE8OB, VE7EM, 4X50AT on to W5AA. Alas, space closes in so we've had to prune Paul's list down, but he found much more on 18 and 21MHz.

Now to **Colin Dean** in Barnsley, who used 3.5MHz sideband for AP2KSD, A41LZ, A61AJ, A61AO, C6AKE, HK0/IK5BGL, JW0L, J69B, VK3DZM, VK5MS, VP2VF, VU2ZZA,YB2PBX, YS1RRD, ZA1MH, ZF2JB, 3A/DJ7RJ, 4L8A, 5B4/RZ3TX, and 7J4AAL. As for 7MHz, the crop here included AP2AR, AP2KSD, A45ZN, A61AO, A61AQ, A61AS, BA4CH, BV2KS, DS5RNM, ET3BT, EX8MLE, FK8GM, FK8HC, JA1, JA2, JA3, JA5, JA6, JA7, JA8, JA0, JY5HX, JX7DFA, J69EE, OD5VT, PJ9G, SU1GS, TT8AM, TT8ZB, T77WI, VK1MJ, VK4NM, VU3NAX, YB6MF, ZL4PD, 3A2MD, 3B8CF, 4JA9RI, 4L1UN, 4S7BRG, 7Z1IS, 8P9P, 8Q7BE, 9J2AM, 9K2AI, and 9Y4NW.

Letters

Don Robson writes in from South Shields and wonders about the relative merits of the long-wire magnetic balun compared with a conventional antenna tuner. He says the balun "seems to behave very well and saves all that knob-twiddling!"

I have no personal experience of the magnetic balun, alas. When they first appeared on the market I already had several antenna tuners - there was even a commercial one! - and for each one I had logged the settings for the various bands. That being so, I didn't need to do much knob-twiddling anyway, so I didn't see the point of spending my hard-earned cash on what at best was a duplication and at worst might not be so useful.

A decent a.t.u., especially if home-brewed, can be made to match any antenna, given that, in an extreme case, you may have to threaten it with a soldering-iron. The magnetic balun arrangement lacks this basic flexibility when faced with something a bit out of the ordinary. To my mind it's a question of "Yer pays yer money and yer takes yer choice!"

Lists

Send your lists either to the E-mail address at the head of the column, or to me at PO Box 4, Newtown, Powys SY16 1ZZ, to arrive by the first of the month.

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ERA Micro-reader V3.2		£90.00
Global AT-1000	ATU	£69.00
Icom headphones		£39.00
Icom IC-SP3 speaker		£60.00
JPS NTR-1	DSP filter	£119.00
Mizuho AN-1	6-way antenna switch	£45.00
Timewave DSP-9+		£125.00
TV-1000	RTTY decoder	£40.00
Universal M-8000	Decoder	£899.00
Yaesu FRT-7700	ATU	£50.00

FINANCE EXAMPLE

Cash Price	Less 10% deposit	Balance for finance	12 months @	Total finance price
£289.00	£29.00	£260.00	£23.87	£315.44

OPENING HOURS
Monday - Friday 9.00-5.00pm.
Saturday 9.00-2.00pm.
Closed Sundays.

WORLD-WIDE DELIVERY
Our efficient couriers ensure a guaranteed next day delivery in the UK and a 48-hour worldwide service if required.

PART EXCHANGE
We urgently require your treasured set. We buy outright for cash. Alternatively, use your old equipment as a deposit on finance for a new or used set.

FINANCE
We now can offer you a competitive finance package with only 10% deposit. Multicomm 2000 is a licensed credit broker. Written quotations are available upon request.

ACCESSORIES
Here at Multicomm 2000 we also have a large selection of books, antennas, linears, etc. If we don't have it in stock we can order it!

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We probably have the largest range of used equipment in the country.
Most of our used equipment carries a full 12-month warranty and can be purchased on finance (if required).

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EMAIL: Sales@multicomm2000.com WEBSITE: www.multicomm2000.com

JACQUES D'AVIGNON VE3VIA

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.

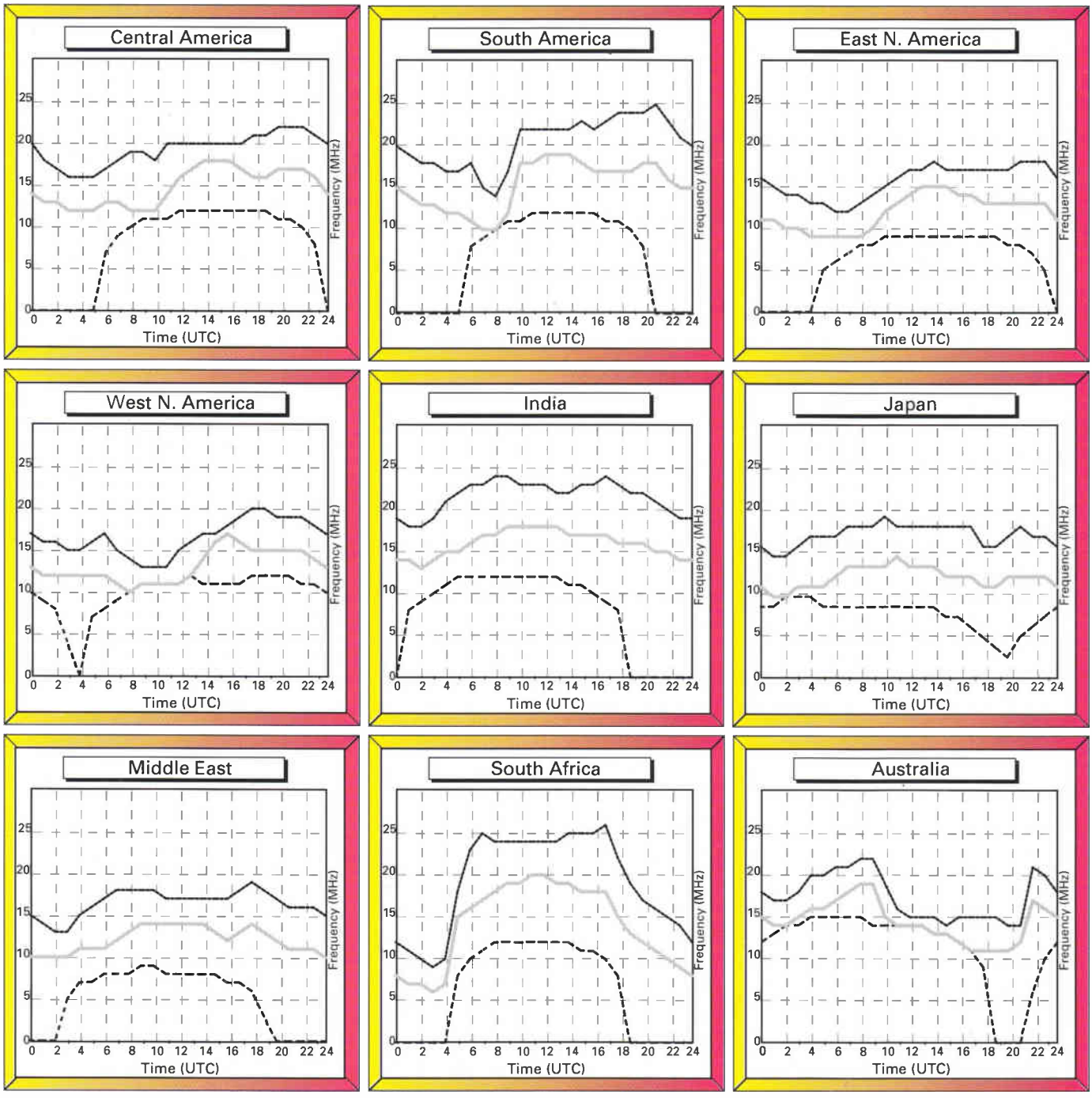
The middle line indicates the optimum working frequency (OWF) with a 90% probability of success for the particular path and time.

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.

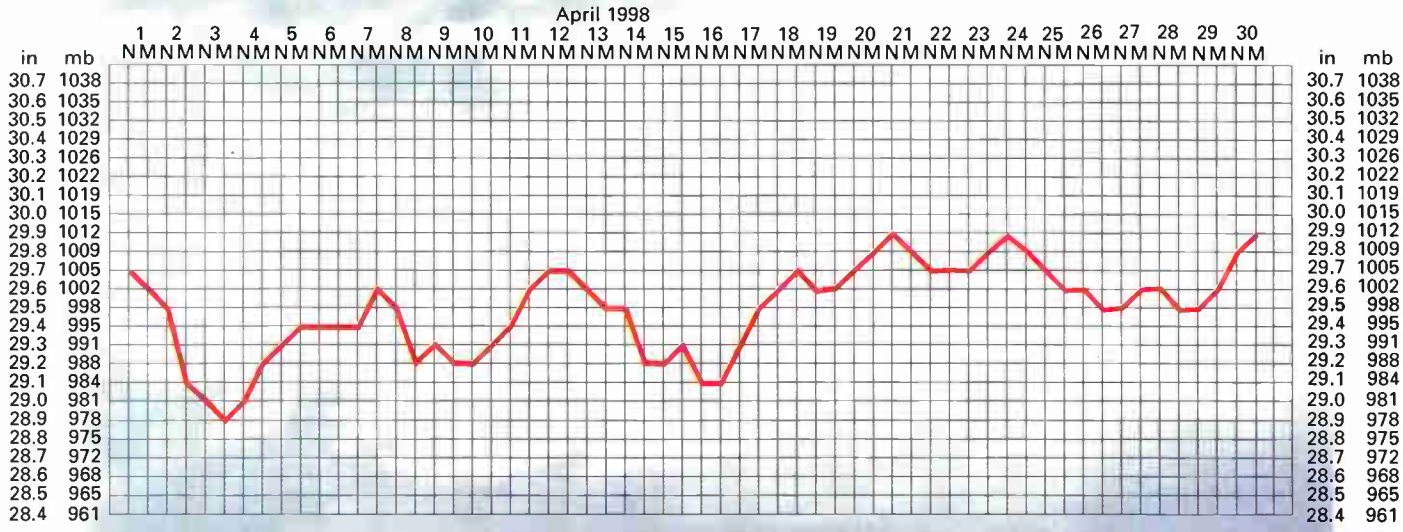
June 1998
Circuits to London

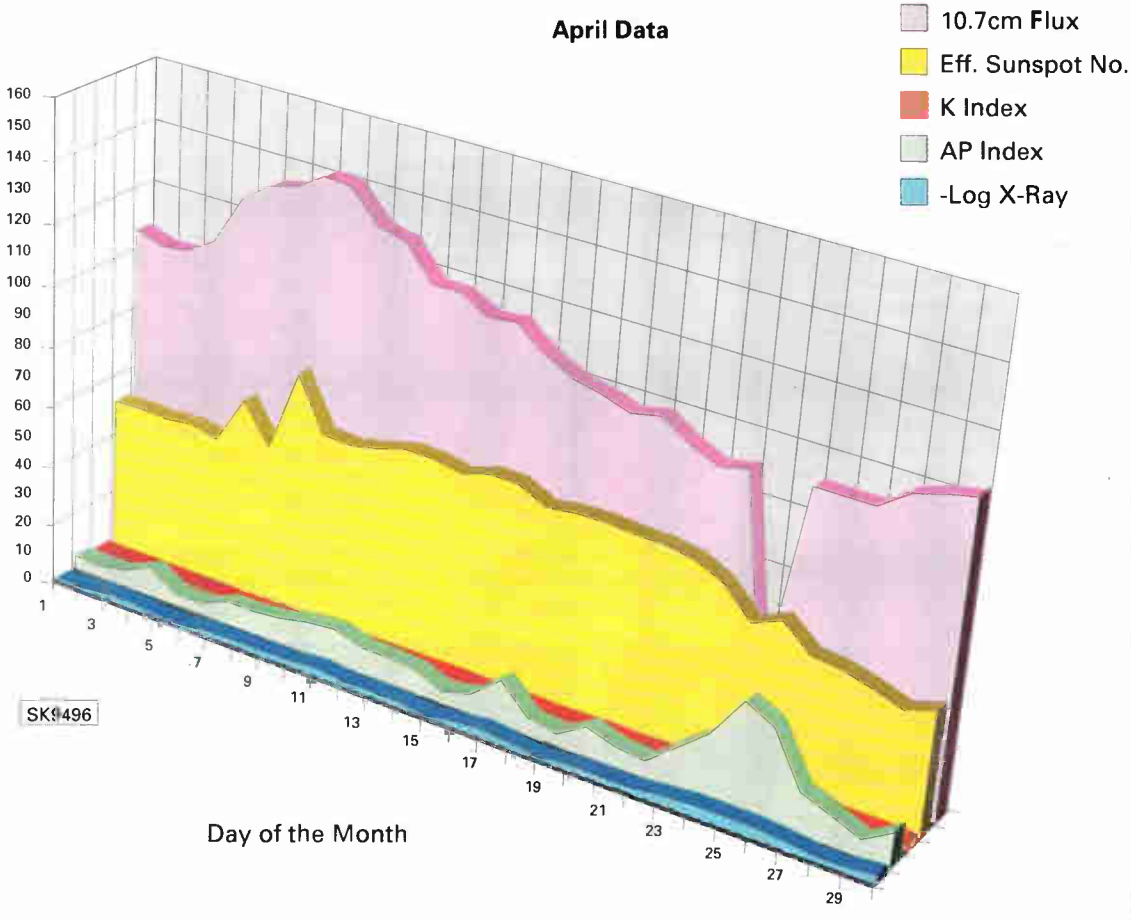


■ KEVIN NICE G7TZC, SWM EDITORIAL OFFICES, BROADSTONE ■ E-MAIL: kevin@pwpublishing.ltd.uk

