John Wilson on Filters in Receivers

MFJ-784B Digital Signal Processing Filter Reviewed

Build a Signal Processor

Sony ICF-SW1000T Reviewed

COMPETITION - WIN an AOR AR7030 Communications Receiver
UBC860XLT

A stylish designer base station scanner which offers 100 memory channels and a 12 band coverage including 800MHz. Features Uniden's patented TWIN TURBO scan and search facility. The BC860XLT represents the best value for money in the home base scanner market - covering all of the most popular bands including the Amateur VHF and UHF bands, Civilian Airband, Marine & PMR, plus the high UHF 800MHz band.

Features include manual keyboard entry with auto track tuning and a unique data skip option for bypassing unwanted data transmissions. It also helps to reduce birdies!

- Full frequency LCD display
- Programmable delay
- 10 priority channels
- Automatic squelch
- 3-day memory backup
- Channel lock-out and priority
- Frequency coverage: 66-88, 108-174, 406-512, 806-956 MHz
- Scan/Search speed: Max 100 channels per sec (300 ch with Turbo on)

Power requirements: 12V DC & supplied 240V AC multi adapter

Price £139.00

UBC65XLT

The new UBC 65 XLT offers outstanding value for money with 10 memory channels and wide frequency coverage. It will prove especially popular for Amateur radio, Ship to Shore, Land Mobile and Public Service coverage.

Features include:
- 10 channels, 8 band coverage, 2 digit LCD display, memory backup, keyboard lock switch and channel lockout and battery low indicator.
- Accessories included: charger and earphone.

Freqency coverage: 66 - 88, 137 - 174, 406 - 512 MHz. Scan speed: 10 channels per second.

Required: 5 x AA Nicads or 12 VDC adaptor

Price £95.95

Available from Nevada dealers throughout the UK or direct from:

NEVADA

UBC 3000XLT

A superior 400 channel handheld from the Uniden stable, offering a near continuous coverage from 25-550MHz and 760-1300MHz. Reception modes include AM, FM and Wide FM, user selectable (FM & WFM only on the upper bands). Automatic search, priority channel and selective scan delay. Turbo scan/search facility offers 300 channels per second in search mode and 100 channels per second in normal mode. With a switchable delay of approximately 2 seconds. Backlight LCD display and fully functional keypad for direct frequency entry.

Accessories included:
- belt-clip
- earphone case
- flexible antenna

with 240V AC adapter/charger.

Price £249.95

NEW!

High Quality Scanners .... at prices you can afford
UBC9000XLT

A new 500 channel base station model covering 25MHz to 1.3GHz in two continuous bands (25-550MHz and 760-1300MHz). Featuring Twin Turbo scan & search modes with 10 user definable priority channels. Easy to read large LCD display and manual tuner together with direct frequency keypad make up a very professional front panel. User selectable modes covering AM, FM and Wide FM modes. Selectable receiver attenuator, delay and data options are available direct from the keyboard. For unattended operation the 9000XLT has an automatic tape recorder ON/OFF and tape output feature! Accessories included: AC mains power adapter, telescopic antenna and owners manual.

Price £325.00

UBC220XLT

The UBC 220 XLT is an easy to use scanner with 200 memory channels. Includes 10 band coverage, automatic search, priority channel and selective scan delay. Display light, automatic lockout and direct channel access. Also includes Belt clip, earphone case and flexible antenna accessories. Frequency coverage: 66 - 88, 108 - 174, 406 - 512, 806 - 956 MHz. Scan speed 100 channels per second scanning and 25 frequencies per second in search mode.

Price £189.95

UBC120XLT

Handheld

A new compact designed handheld featuring Twin Turbo Scan & Search, and a pre-programmed SVC (service) search facility which allows you to toggle the aircraft, marine and other service bands in search mode. For maximum convenience in monitoring, the 120XLT has 100 memories arranged in 10 banks plus 10 priority channels enabling you to keep track of your favourite frequencies. Channel lock-out and unique data skip facility are also included. Full frequency LCD display with direct frequency entry keyboard. Complete with NiCad battery and charger, belt clip, earpiece and rubber duck antenna.


Price £139.00

Europe's Number 1 Supplier

- Retail & Mail Order 01703 662145
- Trade & Export 01703 698113
- Fax 01703 690626
Capture the action!

Scout® Reaction Tune® brings you all the action. Whether it is police, fire, commercial or just everyday communications monitoring, the Scout will bring you closer to the action. The Scout will not only capture the frequency, but it automatically tunes the receiver to that frequency at the same time. (see receivers appl. below). Let the Scout Reaction Tune your way into the world of communications.

FEATURES
- Records up to 400 unique frequencies in memory.
- Records up to 255 hits on each frequency in memory.
- 10MHz - 1.4GHz single frequency range.
- Records frequencies automatically with Patented Digital Auto Filter & Digital Auto Capture.
- All frequencies are automatically saved until deleted.
- Interface to a PC with the optional OPTOLINX or CX12AR for data download.
- Custom 10 digit LCD display with automatic EL backlighting.
- 16 segment RF signal strength bargraph.
- Pager style vibrator for discreet recording. Distinctive beeper indicates frequency detection.
- Rapid charge NiCads with AC charger supplied; 2 hour recharge and 8-10 hour battery discharge.

FEATURES (continued)
- Operating Time: 8 - 10 hours
- Power: 2VDC 1 Amp wall plug adapter for rapid charging. 6VDC 130mA minimum operating power required. AC90 adapter supplied.

SPECs
- Frequency Range: 10MHz - 1.4GHz
- Input Amplifier: 50 Ohm vswr <2:1
- Sensitivity: 1mV 30MHz - 900MHz
- Maximum Input: +15dBM, 50 milliwatts
- Display: 10 digit LCD with backlight

Using the optional $AC8000 is a snap - Just plug and play. $AC8000 includes cable, back panel with slot, and velcro attachments.