Propagation Extra

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

TV Logos

Once you've identified a station by a particular on-screen logo it can be very confusing if an unexpected alternative caption suddenly pops up. For example, the Ukraine 2nd network shows 'YT-2' and also '1+1' as we have now discovered.

Of course, in these days of time sharing channels and networks this is only to be expected. No doubt we'll see a new influx of baffling logos over the coming months!

Service Information

Netherlands: TV Flevoland shows text pages during the night. The text service is known as 'Flevo TT'. TV Gelderland's logo consists of a letter 'G' in a blue box in the top-left corner of the screen.

Ukraine: The mystery '1+1' logo that has been baffling DXers for several seasons belongs to 'Studio 1+1' which broadcasts over the Ukranian YT-2 network for several hours during the day.

This month's Service Information was kindly supplied by **Tom Crane** (Hawkwell, Essex) and **Roger Bunney** (Romsey, Hampshire).

Keep On Writing!

Please send DXTV, SSTV and f.m. reception reports, plus any other information, to arrive by the first of the month to: **Garry Smith, 17 Collingham Gardens, Derby DE22 4FS.**

Towards the end of March a small tropospheric lift produced the usual French, Dutch and Belgian signals across central parts of England. Again, Band I reception has been almost non-existent, although the Danish DR-TV PM5534 test card flickered up briefly on Channel E3 via Meteor-Shower on March 20th.

The first few months of the year are usually miserable with hardly any signals at all in Band I but this must be the worst period we have had for many years. Let's hope this is the lull before the storm!

March Log

All reception was via enhanced tropospheric conditions except for the Danish logging on the 20th. Reception reports were kindly supplied by **Tom Crane** (Essex) and **Peter Barber** (Coventry).

20: Denmark: DR-TV PM5534 test card on E3 (Fyn transmitter) at 0820UTC via Meteor-Shower!
Belgium: VRT TV1 on E43 (Egem) via tropospheric propagation.

27: France: Canal Plus L7 (Rouen), L9 (Reims) and L10 (Strasbourg). Belgium: VRT TV1 E10 (Wavre).

28: Netherlands: NED-1 E4 (Lopik).
Belgium: RTBF-1 E8 (Wavre), VRT TV1 E10.
France: Canal Plus L5 (Lille) and L7 (Rouen).

Reception Reports

Peter Barber (Coventry) noticed a build-up of French Band III reception during the evening of March 27th between 1852 and 2211UTC. The following morning at 0640, Belgian signals were present on E8 and E10.

Peter is considering building a loop within a loop antenna for Band I reception this summer. The outer loop will be cut to 50MHz and the inner loop to 60MHz.

Apart a few Meteor-Shower pings on the scanner showing up on Channels E2, R1 and E3, **Simon Hockenhull** (Bristol) reports very quiet conditions. The anticyclonic conditions over the United Kingdom failed to produce tropospheric reception even though the barometer reached 30.80in!

During the middle of March, an increase in foreign traffic was noticed on the 27MHz CB bands and also on the 28MHz amateur band, especially around noon. The reception sounded too steady for Sporadic-E propagation, so maybe this was due to increased F2 activity.

Tom Crane (Hawkwell, Essex) has noticed several of the new Dutch regional stations recently. Also of interest was a number of German channels including those of WDR (Westdeutscher Rundfunk), NDR (Norddeutscher Rundfunk), BR-3 (Bayerischer Rundfunk), SWF-3 (Südwestfunk), HR-3 (Hessen Drei), VOX and RTL+.

On March 10th at 1800UTC, **Lt. Col. Rana Roy** (India) discovered 525-line (System M, NTSC colour) signals from Myanmar TV on Channel A4. This must be a new station as the only currently listed outlet is Yangon on Channel A6 with 10kW e.r.p.

The picture had the logo 'MRTV' in the top-right of the picture and programmes were in English and Burmese. Tropospheric DX has also occurred from Pakistan on E10 (Sialkot) and E5 (Lahore). Indian transmitters received by Rana included Jalandhar on Channel E9 and Kasauli on E6.

David Bocca Corsico Piccolino (Northern Italy) lives very close to the Monte Penice transmitter and confirms that there are no private TV broadcasts in Band I from this site, although there are private f.m. trans-missions. Only RAI UNO is transmitted on Channel B.

For DXing David uses the 3-element Channel B communal antenna for the flat where he lives but this summer he hopes to install his own 4-element Band I array once the battle with the caretaker has been won! During good tropospheric conditions, RAI UNO from Turin on Channel C can be resolved at P3 strength.

Antenna Overhaul

By the time you read this, the Sporadic-E season should have commenced, so if you haven't checked or overhauled your existing antenna system, now is the time to do it! Loft antennas have less chance of suffering from weather damage than an outdoor system, although it is probably just worth a check to see if the cable is still intact. It is surprising what the head of the household can accidentally (or deliberately) disturb while she's putting away the Christmas decorations!

The biggest headache with an outdoor system is when water gets into the dipole connector box. This can seep along the coaxial down-lead by capillary action and literally drip out of the coaxial plug and even damage your equipment. If water damage has occurred then the only safe option is to replace the down-lead completely.

Remove the dipole connector and clean up all the connections and also the dipole rods. A seized-up rotator can usually be freed although this does necessitate removal of the antennas.

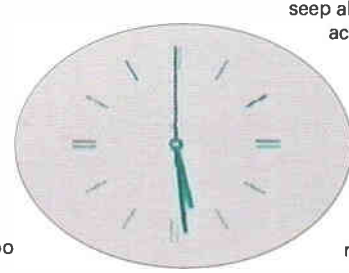
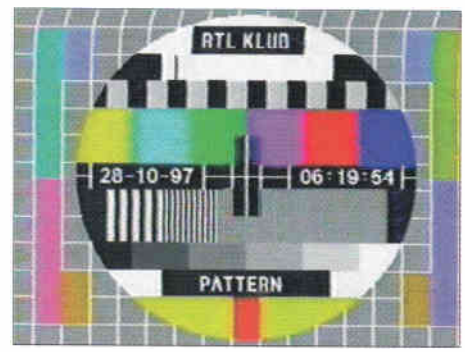


Fig. 2: (above) The Hungarian 1st Network clock caption.

Fig. 1: The PM5544 test card radiated in Hungary by MTV-2. Photo: Laszlo Kozari, Hungary.

Fig. 3: (below) Identification caption used by MTV-1.

Fig. 4: The PM5544 test card transmitted by RTL Klub in Hungary.



Disconnect the control unit from the mains first. Examine the rotator gears, then clean and lubricate where appropriate.

Fig. 5: The RTL Klub clock caption.

Equipment

It's so easy to become a Sporadic-E addict. All that's required is a receiver covering Band I frequencies, an antenna such as a loft dipole and plenty of patience. Reception is random but when openings do occur they may last for many hours with stations rapidly swapping and changing.

Catalogue stores often stock inexpensive multi-band TV sets but examine it carefully to ensure that it actually covers Band I. Look out for markings indicating Channels 2-4 (Band I) and 5-12 (Band III). Choose one with a rotary tuning knob for ease of selecting the required channel.

Electronic search-tuning is often a hindrance as a good-quality signal may need to be present before it can be stored in its pre-set memory. Many sets will only resolve the UK 6.0MHz sound channel but if you already have a scanner covering 45-70MHz, then this can be used for monitoring the sound.

A converter, such as the D-100, with a reduced vision i.f. bandwidth facility will dramatically improve the reception threshold and selectivity, which is important because Band I channels are interleaved.

Sporadic-E signals can be strong (remember when they used to wipe out BBC-1 405-line pictures during Wimbledon) which means that a simple indoor dipole antenna can be used. However, a rotatable multi-element outdoor array will provide superior results in terms of pick-up power.

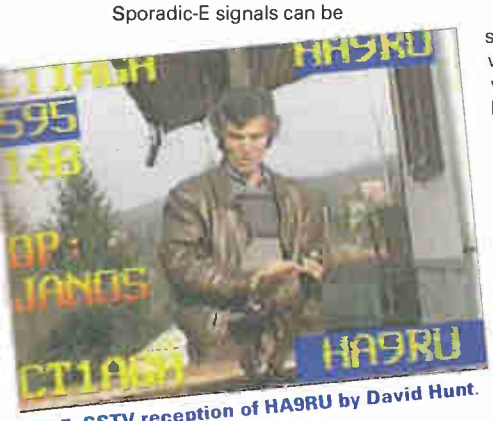


Fig. 7: SSTV reception of HA9RU by David Hunt.

Full details about suitable equipment for DXTV can be found in the publications entitled *DX-TV For Beginners* and *Guide To DX-TV*. Both books are available from the *SWM* Book Store (details are at the back of this issue).

Middle East Transmitters

It has been suggested that the Egyptian Channels E2 (2nd network) and E4 (1st network) relays at Dumyat may have been forced to close due to interference from the Syrian 2nd network transmitter at Homs which uses Channel E2. Note that the *WRTH* incorrectly calls this transmitter 'Holms'. According to the EBU transmitter map and listings it is 'Homs'.

It is interesting to note that the 2nd network transmitter at Homs was established in the Eighties although it was never identified in Europe until 1995/96 and this suggests that it was originally a low-power relay which has now increased its e.r.p. Looking at the map, Homs is close to the border with Lebanon and is only about 100km from the Fih 1.1kW outlet of TL-1 which also uses Channel E2.

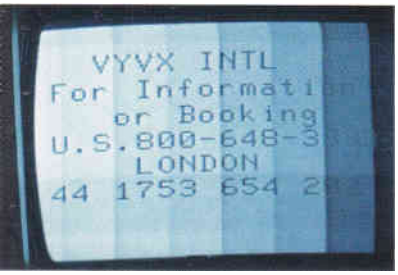
Could this mean that the Lebanese outlet may also have closed because of possible interference? Channel E2 is also used by TL-2 (Jounieh 1kW) and TL-3 (Beit Mery 1kW).

If anyone has acquired any reliable information via the Internet about Middle East Band I transmitters, we would be pleased to hear from you.

Fig. 6: SSTV reception by David Hunt in Brighton.

■ ROGER BUNNEY, 35 GRAYLING MEAD, FISHLAKE, ROMSEY, HANTS SO51 7RU

Satellite TV News



A North American satellite lease holder retains this card on-air during non-feed time via Intelsat K @ 21°W in NTSC.

An example of home-town USA TV on a Brightstar/Reuters lease via Intelsat K @ 21°W.

On Intelsat K again, Brookmans Park was well known for the BBC Medium Wavetransmitters in earlier years, now into the new transmission technology.

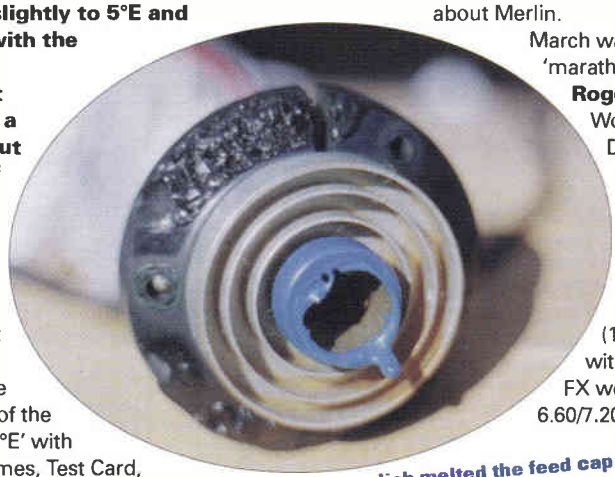
Intelsat 27°W one day put up this card for a few seconds after a medical programme.

Despite the increasing number of satellite users opting into digital carriage - particularly in news linkage - growth across the satellite industry has maintained analogue activity across the Clarke Belt and there's still plenty to be seen. March into April and perhaps the most important 'event' that featured heavily in the UK broadcast/news media were the Northern Ireland peace talks and although Sky seemingly are using digital circuits, Ulster TV maintained a high profile with live inserts into local programming throughout the period. *Telecom 2C* @ 3°E (12.608GHz hor. via uplinker UKI-120 DGSP) provided high quality pictures from their temporary studio at Stormont suitably logo'd 'UTV-LIVE' - and obvious jubilation in the studio on April 10th when an acceptable agreement was announced. The Telecom satellites at 8°, 5°W and 3°E (no's 2A; 2B/D; 2C respectively) provide very strong signals across the UK easily received on an 800-900mm dish. Whilst checking out 3°E one evening I noticed a weak 'Merlin' caption, swinging the dish slightly to 5°E and *Sirius-2* appeared with the caption 'Merlin Communications' at 12.223GHz vertical, a very strong signal but over several days of random checking no pictures were seen.

Eutelsat's *Hot Bird 4* after launch was slotted early March at 29°E and downlinked 'Transmissions via the Europesat 1 network of the Eutelsat System at 29°E' with various test programmes, Test Card, etc. Mid March and there arrived at 28.2°E the SES *Astra 1D* satellite (ex 19.2°E) ready for the Sky digital transmissions in June. And thus were gathered the combatants for the mother of all satellite battles, in the 11.995GHz corner SES/Sky and in the 12.305GHz corner Eutelsat. Both lay claim via the ITU to this orbital slot and certainly if both operate satellites from the closely adjacent positions serious interference will result. I suspect market forces will reveal the winner!

Another satellite always worth checking - and it Eurospots with high level signals - is *Intelsat K* @ 21°W. One daily user with several feeds is the German NTV network, they produce a live insert from Wall Street into an NTV financial news programme, great excitement on March 19th with financial institutions combining - namely AMEX and NASDAQ. Sky often use the K slot for East bound inserts ex USA into the UK during the Sky News *Sunrise* breakfast time programme. Depending on any late breaking news which may require a live report from that area, so can appear a local TV station output + identification slide - either a main network affiliate or from a local station in rural America. The distant studio hooks into either a domestic sat or terrestrial link and eventually via one of the main Brightstar/Reuters leased transponders to bridge the Atlantic. I recently caught the Oklahoma State University and WCMH-TV ch.A4 Columbus, Ohio during these early morning 'opening slots'.

SWM reader **John Womersley** (Yorkshire) has recently invested in a Nokia 9602 digital receiver and is enjoying programming the various programme/feed parameters into its memories - it can hold 500 channels and will also list within separate menus both radio and TV channels. Though a little restricted with his tracking dish coverage - John uses a Mini windscreen wiper motor driving a 100mm scaffold pole with dish there-on to sweep 19°E to 4°W he found that *Sirius-2* @ 5°E carried numerous digital signals including several from the NTL uplink site at Crawley Court near Winchester. Digital programming on *Sirius* is mainly Scandinavian orientated since the bird sports Central and Northern Europe -there's a strong (800mm dish size) signal available from the Telecom birds across much of the UK, see the above comments about Merlin.



The focussed heat from my 1.2m dish melted the feed cap and LNB support clamp.

March was described as a 'marathon of football' by **Dean Rogers**, highlights in Woolwich Road, SE2 for Dean were the friendly matches with England's Under 21s v. Switzerland's Under 21s linked into Sky Sports via BT's lease trdr on *Eutelsat II F3* @ 16°E (11.163GHz hor) - audio with a mix of commentary + FX were carried on both 6.60/7.20MHz. The same transponder fired up the following day with more Sky offerings, another friendly between the Swiss and UK with pre-match interviews, etc. Interesting that the same subcarriers were used but with sound FX only, no commentary! Football from a much warmer climate than Woolwich Road was logged on the 22 March with a live Spanish match early evening via *Eutelsat II F2* @ 10°E (11.080GHz hor) @ 1830UTC. The match was uplinked out of Tenerife by the Telefonica truck 'TELEF-ETT-F3'. It wasn't all football in March, Dean watched live cross country skiing - the Biathlon World Cup - from Austria on the 12th March (for Eurosport) and the next day live alpine skiing from Cran Montana, Switzerland (for ORF Austria), both carried live on *Eutelsat II F4* @ 7°E in clear PAL. Remember Dean is using just an 800mm dish - it's really possible to use minimal equipment for effective reception.

From Thailand **Alex Smith** writes following his working visit to South Africa, during his stay he travelled North to visit friends living in Bulawayo, Zimbabwe. They are watching the Astra channels

from *PAS-4* @ 68°E (Ku-band) though Astra Plus/AstraSat channels have been discontinued to be replaced with South Africa's SABC-1,2 and 3 in clear PAL free to air plus BOP-TV. A 1.2m dish is necessary for acceptable reception from the South African spot spill-over. The SABC service is intended for TV reception in those areas remote from terrestrial transmitters, a receiving package is available comprising a dish, LNB/receiver, TV, battery and solar panel.

Keep a check on the 7°W slot for signs of Nilesat-101 that should launch about mid April (time of writing), nearly half of the 12 transponders have already been leased.

Every 2nd Friday of each month Dr. Dish (Christian Mass) presents a satellite enthusiast's programme live on DFS Kopernikus-2 @ 28°E (11.550GHz vertical @ 2000CET).

Orbital News

Channel shutdowns on Astra seem to becoming more frequent. The end of March saw the closures of CMT and The Weather Channel, now Sky Scottish have advised their closedown May 31st next. The reason is lack of audience and failure to reach financial targets. Sky plan to launch a 24 hour *Sky Sports News* starting June as a run-up to the start of their digital services at the same time. A new UK satellite showbiz channel 'E!Entertainment Television' reckons to launch Summer/early Autumn in both analogue/digital.

When the new *Astra 1K* satellite launches into 19.2°E it will carry 52 Ku-band transponders and two Ka-band transponders. Separated beams will provide coverage for the UK and Central/Eastern Europe allowing co-frequency operation on the individual downlinking footprints. Reception on dishes down to 600mms will be possible across the extended footprint, even into the Russian Urals. And this Autumn *Astra 1H* flies into 19.2°E replacing the veteran *1A*.

A new regional French TV service 'Chaine Regionale' will be carried on the Television par Satellite (TPS) digital package as from May. Content will be derived from the nationwide local/regional studios that make up the France 3 terrestrial service. And Greece has announced plans for a single digital satellite platform using a common digital decoder. The Nultichoice Hellas group has already detailed proposals for its 'Nova' digital satellite package with $15m already invested and is awaiting the government go-ahead. There have been discussions on extending the ERT-1 national service into S.E. Asia via digital capacity within the AsiaSat-2 European package.

The new Indian government is considering limiting foreign involvement with broadast firms from 50% down to 20% - this should prevent large foreign groups gaining a monopoly of the Indian satellite airwaves. Sun Plus is the new Tamil language channel for Southern India which will soon be broadcast in addition to the Malayalam language channel that launches Summer '98. The Sun Network already transmits channels in Tamil, Kannada and Teluga languages. Following the failed orbital launch of AsiaSat-3 on Christmas Day, AsiaSat have announced a replacement Hughes HS-601 satellite should be launched via a Russian Proton rocket late Spring '99 - in the meantime channel obligations will be fitted into capacity on the *AsiaSat-1* and *2* birds.

Action time Peru, some time back hostages in Lima took over a local embassy, John Locker (Wirral) caught the action live on a feed for NHK!

Sirius-2 @ 5°E capacity has been booked by the UK cable firms for distribution of their 'Front Row'5 channel PPV service using Scientific-Atlanta PowerVu encryption.

Another Hughes 601 satellite has been ordered by PanAmSat to slot at 43°W (alongside *PAS-3* and *6*) providing increased capacity into Central/South America. *PAS-6B* is under 'expedited' construction with a planned launch Autumn '98 and will carry 32 high power Ku-band transponders, this to cover service deficiencies resulting from low power output solar panels on the active 43°W *PAS-3*.

Important Intelsat news...orbital slot changes are advised...*801* has moved from 64°E to 31°W; *506* has moved from 34°W to 29°W; *511* has moved to 29° W and *506* now defunct has been 'de-orbited'; the new *805* (May/June launch) to 55°W and the 'de-orbiting' of *512* from that same slot.

Meanwhile an independent commercial spin-off company 'New Skies Satellites NV' has been formed by Intelsat (who retains 10% interest) allowing the new company to operate within a fair competitive frame work and on a level playing field with its competitors (as the press release states). Intelsat have thus transferred the following birds into 'New Skies' operation...*703* @ 57°E; *K-TV* @ 95°E; *513* @ 183°E; *K + 803* @ 21°W; *806* @ 40°W.

Sirius-2 @ 5°E and the Merlin leased transponder.

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

Airband

Abbreviations

AIC	*Aeronautical Information Circular*
AIP	*Aeronautical Information Publication*
a.t.u.	antenna tuning unit
CAA	Civil Aviation Authority
d.m.e.	distance measuring equipment
ft	feet
h.f.	high frequency
ICAO	International Civil Aviation Organisation
kHz	kilohertz
MHz	megahertz
n.d.b.	non-directional beacon
SSB	single sideband
TACAN	TACtical Air Navigation
v.h.f.	very high frequency
v.o.r.	v.h.f. omni-directional radio range

I never cease to be surprised by the constant interest in *Concorde*. If one flies over, people look up and say "There goes *Concorde*!" (as if it's the sole example. They never say "There's a *Concorde*!"). It (they?) even features quite often in this column or Graham Tanner's 'SSB Utilities' (as it did in March). So, compiled by Graham, here are Concorde's typical v.h.f. frequencies when leaving Heathrow. Note that there's nothing special, they're the routine frequencies you'd expect for this route.

Clearance Delivery/Ground 121.7, Tower 118.5, No. 1 Radar Director 134.975, London Airways 134.325, 134.75, 126.075; Shannon Control 135.6MHz.

Follow-Ups & Foul-Ups

Sorry, the photo on page 51 of the April issue was not meant to be a quiz. Chris took the picture of the Vickers Vimy replica.

In March I tried to help **Arthur Oglesby** (Harrogate). In simplifying his details to fit the space, I gave the impression that he is current on the Miles Messenger. Now, those few that remain are historic and Arthur wishes to make clear that he is no longer lucky enough to own one. He also elaborates on his Army service which included being a Battalion signals officer.

Arthur's problem was poor h.f. reception on some bands with a particular antenna/receiver combination. Well, the FRG-100 receiver is plenty sensitive enough across the h.f. spectrum and can't be blamed (unless a fault has developed). So, Arthur, it's a bit like someone who seeks your expertise as they're not catching enough fish.

I'm sure that Arthur, who teaches angling, wouldn't encourage anyone to give up. It's a matter of patience, experience and having the correct equipment. There couldn't be a better analogy when it comes to 'catching' radio signals. Perhaps an a.t.u. is the 'bait' you need, Arthur. Unfortunately, trying one is the only way to find out.

Do check that the FRG-100 is operating correctly as it has eight different input filters for the various parts of the h.f. bands, conceivably one could be faulty. Each of the four bands you mention is received through a different filter.

Information Sources

In April I mentioned the flight routings on computer disk by **Len Woolley** (Bude). Unfortunately it takes Len months to update the information - by which time, I suppose it's starting to get out-of-date. Len has already received requests for the disk. When it's available, he'll let me know and I'll mention it here.

I looked up Pakistan's flight numbers in *Flight Routings* (from the *SWM* Book Store). All the three-digit numbers began with 7, so like **David Brown** (Northampton), I can't explain what 014 is.

David wants to know about fuel dumping. Most smaller aircraft are able to land at full take-off weight, but larger ones (Boeing 747, etc.) can not. A heavy landing is unpleasant (and expensive if any damage is done). If an emergency develops early in the flight, fuel might need to be dumped before a precautionary landing can safely be made.

PA-28. *Christine Mlynek.*

Although the fuel forms a fine mist in the slip-stream, it is dumped over the sea for safety, it is not considered a great hazard to any shipping below. If a wing-mounted engine is at fault and presents a fire risk, fuel should not be dumped from the outlet valves on the same wing.

Safety: The Debate

It's only a personal observation, but I feel that most workers want to do a good job - but occasionally middle management just see costs rather than benefits. In aviation, for example, employees might feel that they benefit from training but managers just rate the training as an expense.

So, often it's a matter of knowing the price without realising the true value. I don't think I'm alone in this opinion. **Henri Walser** (Switzerland) left the avionics trade in frustration at this attitude. Well, Henri, you have a point.

Flying is becoming ever safer in terms of rate (i.e. accidents per passenger-mile flown). Unfortunately, the amount of flying is increasing. Even if the rate improves slowly, there could eventually be sufficient aircraft flying for there to be several total losses (world-wide) each year. The press would love to report each one!

Radio Procedures

I refuse to take sides in the argument over the meaning of VOLMET. In this country we generally accept 'VOLume METeorological report' but Henri sticks to the ICAO/World Meteorological Organisation derivation where 'VOL' part comes from the French word, 'voler' to fly. They also use the word to mean that something's been stolen, as if it flew away on its own!

Now to clarify the pressure altimeter Q-codes. Internationally agreed codes spoken over the air include QFE. When set on the altimeter sub-scale, the altitude reading will be zero when touching down at the aerodrome. If the runway has a significant slope, the QFE is stated. In other words, if the runway slopes up, setting threshold QFE gives a zero reading. Taxi to the other end of the runway - and the altimeter reading starts to increase!

QNH is set to read altitude above sea level. Charts show the elevation of terrain (mountains) above sea level. If you're flying at 3000ft QNH and there's a 4000ft mountain in the vicinity, watch out!

What about QNE asks Henri? This is often misunderstood. If the air pressure is very low, less than 800 hectopascals (hPa) for British specification altimeters (950 for USA types) then QFE cannot be set. Instead, standard pressure 1013.25hPa is set but the altimeter will over-read on landing. It is this indicated reading that the controller passes as the QNE (i.e. QNE is in feet, not hectopascals). The QNE at any given aerodrome depends on the actual air pressure as well as aerodrome elevation.

QFF. Not a misprint, rarely seen though. If the temperature is below minus 13°C an altimeter set to QNH could over-read. This fools the pilot into thinking that clearance from the mountain is greater than it really is! QFF is a corrected QNH to compensate for this.

As for hectopascals, they're the new (scientifically accurate) version of what we once called millibars. A bar is an atmosphere so a millibar is one thousandth of this. Actually, pressure changes all the time so 1013.25hPa is reckoned to be average.

Local Airspace

From Sheffield, **David Crosslands** reports on progress at his local airport. KLM have started a regular Amsterdam service with the Fokker 50, Brymon might be next to the Channel Islands with Dash 8 equipment. Quick thought: does that mean that the good old Chipmunk should actually be called a Dash 1? What do you think?

Latest addition to the previously-reported radio facilities at Sheffield is d.m.e. SFH replying on 1137MHz, channel 50Y.

Not so far from **R. Frost's** Felixstowe is Wattisham, noted for its Army helicopters. Now, 124.925MHz is listed as an Air/Ground

frequency and indeed Wattisham has an Aerodrome Traffic Zone (ATZ). However, it also has a Military ATZ. Perhaps it's too busy for Air/Ground procedures alone?

So, alternatives are (all MHz); Approach 123.3, 125.8, 291.125; Radar 283.575; Talkdown 356.175, 359.825; Tower 122.1, 358.6. All replies appear here, I cannot write back directly - it does say so at the end of each column, but an occasional reminder is necessary!

Frequency & Operational News

Visual cross-Channel traffic is recommended to route from Southampton, over the Isle of Wight, through Danger Area 036 and onto the Cherbourg Peninsular. *AIC* 18/1998 from the CAA lists the relevant frequencies. Danger Area Crossing Service is from Portland Radar/Plymouth Military which share 124.15; also needed are Brest Information 122.8, Jersey Zone 125.2, London information 124.75 and Solent Approach 120.22MHz.

Aerodromes: Elmsett (Suffolk) is a new aerodrome with Air/Ground 130.425, but *AIC* 19/1998 instructs pilots to call nearby Wattisham 125.8MHz initially. Lydd's new runway is 14/32. Tiree's runway designator changed to 17/35 (was 18/36 before magnetic North moved round).

Airways: On B1 between Dublin and Wallasey, new reporting point is GINIS. On B39 east of Dublin, new reporting points are NEFYN and BEGDA and there's a new significant point. Write to me if you need details of these. N862 is extended.

Beacons: Benbecula: New d.m.e. (BEN); v.o.r. (BEN) now 113.95 (was 114.4MHz); so TACAN (BEZ) no longer paired with v.o.r. At Halfpenny Green, n.d.b. HG (356kHz) has limited hours of operation, so the propagation enthusiasts shouldn't get too alarmed if it can't be received; likewise, Leeds Bradford LBA (402.5kHz). Prestwick n.d.b.s.: PE withdrawn, PIK is a new one on 355kHz, strange, I thought PWK was on this frequency. Prestwick also has new d.m.e. IPP (runway 13) and IKK (runway 31), reply 1001MHz, but loses 31's outer marker.

Moni. *Christine Mlynek.*

Controlled Airspace: Three new reporting points in the vicinity of Prestwick are GILOK, LECKI 7 KOMOK (write to me if details needed).

Heliports: New ones are at Ascot, Cheltenham, Glasgow (City) and Silverstone. I suspect that some of these already exist but have been upgraded in some way.

Aerobatic display aircraft (including during practice) should now squawk 7004 unless under radar control (*AIC* 21/1998).

Thanks again to **Martin Sutton** (CAA) for sending *AIP* amendments from which some of the above is extracted.

All letters received up to April 9 have been answered. The next three deadlines (for topical information) are June 8, July 7 and August 10. Replies always appear in this column and it is regretted that **no** direct correspondence is possible.

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Decode

"The fact that the aircraft are travelling at many thousands of feet above the ground using broad beamwidth antennas means the signals can be received over a very wide area."

Although this column has tended to focus on h.f. utilities, this month I'm going to move into one specialist area of v.h.f. datacomms - ACARS. The reason I haven't looked much at v.h.f. modes is the very nature of the transmission system. Because most v.h.f. communications are restricted to line-of-sight paths interception becomes rather difficult.

Spy-in-the-sky?

However, one area of listening that has always appealed to a wide range of listeners is the v.h.f. air bands between 118 and 136MHz. Although this is still restricted to line-of-sight, the fact that the aircraft are travelling at many thousands of feet above the ground using broad beamwidth antennas means the signals can be received over a very wide area. You can receive airband signals with very basic equipment simply because the signals generally get to you over an uninterrupted line-of-sight path.

The reason this has ended-up in my column is the rapid growth of data communications between aircraft and the ground. The data system used is known as ACARS which is an acronym for Aircraft Communications Addressing and Reporting System. The system was originally developed by Aeronautical Radio Incorporated or ARNIC as they're known back in 1991.

Whilst I will be looking at the v.h.f. ACARS system, the full ARNIC plan includes full global coverage using satellite and h.f. links as well. The key to the success of the ACARS system is the tremendous automation offered to the airline companies. In simple terms, ACARS is just a rather sophisticated E-mail system for the aviation industry. In much the same way as radio amateurs use their callsigns as a unique identity, the ACARS system uses the aircraft's registration. The main components of the ACARS system are the airborne system, ANRIC ground system and the Air Carrier subsystem.

The airborne system contains all the necessary kit to filter-out ACARS signals and link with the aircraft's instrumentation system. This allows E-mail messages for the crew to be displayed on the v.d.u.s and also gives the ground crews direct access to all manner of vital data. Examples being the ability to remotely download payload and fuel data as well as fault logs and any alarm signals. Before ACARS all this data had to be passed using voice comms - all very tedious for the aircrew. The automatic routing offered by the aircrafts registration means that messages or data requests can be sent from anywhere in the world in the confidence that they will be automatically routed to the aircraft's current location. As you can see from this the ACARS system is a really powerful tool for the airline operators and should increase both the safety and efficiency of air travel.

Let's now take a closer look at the system in common use on v.h.f. One of the first things to do is to take a listen. If you're in Europe the busiest frequency is 131.725MHz which is the primary channel. You will also find activity on the secondary channel on 131.525MHz and maybe even the new 136.9MHz channel. If you do take a listen you will find it sounds very similar to amateur packet radio signals. Despite the similar sound the format actually uses 2400baud and phase shift keying.

Don't worry if you don't hear a signal straightaway - the signals come in short bursts and the periodicity of transmissions depends very much on where you live. If you live virtually anywhere in the South of England you should finds loads of traffic emanating from all the international traffic flowing in and out of the major airports such as Gatwick and Heathrow. In other more remote parts of the country you may find you have to wait a while to capture some signals.

The real reason for spending some extra time on this fascinating mode is the arrival of a brand new ACARS decoding program called *SkySpy*. What makes the program particularly interesting to me is the fact that it has been written by **Wilhelm Schroeder** of *Hamcomm* fame! Like many data modes these days, just receiving the raw data is really only part of the battle. A good example of this is the decoding of RTTY weather data. Whilst decoding the five digit groups is dead easy turning this into plain text requires some extra programming. To give you some idea of the format used for ACARS, I've shown some raw data in **Fig. 1**. As you can see it's not a very friendly format. However, just like the weather example I mentioned earlier, the data is split into distinct sections. And the data in **Fig. 1** turns out to mean the following: CS-TNB is the aircraft's Portugese registration whilst TP0481 is the Air Portugal flight number. *SkySpy* has been specifically designed to make the processing of ACARS data as simple as possible.

A major component is the inclusion of a special flight database that has comprehensive registration and airline details to help filter the messages. This is supplemented by the use of a Microsoft *Access* database format to store the decoded logs. By using this system you can very rapidly index your captured data on any of the main fields. If for example you're looking for Iberian Airways flights you can, at the press of a button, index the entire log by flight number! In addition to automatically capturing all the incoming data to your master file *SkySpy* can save data to disk.

Rather than just dump the raw data to disk, *SkySpy* filters and tidies-up the data to present a neat format. The main file display also expands upon double-clicking on entry to pro vide greater detail.

One of the other great features of *SkySpy* is the built-in filtering to minimise the amount of garbage that gets into the main database. This filtering is done on several fronts. First of all every message is checked for errors and, next the messages are checked for duplicates. Duplicate and corrupt messages are then excluded from the database.

The system isn't foolproof but certainly goes a long way to keep the data clean. Another feature,

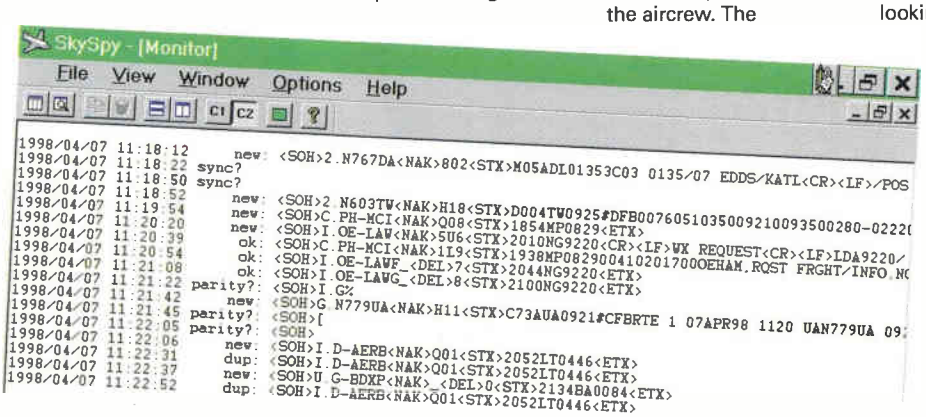

Fig.1: SkySpy Raw ACARS data display.

which I think is unique in ACARS decoders, is that it's been written to run under *Windows95* and can run happily in the background whilst you use your PC to get on with other things! As you can no doubt see, *SkySpy* is a pretty impressive ACARS decoder which I'm sure is going to make quite an impact on this market. *SkySpy* is currently being distributed by **Pervisell Ltd.** and registered versions are available from them at just £24.99 for the software with *Hamcomm* type interfaces available from £16.99. For more information contact **Pervisell Ltd., 8 Temple End, High Wycombe, Bucks HP13 5DR**. Tel: **(01494) 443033** or visit their Web site at: **www.pervisell.com**. My thanks to Pervisell for the supply of the review software.

ARQ-E

Once new utility listeners have mastered the basics of conventional RTTY and FAX traffic, the next step is to take a look at some of the more complex modes.

Now that *RadioRaft* is well established on the radio scene, moving into the complex modes is not a particularly expensive option. To help you on your way I'll just give you a few inside details on the mode to help you better understand how to receive it. Like many of the complex modes, ARQ-E has developed out of good old RTTY and remains essentially a mode for communicating text messages.

The problem with RTTY is its poor performance in difficult or varying radio conditions which makes it unsuitable for unattended operation. What was needed by commercial authorities was a form of self controlled radio link that would provide some sort of assurance that a message going in at one end would actually come out at the other! Ideally the link needed to be able to operate as a seamless component in a much wider network that could combine land-lines and radio links.

In order to meet this requirement the link needs to have some form of built-in error correction to overcome interference or poor propagation. There is also a requirement for the link to monitor its own performance in the absence of any messages and report back into the network the quality of the link. This latter requirement is very important to ensure the smooth running of any large network.

So let's look at how ARQ-E deals with these requirements. The first point of difference between RTTY is that ARQ-E is a synchronous signal as opposed to RTTY's asynchronous mode.

What's the difference I hear you ask! Well in asynchronous signals each individual character is wrapped-up with a start bit at the beginning and one and a half stops bits at the end. This was originally done to make the identification of each character simpler to handle with an electro-mechanical teleprinter.

The down side is that these extra two and a half elements are completely useless as they carry no information whatsoever and are therefore termed redundant. If you remember that a standard RTTY character is five elements or bits long then throwing-in another two and a half elements is rather wasteful.

With a synchronous system the characters are sent without any start or stop bits which straight away makes potential for a much faster transmission rate. The snag with this more efficient use of the transmission medium is getting the receiver to synchronise and locate the start of each letter. This is not as hard as it sounds because the teleprinter alphabet used has built-in unique characteristics that the receiving decoder can identify.

Now for a look at the alphabet used for ARQ-E. By alphabet I simple mean the look-up table that's used by the system to convert the letters, numbers and punctuation of the message into a series of pulses or serial numbers that can be sent in the same way as RTTY. The ARQ-E system is very closely related to the ITA2 used for RTTY - the difference being the addition of two extra elements and three extra characters. The two elements are added to the start and end of the *ITA2* character and the three additional characters form the basis of the automatic features of ARQ-E. To give you an idea of how the code looks here's a comparison of a few letters.

Letter	ITA2	ARQ-E
A	YYBBB	BYYBBBY
B	YBBYY	BYBBYYB
C	BYYYB	BBYYYBB
D	YBBYB	BYBBYBY

Where Y = Logic 1 or Mark: B = Logic 0 or Space

As you can see, in each case, the middle five elements use the standard *ITA2* code. These extra elements create a set of 35 unique characters out of a possible combination of 127. It is this fact that forms the basis of the systems error correction. At the receive end of the link the decoder will examine each group of seven elements and only accept those that fit one of the 35 unique characters.

The three additional characters I mentioned provide the necessary control to help deal with any errors. The three characters are listed here: Idle - alpha or phasing 1, Idle - beta Repeat Request (RQ) or phasing 2. Out of these it's the Repeat Request that goes hand-in-hand with the error detection system.

Whenever the receiver detects an error it sends this character back to the transmitter which causes it to repeat the last block of characters. The two idle characters are used to keep the link alive when there's no traffic to be sent. In this way the quality of the link can be monitored, as even the idle characters are subject to the same error checking process.

In order to handle this type of error correction it is vital that the message is divided-up into manageable groups of characters to help control the amount that has to be repeated in the even of an error. In the case of ARQ-E the message is grouped into three or seven characters plus one RQ signal. The choice of three or seven characters being determined by the propagation delay of the link. The other important point about ARQ-E is that it operates using two frequencies and can operate in duplex mode this means that messages can flow in both directions at the same time. There are a huge range of speeds used for this mode including the following: 48, 64, 72, 96, 144 and 192.

You will also note there is another mode that's very similar to ARQ-E and that's ARQ-E3. This is almost identical except it uses the *International Telegraph Alphabet No.3* and a different error detection system. Instead of checking for unique characters, the ARQ-E3 detection system just checks to make sure that each received character contains three Ys and four Bs.

If you want to try your hand at receiving this mode, I've included a sample of **Day Watson's** latest ARQ-E complex log.

Table 1

MHz	Mode	Time	Station [Routing]
3.2000	ARQ/E//96/I/85	2300	UNID.
5.3010	ARQ/E//192/E/400	1458	UNID.
5.4300	ARQ/E//192/E/400	2121	FF BASTIA [RFFHCB]
6.8340	ARQ/E//184.6/I/400	1924	FF NAQDURA [RFFXL]
6.9638	ARQ/E//192/I/170	2240	FF KDURDU [RFLIGA]
7.7160	ARQ/E//192/E/170	1855	UNID.
7.8417	ARQ/E//96/E/400	2305	FF BANGUI (RFFXI)
8.0150	ARQ/E//184.6/E/345	2005	FF PARIS [RFFX] ?
10.3640	ARQ/E//48/I/850	1956	FF LIBREVILLE [RFTJD] ?
10.6260	ARQ/E//184.6/I/400	1413	FF NAQDURA [RFFXL]
13.5725	ARQ/E//184.6/E/400	1543	FF PARIS [RFFX]
15.8617	ARQ/E//96/E/170	0922	FF PARIS [RFFX]
15.8627	ARQ/E//96/E/400	1458	FF PARIS [RFFX]?
16.2277	ARQ/E//96/E/400	1335	FF BANGUI [RFFXI]
17.4227	ARQ/E//200/E/400	1304	FF DHAHRAN [RFFVAE]
5.0717	ARQ/E3//192/E/400	2228	UNID FF ?
6.8367	ARQ/E3//200/E/400	2015	FF NDJAMENA [RFTPA]
6.9587	ARQ/E3//200/E/400	2254	FF UNID ?
7.4567	ARQ/E3//192/E/100	2245	FF DAKAR [RFTJ]
7.8315	ARQ/E3//48/I/400	2228	ANTANANARIVD AIR (5ST)
7.8967	ARQ/E3//96/E/400	1000	FF FT DE FRANCE [RFLI]
9.0767	ARQ/E3//192/E/400	1921	FF PARIS (RFFA) ?
9.1267	ARQ/E3//192/E/400	2139	FF LIBREVILLE [RFTJD]
9.1267	ARQ/E3//192/E/400	2310	BREVILLE [RFTJD] ?
10.0487	ARQ/E3//192/E/400	1511	FF PARIS [RFFA] ?
10.3937	ARQ/E3//200/E/400	2318	FF PARIS ?
10.4937	ARQ/E3//48/E/400	1655	FF PORT BOUET [RFTJF]
10.8737	ARQ/E3//100/E/400	1939	FF LE PORT [RFVI]
10.9177	ARQ/E3//48/E/400	2147	FF DAKAR [RFTJ]
13.4442	ARQ/E3//100/E/400	0622	FF DJIBDUTI [RFQP] ?
13.5437	ARQ/E3//193/E/400	0750	FF LIBREVILLE [RFTJD]
13.8467	ARQ/E3//100/E/400	1722	FF LE PORT [RFVI]
13.9867	ARQ/E3//192/E/400	1725	FF PARIS [RFFA] ?
14.5857	ARQ/E3//200/E/400	1650	FF NDJAMENA (RFTPC)
14.6267	ARQ/E3//192/E/400	1124	FF FT DE FRANCE [RFLI]
14.718.3	ARQ/E3//100/E/400	0840	FF NDUMEA [RFHI]
14.8017	ARQ/E3//100/E/400	1550	FF LE PORT (RFVI)
14.9267	ARQ/E3//192/E/400	1224	FF DAKAR [RFTJ]
14.9597	ARQ/E3//192/E/400	0948	FF DAKAR [RFTJ]
16.0777	ARQ/E3//192/E/170	1128	FF PARIS [RFFA]
16.0877	ARQ/E3//100/E/170	1352	FF LE PORT [RFVI]
16.2617	ARQ/E3//192/E/380	1729	FF LIBREVILEE [RFTJD]
16.3518	ARQ/E3//192/E/170	0938	FF UNID ?
17.5509	ARQ/E3//193/E/380	1540	FF DAKAR [RFTJ]
18.3207	ARQ/E3//192/E/400	1453	FF DAKAR [RFTJ]
18.3802	ARQ/E3//100/E/400	1557	FF PARIS [RFFA]
19.1457	ARQ/E3//200/E/400	1159	FF DAKAR [RFTJ]

Table 1: Day Watson's ARQ-E/E3 Frequency List

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Info in Orbit

The next weather satellite (WXSAT) in NOAA's polar orbiting series - NOAA-K - was scheduled for launch on 13 May, so hopefully by the time this edition appears we should be hearing its telemetry. After achieving a successful orbit, it will be renamed NOAA-15. Early a.p.t. (the v.h.f. signals on 137.50MHz) will include two visible-light channels for a few days before the infra-red channels are activated.

Fig. 1: NOAA-K launch patch.

Fig. 2: POES logo.

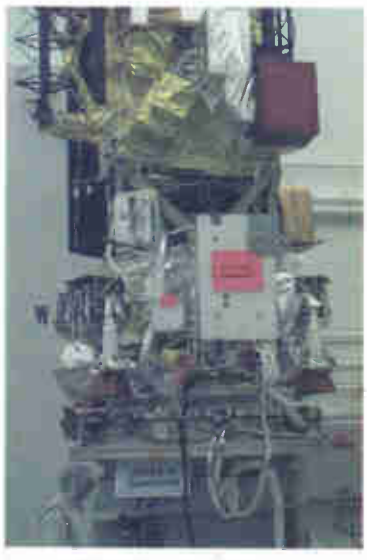

Fig. 3: NOAA-K spacecraft.

Since 1978, the National Aeronautics and Space Administration (NASA), together with the National Oceanographic and Atmospheric Administration (NOAA), have jointly developed the polar orbiting NOAA weather satellite system. These satellites provide global data for NOAA's short and long-range weather forecasting systems. The constellation consists of two polar-orbiting satellites known as the Advanced Television Infrared Observation Satellites (TIROS-N or AT-N) - currently NOAA-12 and -14. Operating as a pair, these satellites ensure that environmental data for any region of the Earth, are no more than six hours old. NOAA-12 passes south-bound over Britain (and elsewhere) during local early morning (around 0730UTC in the UK), and NOAA-14 passes northbound during early afternoon (around 1330UTC in Britain).

These satellites have not only provided cost-effective data for immediate and real needs, but also for extensive climate and research programs. The weather data (including images seen on television news programs) has afforded both convenience and safety to viewers throughout the world.

The satellites also support the SARSAT (Search and Rescue Satellite Aided Tracking) part of the COSPAS-SARSAT constellation. Russia provides the COSPAS (Russian for Space Systems for the Search of Vessels in Distress) satellites. The international COSPAS-SARSAT system provides for the detection and location of emergency beacons for ships, aircraft, and people in distress, and is responsible for the saving of more than 7000 lives since its inception in 1982.

During the final few weeks before launch, I monitored the launch status reports published by NOAA, as a series of tests were completed on the sub-systems. The following paragraph is typical of the tests performed:

Daily Report for 7 April -
"Battery discharged started Monday at 12:30 p.m. and will be complete Wednesday afternoon. Shorting plugs and other mechanical operations for the battery will be complete by Thursday. The r.f. link checks between 836 and SLC-4 were started today and will be complete by Wednesday."

While the actual spacecraft was undergoing structural and mechanical tests, a number of pictures were taken by staff, giving an opportunity to include a few in this edition. **Figure 3** shows *NOAA-K* under test on 18 March. The main body of the satellite is 4.2m long, and has a diameter of almost 2m - see **Fig. 4** for further details. The launch vehicle - a Titan II - see **Fig. 5** - was built by Lockheed Martin Aerospace.

NOAA-K's Orbit

NOAA-K is a three-axis, stabilised spacecraft that is being launched into an 833km circular, near-polar orbit with an inclination of 98.7° (and therefore retrograde) to the equator. The total orbital period will be approximately 101.35 minutes. The part of the orbit where the WXSAT is in sunlight will vary from 77 to 101 minutes, with a corresponding 24 down to 0 minutes in the Earth's shadow.

During each orbit of *NOAA-K*, the Earth rotates 25.59°, so the satellite observes a different portion of the Earth's surface on each orbit. The nominal orbit is planned to be Sun-synchronous, and will precess (rotate) eastward about the Earth's polar axis at the same rate and direction as the Earth's average daily rotation about the Sun. This precession keeps the satellite in a constant position - with respect to the Sun - for consistent illumination throughout the year.

NOAA-K's orbit will cross the equator at about 1930 northbound and 0730 southbound local solar time - replacing *NOAA-12*.

NOAA-K Transmission Frequencies

The automatic picture transmission (a.p.t.) frequency of 137.50MHz is only one of several transmissions from each NOAA WXSAT. **Figure 7** lists the on-board equipment and the associated transmission frequencies.

Status Of Previous NOAA WXSATs

NOAA-K (15) is the latest craft in the series, but some of the earlier craft are still functioning, at least in part. The following summarises their status:

NOAA-F (9) was launched 12 December 1984, into an afternoon orbit and is currently in standby

NOAA-K Characteristics

Main Body:	4.2m long, 1.88m diameter.
Solar Array:	2.73 by 6.14m - 16.76m^2
Weight:	At liftoff - 2231.7kg, weight includes 756.7kg of expendable fuel.
Lifetime:	Greater than two years.
Load Power Requirements:	833W for 0° sun angle, 750W for 80° sun angle.

Fig. 4: NOAA-K spacecraft characteristics.

operation. The Microwave Sounding Unit, a primary mission sensor, failed on 7 May 1987. The Digital Tape Recorder (DTR) 1A/1B failed two months after launch. The Earth Radiation Budget Experiment (ERBE) scanner stopped outputting science data in January 1987. The Solar Backscatter Ultraviolet (SBUV/2) and the Stratospheric Sounding Unit (SSU) instruments are continuing to operate satisfactorily. NOAA-9 also has real-time and global Search and Rescue (SAR) on board. The Microwave Sounding Unit (MSU) channels 2 and 3 have failed, and the satellite's power system is degraded. In August 1995, there was a very high power over-voltage condition which resulted in more system failures. The satellite's capability to collect, process, and distribute SBUV/2, SSU, and ERBE-Non-scanner (NS) data is now limited to stored TIROS Information Processor (TIP) data on 137.77MHz.

NOAA-G (10) was launched 17 September 1986, into a morning orbit, and it is currently in a standby operational mode with all of its data transmitters turned off. The MSU, ERBE-Non-scanner, HIRS instruments, the real-time SAR and other subsystems are performing satisfactorily. The ERBE-Scanner exhibited a scan sticking anomaly that is apparently generic to the instrument. The SAR Processor (SARP) 406MHz receiver has also failed. The SARP was used to provide global SAR data before its failure. In December 1994, the AVHRR IR channels were damaged and remain severely degraded from a satellite tumble caused by an overflow of the satellite's ephemeris clock. *NOAA-10* was placed in standby on 17 September 1991 (when date *NOAA-12* became fully operational).

NOAA-H (11) was launched 24 September 1988, into an afternoon orbit. The AVHRR (the imaging radiometer) failed on 13 September 1994. It is currently in a standby operational mode transmitting global and real-time SAR data directly to local users around the world. The *NOAA-11* spacecraft was modified for a 0° to 80° Sun angle and includes fixed and deployable sunshades on the Instrument Mounting Platform. The increase of maximum Sun angle from 68° to 80° allows an afternoon nodal crossing closer to noon to enhance data collection. The HIRS/2, MSU, and SSU instruments and the power subsystems operate satisfactorily. In September 1994, the AVHRR scan motor failed, leaving the instrument inoperative. In October 1994, the SBUV/2 diffuser failed, however, the instrument continues to collect global ozone data. In April 1995, DTRs 1B and 5A/B failed to operate. Two gyros have failed and attitude control is being maintained through the use of new reduced gyro flight software. In addition, before the *NOAA-D* launch, a gyro-less flight software package was installed on *NOAA-11* which will provide attitude control, at expected reduced accuracy, should the X-gyro fail. The satellite was placed in standby mode in March 1995 and was reactivated to provide soundings after a *NOAA-12* HIRS filter wheel anomaly in May 1997.

Morning Orbit

NOAA-D (12) was launched on 14 May 1991, into a morning orbit and is currently the designated operational morning satellite. It replaced *NOAA-G* (10) in orbit, however, it does not have a SAR package on board. The Skew Gyro periodically exhibits a high drift rate, which is corrected with real-time operational command procedures. In May 1997 the HIRS filter wheel mechanism degraded to the point that soundings were unusable. The remaining instruments and other sub-systems continue to operate satisfactorily. Currently, it is planned for *NOAA-K* (15) to replace *NOAA-D* (12) as the operational morning satellite.

NOAA-I (13) was launched on 9 August 1993, into an afternoon orbit. On August 21, 1993, two weeks after the launch, the spacecraft suffered a power system anomaly. All attempts to contact or command the spacecraft since the power failure have been unsuccessful.

Fig. 5: TITAN II launch vehicle.

NOAA-J (14) was launched on 30 December 1994, into an afternoon orbit and is currently designated as the operational afternoon satellite. A few hours after launch, a GN2 regulator valve leak caused the spacecraft to tumble. The satellite was recovered within hours and remains in a stable orbit. In January 1995, it was determined that one of the four Space Environment Monitor (SEM) telescopes was inoperative, reducing data collected by 12%. In February 1995, the SARP failed, the SBUV/2 Cloud Cover Radiometer (CCR) failed, and DTR 4A/4B was deemed inoperable.

Fig. 6: NOAA-K simulation.

Frequencies

NOAA-14 transmits a.p.t. on 137.62MHz

NOAA-12 (shortly -15) transmits a.p.t. on 137.50MHz

NOAAs transmit beacon data on 137.77 or 136.77MHz

METEOR 3-5 (or 2-21) use 137.85MHz

OKEAN-4 and SICH-1 use 137.40MHz

METEOSAT-6 (geostationary) uses 1.691 and 1.694.5GHz for WEFAX

GOES-8 (western horizon) uses 1.691GHz for WEFAX

MIR uses 143.625MHz for voice.

Link	Carrier Frequency	Information Signal	Baseband	Modulation	Subcarrier Frequency
Command	2026MHz	Digital commands Clear or Encrypted	2kbps	NRZ-M	16kHz
Beacon	137.77 and 137.35MHz	HIRS, SEM, DCS data, spacecraft altitude data, time code, housekeeping, telemetry, memory verification, all from TIP	8.32bps	Split phase phase-shift keyed (PSK)	
VHF real time (APT)	137.50 and 137.62MHz	Medium-resolution video data from AVHRR	2kHz	a.m./f.m.	2.4kHz
S-band real time	1.698 or 1.707GHz	High-resolution video TIP and AIP data	665.4kbs	split-phase PSK	
S-band playback	1.698 1.7025 or 1.707MHz	High-resolution AVHRR data from MIRP, medium-resolution AVHRR data from MIRP TIP and AIP outputs	2.6616Mbps	Randomised nonreturn-to-zero/PSK	
Data collection (uplink)	401.56	Earth-based platform and ballons	400bps PSK	Split-phase	
S-band playback to European ground station	1.698 1.7025 or 1.707MHz	TIPD or AIP data recovered from tape recorders as scheduled	332.7kbps PSK	Split-phase	
S-band contingency and launch	2.2475GHz	Boost during ascent and real-time TIP in orbit	Boost 16.64kbps TIP in orbit 8.32kbps	Split PCM/BPSK	
SAR L-band downlink	1.5445MHz	Data transmission from SARR and SARP to ground LUTs	250kHz	PM 2 rad peak	
SAR uplinks	SARR 121.5MHz 243MHz 406.05MHz SARP 406.05	From ground ELT/EPIRBs/PLBs to spacecraft	(video) 25kHz for 121.5MHz 45kHz for 243MHz 400bps for 406MHz	PM for 121.5/243MHz FM for 406MHz	

Fig. 7: NOAA-K transmissions.

Also, the Earth Sensor Assembly (ESA) exhibited high Quadrant 3 (Q3) data counts due to apparent contamination of the detector. In March 1995, the MSU scanner seized and the instrument was powered off. After three weeks, the MSU was powered on and has been operating satisfactorily since. Flight software was modified in April 1995, to correct the high ESA Q3 counts and to turn off the MSU should the scanner seize up again. Between April 1995 and December 1996 the SBUV grating drive experienced significant degradation. The grating drive control was reprogrammed to compensate for these problems as well as for the CCR failure. All other instruments operate satisfactorily. In November 1995, the Demodulator portion of the Command Receiver and Demodulator (CRD) for On-board Processor #1 (OBP1) failed, resulting in the loss of the backup OBP. OBP1 was commanded off. Flight software and ground software packages were modified to permit the use of and commanding to only OBP2.

My thanks to the National Oceanographic and Atmospheric Administration (NOAA) for the extensive use of their graphics and information.

METEOSAT Series Locations

Recent manoeuvres by the METEOSAT WXSATS have resulted in the following longitudes for the various craft:
METEOSAT-5 drifting to 65° east for the 'Indoex' project.
METEOSAT-6 longitude 1° west.
METEOSAT-7 longitude 350° (10° east of Greenwich).

Correspondence

Bob Cobey G0HPO lives in southern Britain and jointly provided last month's QFH antenna project. He uses his loft-mounted QFH to feed his newly designed RIG (Remote Imaging Group) RX2 receiver. Using a computer running the 'sound-card' decoding program *WXSAT* he produced **Fig. 8**, a *NOAA-14* day-time image of Britain on 1st April.

Increasing amounts of correspondence come by E-mail from people around the world, and this is providing a variety of locally received NOAA imagery. **David Wiechman** of Northridge in California sent this *NOAA-14* image - see **Fig. 9** - received on 22 February at 2057UTC which shows the Great Lakes complex toward the upper right. The lower part shows the Gulf of Mexico.

MIR Monitoring

Many correspondents have asked for further details of *MIR* frequencies; here is a current list:

Amateur radio:
145.550 simplex
435.775 uplink/437.975 downlink (Packet)
435.725 uplink/437.925 downlink (QSO duplex mode)
435.750 uplink/437.950 downlink (repeater)
Cosmonauts also use:
145.200 uplink/145.800 downlink

Next Month

Scientists at the R&D Centre in Moscow have produced complete systems for imaging satellite monitoring and I have prepared a feature on one of their systems for next month's column.

Shuttle Launch Schedule

STS-91 *Discovery* is scheduled for a final docking with *MIR* on 28 May. It will be taking more components including the Space-Hab single module.

STS-88 *Endeavour* is still officially scheduled (as in early April) for the first International Space Station launch on 9 July, but the date being quoted elsewhere for this flight is 3 September.

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

Kepler Elements - MIR and Shuttle

1 For a print-out of the latest WXSAT elements, *MIR*, and the Shuttle (if in orbit), send a stamped addressed envelope and secured 20p coin or separate, extra stamp. Transmission frequencies are given for operating satellites. This data originates from NASA. During Shuttle operations I send Kepler elements by return-of-post.

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.

3 You can have the data as a computer disk file containing recent elements for the WXSATs, and a large file holding elements for thousands of satellites. A print-out is included, identifying NASA catalogue numbers (for the WXSATs, Amateur Radio satellites, and others of general interest), ideal for automatic updating of your tracking software. Please enclose 50p with your PC-formatted disk and stamped envelope.

Fig. 8: NOAA-14 1 April image from Bob Cobey.

Fig. 9: NOAA-14, 22 February from David Wiechman.

Fig. 10: METEOR 3-5 image of Barents Sea on 16 March from B. Stevely.

Attention - 123!

Table 1
Fader Frequencies in MHz

3.191
3.217
3.382
4.023
4.062
4.457
4.478
4.496
4.563
4.845
5.090
5.110
5.195
5.313
5.328
5.400
5.468
5.788
6.505
6.796
6.825
6.848
6.878
7.387
7.500
7.658
7.813
7.997
9.125
9.138
9.225
9.245
10.142
10.480
11.100
11.517
13.431

(These can vary by up to 3kHz)

Espionage and intelligence related communications have always been the most 'serious' users of the h.f. spectrum. Whilst most of the traffic is routine, their messages can potentially start wars, order assassinations and determine world history.

Above The Law?

Publicly, their very existence is denied by governments - not only by the agencies themselves, but by radio spectrum regulation agencies, including even the ITU. They are immune from international law, operate wherever and whenever they please - using broadcast-level powers - and use bogus callsigns, which, in certain cases, are legally allocated to 'innocent' countries.

According to British law, ordinary members of the public are only legally permitted to monitor legitimate broadcast and amateur transmissions and little else. However outdated and unrealistic this may seem, numbers stations officially don't exist, so we can feel free to monitor these figments of mass delusion without the guilt which may engulf us when we accidentally stumble upon, for example, an army cadet net or Reflections Europe!

The letter from Ian Wadham (April *SWM* page 8) has inspired this brief excursion into the absurd hypocrisies of officialdom. The band 6.6-6.7MHz ('Echo Charlie' /45m) was used by Marconi, and other early unlicensed pioneers, for QSO nets, this tradition has continued ever since.

The occasional aeronautical users, with their much higher radiated power, probably see this as a minor irritation: coping with QRM/QRN, fading, etc. is routine and they are proficient at managing this. However, far more serious, due to their high power and tenacity, is the use of aeronautical frequencies by numbers stations, five of which regularly use this 100kHz segment at present: E10, E15, E9, M17 and M3.

E9 for example plays Jean Michel Jarre music on 6.645MHz followed by a female voice announcing "Forty-four D" and up to half an hour of 5-figure groups, finally ending with the music again. Countless examples of numbers stations using frequencies outside the fixed allocations exist, some of them running schedules for years on end.

In the 70s, the most bizarre of all these stations popped up every weekend on 6.425//6.650 playing *Tyrolean* yodelling songs and reading out cryptic phrases (of which more in a future column). What was done to close it down, or even move it? Nothing - it continues for several years unmolested until its mission was accomplished.

Numbers stations and their like are without doubt the only transmissions to enjoy supra-legal status. This reflects their supreme importance, a fact which has been neglected by s.w.l.s for too long!

Nor are the broadcast bands immune from incursions. Regular users of these bands include **G2** (Swedish Rhapsody - 6.200, 7.250, 7.315 & 9.457MHz), **E10** (Mossad), **M3**, **G16** (12.092MHz), **E3** (Lincolnshire Poacher) 12.603MHz. These are just a few which come to mind. Occasionally, a Russian family member may encroach into a broadcast band but, considering their massive traffic output, they are pretty well behaved on the whole.

Maritime bands are also habitually used by Numbers stations, e.g. MI6's Lincolnshire Poacher on 8.464. Surprisingly, it is the amateur bands which are least affected by invaders of this kind - the most notable and consistent being the SLTs (single letter transmissions - **MXC**) in the 40m band.

Many SLTs operate in, what we call, cluster bands. One can be found around 7.039MHz, a narrow band containing four SLTs sending continuously their respective letters: C, S, F and P. We'll have more to say about these.

Another regular is the numbers station **E15**, which can be heard daily on 14.000MHz at 1400 and 1700UTC u.s.b. (call: FYP) sending its 5-letter messages in an archaic phonetic alphabet. Perhaps the agencies reluctance to place their outgoing transmissions amongst the amateurs was an attempt (before the rise in 'utility' s.w.l.ing) to avoid the inevitable curiosity that would result. Amateurs may have begin to feel unjustly fettered by their licence conditions, in sharing their jealousy guarded frequencies with these outlaws - true pirates of the airwaves.

Faders

Perhaps most of all, it is the mysterious 'faders' (**XF**) which flout the spirit of the ITU. An enigma since the early 70s at least, they litter the lower h.f. spectrum, however, the uninitiated mind tends to filter them out as a species of QRM. By monitoring the frequencies listed in **Table 1**, (there are more) and seeking a common signal, you'll learn to recognise their unmistakable sound.

They tend to 'fade' from a high to low level in a matter of seconds - a harsh rasping sound, not unlike a passing motorbike! All 'traffic' is sent in bursts of precisely 7.5s at 7.5, 15, 22.5, 30, 37.5, 45, 52.5 and 00s past the minute. Bursts can vary from 7.5s to up to 15min. The 'fading' element can occur at any 7.5s point - with the signal varying from high to low or going off-air only to return without warning.

Transmissions always follow precise clock time, i.e. any given burst is always correctly positioned within the clock minute. When tuning across the bands, its not unusual to find a dozen or more faders in one sweep.

It is believed that the apparently complex signal consists of f.m. subcarriers spaced irregularly at 500, 1100, 1400, 2000, 2600 and 3400Hz. It is almost certainly the case that a single organisation is responsible for this unique mode and the numerous transmitters involved, and we'd be very interested to learn more.

What is the mode? What organisation/countries are involved? Where are all those transmitters?...and most of all, what is their purpose?

M23 Breaks The Monotony Record?

In the last 'Attention 1, 2, 3!' we spoke a little about schedules. Some are very short lived, others, very long lasting, may send thousands of different messages in their lifetime. However, there's one we know of which has operated twice daily for over a year without sending a single message.

This honour belongs to **M23**, the Chameleon station - so-called due to its bewildering and irrational variations in format. Whatever camouflage it adopts, we've always seen through its disguises.

The particular schedule concerned operates daily at 0800 & 1400UTC on 8.307//9.285MHz (in parallel) and, since it started in February 1997 has only sent its 'ID' repeatedly for 10 minutes before closing down. This pattern relates to its odd/even style (it has several others).

By this we mean that when the ID is made up of odd numbers, it acts as a null message indicator, e.g. 579, 197, etc. - no message will follow. Alternatively, an ID of even numbers, 268, 808 and so on, warns the recipient to stay tuned and prepare to copy down the 5-figure message to follow.

This schedule always uses the same SN, 579. Others may not; they may use 373 one day, 791 another, etc., although all part of the same schedule. One day this agent may have to get out pen and paper!

Letters

Thanks to all of you who wrote in. It's good to hear that you are actually finding the stations we mention - and more besides. **J. Mac** (Hereford): The male voice you heard calling in English '948 949 948 1' followed by 5-figure message on 9 Feb. '98 at 2120UTC , 5.447MHz a.m., was **E7**, part of a large family of Russian stations which transmit regular schedules in Morse **(M12)**, Russian **(S7)**, English, German **(G7)** and Spanish **(V7)**.

'948' is the schedule number and the '1' refers to the number of messages; a 3 or 4-figure DK and GC follow before the message, which ends as you say with '000 (pause) 000'. On the same day at 2130 you reported an English female repeating '82474' on 4.740MHz a.m. This is **E1**, 'Ready! Ready!' (actually she does finish with 'End'. Uses regular schedules along with its busier Morse counterpart, **M17**. A composite (non-random) header is used, the '82' part being the schedule number.

PW (Salop) asks about the 5-letter transmissions on 3.840 (and numerous other frequencies) - these are **E10** run by Mossad (jointly with S. Africa?) who have transmitters all over the world, which can be heard at all times of the day.

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

Maritime Beacons

Particularly good conditions were observed after dark by **Peter Rycraft** (Wickham Market) at the end of February and beginning of March. He logged eight beacons which are fairly 'rare' for him (CV **287.5**; OM **288.0**; ZB **289.0**; BS **290.0**; LC **291.9**; FV **303.0**; IA **303.5**; HO **312.0**) in addition to many others.

Several beacons on the coast of Greenland and Iceland were received at night by **Robert Connolly** in Kilkeel. He also heard two on the Canaries (LT **291.9**, NA **291.9**) and many more in other areas - see chart. Beacons in far away places were also heard at night by **John Eaton** in Woking. They included Italy (VN **284.5**); Portugal (CV **287.5**); Spain (SN **291.0**, VI **290.5**); France (FT **285.5**); also the Faeroe Is (NL **404.0**).

In Whitstable, **Eric Tubman** tried searching the band after midnight and he was rewarded by hearing additional beacons. During the evening **Brian Keyte** (Gt.Bookham) logged two in Poland (JA **295.5**, H **306.5**) for the first time. He added five in Norway to his list but all of the Swedish beacons which he had heard previously were noticeably absent.

Other activities prevented **Ross Workman** (Shoreham-by-Sea) from searching the band very often but he did receive at night the sky waves from beacons along the coast of Spain (MA **284.5**, MY **303.0**, PA **313.0**); France (FT **286.5**, YE **303.0**); also the Faeroe Is (NL **404.0**). During daylight he picked up the ground waves from 20 others.

Along on the Isle of Wight **George Millmore** (Wootton) logged during daylight 18 beacons on both shores of the English Channel and one on the Isles of Scilly. Reception at night was marred by electrical interference and only the beacons at St.Catherines Lt (CP) **293.0** and Portland Bill (PB) **309.5** were audible. Some success in reducing the detrimental effects of local electrical interference was achieved by **Dave Clench** (Worcester Park) by powering his active antenna and Target HF3 receiver from batteries.

An interesting list of 41 beacons was compiled by **Albert Moore** in Douglas, IoM - all were received during daylight except for two (YM **288.5**, JA **295.5**) which were heard during the evening. The new, fourth edition of Robert Connolly's popular guide to the LW Marine and Aero radiobeacons in Europe (Arctic to North Africa) is now avaiable. It has 54 comb-bound A4 pages and opens flat. For more information please send an s.a.e. to Robert via me.

LONG WAVE MARITIME RADIOBEACON CHART

Freq (kHz)	C/S	Station Name	Location	DXer
215.0	EM	Egedsminde	Greenland	B*
284.0	VN	Capo Vaticano	S.Italy	C*
284.5	LZ	Lizard Lt	S.Cornwall	A,B,C,D,E,F,G,H*,J,K*,M,O,P
284.5	MA	Cabo Machichaco	NE Spain	A*,B,D*,E*,I*,J*,K*,M*,O,P*
285.0	NP	Nieupoort W.Pier	Belgium	B*,D,E,K*,M
286.0	TR	Tuskar Rock Lt	Co.Wexford	B,C,D,E,F,G,I*,J,K*,L,M,O
286.5	BC	Baily Lt	Co.Dublin	B
286.5	FI	Cala Figuera	Majorca	B*,D*,J*,K*,N*
286.5	FT	Cap Ferret Lt	SW.France	B,C*,D,E,J*,K,M*,O*,P*
287.3	HA	Haifa Lt	Israel	B*
287.3	IB	I.Berlenga	Portugal	K*
287.3	MD	Cabo Mondego	Portugal	B
287.5	CV	Cabo Carvoeiro Lt	Portugal	C*,K*
287.5	DO	Rosedo Lt	France	K*
287.5	FR	Faerder Lt	Norway	B*,J*,K*
287.5	MD	Cabo Mondego	Portugal	K*
288.0	HH	Hoek van Holland	Holland	B,K*
288.0	KL	Skiinna Lt	Norway	B*,E*,J*,K*
288.0	OH	Old Hd of Kinsale	Co.Cork	B*,E,G,J,L
288.0	OM	Helnes Lt	Norway	K*
288.5	CT	Pt de Combrit Lt	France	K*
288.5	FI	Cabo Finisterre Lt	N.W Spain	B,D*,E*,K*
288.5	UD	Cabo Salou	S.Spain	K*
288.5	YM	Ijmuiden Lt	Holland	A,B,D,E,G*,K*,M,O,N
289.0	BL	Butt of Lewis Lt	Is of Lewis	A,J
289.0	BY	Baily Lt	Co.Dublin	B,E*,G,K*,L
289.0	ZB	Zeebrugge Westdam	Belgium	K*
289.5	KY	Oksoy Lt	Norway	E
289.5	MN	Hammerodde	Denmark	B*,E*,J*
289.5	NP	Punta Carena	Italy	B*
289.5	SN	Ile de Sein NW Lt	France	B*,D,E,J*,K*,M
290.0	AV	Aveiro	Portugal	B*
290.0	BS	Port en Bessin Lt	France	K*
290.0	MR	Montedor	Portugal	B*
290.5	DY	Duncansby Hd Lt	NE.Scotland	B,E
290.5	SB	S.Bishop Lt	Pembroke	A,B,C*,D,E,F,G,H*,I*,J,K*,L*,M,O,N*
290.5	VI	Cabo Villano Lt	N.Spain	B,C*,I*,K*
290.5	VY	Visby	Sweden	D*,K*
291.0	SM	Pt. St.Mathieu	France	A,C,D,E,F,G,H*,I*,J,K*,M,O,P
291.0	SN	Cabo San Sebastian	S.Spain	B*,C
291.5	SU	South Rock LV	Co.Down	B,D,E,G,I*,J,K*,M,O
291.9	LC	Leca	Portugal	K*
291.9	LT	La Isleta	Canaries	B*
291.9	NA	Punta Lantailla	Canaries	B*
291.9	RN	Reykjanes Lt	Iceland	L
292.0	MH	Mahon, Minorca	Balearic Is	B*
292.0	SJ	Souter Lt	Sunderland	B,D,E,G,I*,J,K*,M,O
292.0	TO	Torungen Lt	Norway	E*
293.0	CP	St.Cathenne's Lt	I.O.W.	A,B,C*,D,E,F,G,H*,I*,K*,M,N,O,P
293.0	RN	Rhinns of Islay Lt	Is of Islay	B,G,J,L
293.0	SY	Svinoy Lt	Norway	B*,K*
293.5	RO	Cabo Silleiro Lt	N.Spain	B*,K*
294.0	KU	Kullen High Lt	Sweden	B*,K*
294.0	PH	Cap d'Alprech	France	A,B,C,D,E,F,G,H*,I*,J*,K*,M,N,O,P
294.5	BA	#Black Hd Lt	N.Ireland	B
294.5	FP	#Lynmouth F'Ind Lt	N.Devon	E
294.5	KA	Kaybolovo Lt	Estonia	B*
294.5	PS	#Pt.Lynas Lt	Anglesey	B,D,E*,J,L,M
294.5	PT	#Souter Lt	Durham	D,E
294.6	NO	Cabo de la Nao	Spain	B*
295.0	DV	Djupivogur	Iceland	B*
295.0	SN	Sletnes Lt	Norway	B*,K*
295.5	CB	La Corbiere Lt	Jersey C.I.	A*,B,D,E,G,H*,K*,M,O,P
295.5	CR	Cap Couronne	France	K*
295.5	JA	Jaroslawiec	Poland	B,E*,G*,I*,J*
295.5	RE	La Rochelle	France	B
296.0	BH	Blavandshuk Lt	Denmark	J*
296.0	GR	Goeree Lt	Holland	D,E,G,K*,M,O
296.0	KN	Skrova Lt	Norway	B*,E*,J
297.0	FG	Pt de Barfleur Lt	France	A,B*,C*,D,E,F,G,H*,I*,J,K*,M,N,O,P
297.5	MA	Mantyluoto	Finland	B*
297.5	PS	Cabo Penas Lt	N.Spain	B,J*,K*
298.0	GX	Ile de Groix	France	B*,E,G,J*,K*,M,O,P
298.0	TA	Cabo Gata	S.Spain	B*,K*
298.5	RR	Round Is Lt	Is Scilly	ABC*,D,E,F,G,H*,I*,J,K*,L,M,N*,O,P
298.5	SW	Skagen	Denmark	B
299.0	AD	Ameland Lt	Holland	B,E,K*
299.0	BN	Les Baleines	W.France	B*,E,H*,K*
299.0	O	Tarifa	S.Spain	B*
299.5	NP	Nash Pt Lt	S.Wales	B,C*,D,E,F,G,K*,M,O,P
299.5	SK	Skomvaer Lt, Rost	Norway	B*,J*
299.5	VR	Utvaer Lt	Norway	B*,J*,K*
300.0	CL	Cloch Pt Lt	W.Scotland	B*
300.0	MZ	Mizen Head	Co.Cork	B,E,G,H*,J*,K*,O
300.0	TI	Cap d'Antifer Lt	N.France	F,H*,K*
300.5	DU	Dungeness Lt	Kent	A,C,D,E,F,G,H*,I*,K*,M,N,O,P
300.5	KS	M.Kanin	Artic Russ	B*
300.5	LA	Lista	Norway	B*,E,G,I*,J*,K*,O*
301.0	CA	Pt de Creach	France	A*,B,E,F,G,H*,J,M,O,P
301.0	ER	Eierland Lt	Holland	B,K*
301.5	KD	Kinnards Hd Lt	NE.Scotland	B*,D,E,J
301.5	L	Torre de Hercules	N.Spain	B*,E*,J*,K*
302.0	RB	Cherbourg Ft W Lt	France	A,B,C,D,E,F,G,H*,J,K*,M,O,P
303.0	D	Rota	SW.Spain	B*
303.0	FB	Flamborough Hd Lt	Yorkshire	B,D,E,G,I*,J,K*,M,N,O,P
303.0	FV	Falsterborev Lt	Sweden	K*
303.0	MY	Cabo Mayor Lt	N.Spain	A*,B*,E*,H*,O,P*
303.0	YE	Ile d'Yeu Main Lt	W.France	A,B*,E,H*,K*,P*
303.4	VC	Cape St.Vincent	Portugal	K*
303.5	BJ	Bjomsund Lt	Norway	B,D*,E,J*,N*,O
303.5	FN	Feistein Lt	Norway	C,E,K*
303.5	GR	Gedser	Denmark	E,L*
303.5	IA	Llanes Lt	N.Spain	B*,K*
303.5	OR	Punta de Llobregat	S.Spain	B*
303.5	VL	Vlieland Lt	Holland	B*,K*
304.0	BR	Cap Bear	France	B*
304.0	PS	Pt Lynas Lt	Anglesey	B,D,E,G,I*,J,K*,L,M,N*,O
304.0	SB	Sumburgh Hd Lt	Shetland Is	B*
305.0	FP	Fife Ness Lt	SE.Scotland	B,D,E,G,J,O
305.0	GL	Ile de Giraglia Lt	Corsica	L
305.5	AL	Pt d'Ailly Lt	France	A,B,C*,D,E,F,G,H*,I*,J,K*,M,N,O,P
305.7	DA	Dalatangi Lt	Iceland	B*,E*,J*
306.0	FN	Walney Is Lt	Off Lancs	B,D,E,I*,J,K*,M,O
306.5	H	Hel Lt	Poland	B*,E
306.5	KL	Kolkasrags	Latvia	B*
306.5	UT	Utsira	Norway	B*,D,E,G,I*,J,K*,N*,O
307.0	GL	Eagle Is Lt	Co.Mayo	B,G,I*,J,K*,L
307.5	RS	Ristna	Estonia	B*,D*,E,G,I*,J*,M*,N*,O
308.0	GR	Gnmsey	Iceland	L*
308.0	PI	Cabo Espichel	Portugal	B*
308.0	RC	Cabo Roca	Portugal	B
308.0	RD	Roches Douvres Lt	France	C*,G,K*
308.5	NZ	St Nazaire	France	B*,D,E,K*
309.5	AL	Algiers	Algeria	B*
309.5	BA	Punta Estaca Bares	N.Spain	A*,B*,G,I*,J*,K*
309.5	MA	Marstein Lt	Norway	B*,E*,G,J*,K*
309.5	PB	Portland Bill Lt	Dorset	A,B*,C*,D,E,F,G,H*,I*,J*,K*,M,N,O,P
310.0	ER	Pt de Ver Lt	N.France	B*,C*,E,F,H*,K*,M,P
310.5	AS	Castellon	Spain	B*
310.5	BO	Bokfjord Lt	Norway	B*
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310.5	GV	Genova	Italy	B*
310.5	RO	Rozewie	Poland	B*
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311.0	NF	N.Foreland Lt	Kent	A,B*,C*,D,E,G,I*,K*,M,N,O,P
311.5	LP	Loop Hd Lt	Co.Clare	B,G,J*
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312.0	HO	Tennholmen Lt	Norway	K*
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312.0	SP	Cap Spartel	Morocco	B*
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312.5	AK	Akmenrags	Latvia	B*,J*
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313.0	TY	Tory Is Lt	Co.Donegal	B,G,I*,J,L
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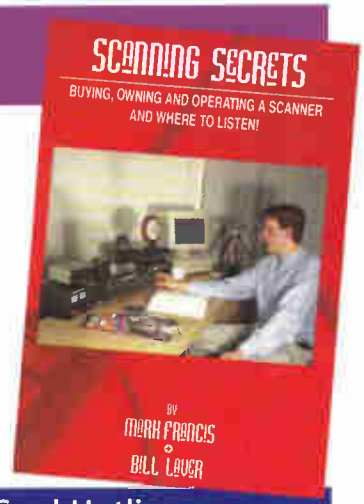

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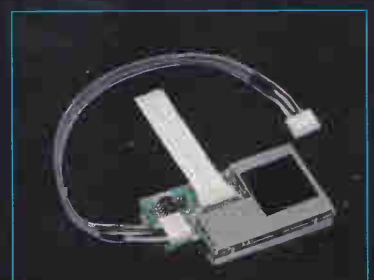

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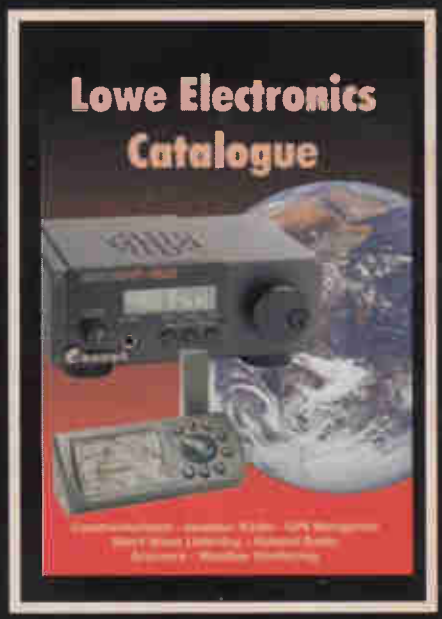

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