Factory Direct Order Line: 1-800-327-5912

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Tel: (01702) 206835 Fax: (01702) 205843
Cover Subject
Filters, filters, filters......

Photo: Tex Swann

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Disclaimer. Short Wave Magazine wishes in no way to either condone, or encourage, listeners to monitor frequencies and services which are prohibited by law. We respectfully refer you all to both the Wireless Telegraphy Act 1949, and the Interception of Communications Act 1985. Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. Short Wave Magazine advises readers contemplating mail order to ensure whether the products are suitable for use in the UK and have full after-sales back-up available. The Publishers of Short Wave Magazine wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.
EDITORIAL

Waveguide

The BBC World Service announced recently that their long-running and popular Waveguide programme was to finish at the end of March this year after a run of 16 years. This will leave the BBC as the only major international broadcaster without a regular programme for the DXer. One of the reasons given for the decision was the lack of any ten minute slots in the new broadcasting schedules.

World Service has announced that there will be an eight-part series giving basic listening advice to be aired in the coming autumn. Informed sources have indicated that it is hoped to give airtime to a new media programme from April next year, but this is not yet certain.

A lot of disappointed listeners have already expressed their reactions to World Service. If you also, feel strongly about this ill-conceived decision, write to World Service to express your views.

Address your letters to: Audience Correspondence, BBC World Service, Bush House, London WC2B 4PH.

Translating Manuals

While reading the instruction manual for the Sony ICF-SW1000T, reviewed by Peter Shore in this issue, my eyes alighted upon an intriguing section headed To fall asleep while listening to the desired broadcast - Sleep timer. I find that I don't need a 'sleep timer' to get this effect - what I really need is something that will keep me awake! An 'Awake timer', perhaps? I wonder if the other language translations from the original Japanese manual offer such gems?

Dick Ganderton G8VFH

LETTERS

IF YOU HAVE ANY POINTS OF VIEW THAT YOU WANT TO AIR PLEASE WRITE TO THE EDITOR. IF YOUR LETTER US PUBLISHED YOU WILL RECEIVE A £5 VOUCHER TO SPEND ON ANY SWM SERVICE

Dear Sir

Whilst I look forward to your excellent magazine every month, I was wondering why you have never run an article on the maintenance and restoration of the Racal RA1?. I have often seen these sets at radio rallies and some are working and some do not and I have been very tempted to purchase one, but as my knowledge of electronics is limited, I am quite wary about doing so.

Would it be too much for me to hope that you could run an article on this most excellent set which is idea for those starting out as short wave listeners as you did for the AR88 and the R1155?

Alan Dry

Bransholme Hull

Dear Sir

I refer to the letter from G. Fry of Freshwater, Isle of Wight (Feb. issue) regarding leaking batteries as I too, have experienced the same problem on two occasions. He asks why they wished to examine/repair his sets - I will tell him.

The defective batteries leak an alkaline electrolyte which is highly corrosive and while the set may be working fine now, he may find that at some time in the future they will fail due to corrosion caused by the leaking electrolyte finding its way into the innards of his sets.

I can vouch for the corrosive nature of this electrolyte from the damage caused to my slate chimney breas and polished wood gas fire. Repairs cost £175, which amount was paid by the battery manufacturers promptly and without demur and the defective batteries were replaced threefold.

J. A. Senior G7RXS

Enderby

Leicester

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.
Dear Sir
I was recently fortunate enough to have been given an Amiga 500 computer together with hard-drive, monitor, colour printer etc. Prior to this, I purchased an AR3000A communications receiver, which as you will be aware, is computer controllable. Following a telephone conversation with AOR (UK) Ltd., it became apparent that there is no "commercially available" software compatible with the Amiga 500 or any other Amiga for that matter.

As a regular reader of SWM, I have noticed that computer related articles have been causing quite a stir during the closing months of 1995 and although I am by no means 'computer orientated' I would cherish the thought of being able to combine technology with excellence, or convenience with pleasure.

May I request through your magazine for owners or previous owners of the AR3000A who have used this receiver in conjunction with the Amiga to pass on the relevant information which would enable others like myself to enjoy this hobby to its fullest.

May I also point out that I have written to you previously on the subject of 'musical discines' and to my knowledge the response was overwhelming as I recall, prompting a reply from New Zealand, which I noted several issues later.

'Now, let me take this opportunity to wish you and all the staff at SWM best wishes and say that I am continuually looking forward to yet another issue of SWM.

A. S. Webb
Gwent

This is the sort of problem that the new 'ShackWare' column will be addressing - Ed.

Dear Sir
My interest in radio started during World War II when I was a W0p/Air in the Royal Air Force using the TR154 and the R1155. I am now in my 70s and retired and so I have more time to enjoy radio as a hobby and it was with great interest I followed the correspondence on the pros and cons of having a computer column in SWM.

Unlike today's youngsters who are taught all about computers at school, I have very little knowledge of what they are capable of doing and was delighted to read your editorial in the February SWM that you have decided to include in SWM a new 'ShackWare' column. Having read Jerry Glennright's article I was very impressed with his approach to the subject and felt sure that his articles would be of great help in enabling me to increase my enjoyment of radio by being able to understand and use a computer in radio.

However, I am disappointed in contact me either by phone or letter and we can take it from there. After getting a compact/portable receiver, the next stage, I've found, is to tweak it to improve reception. How about some articles on a.t.u.s and hallus, comparative tests of the various makes and performance ratings a la Passport To World Band Radio (e.g. Shenni, Global, Howes). The worst thing about SWM is having to wait a month for the next issue! Meanwhile, my sincere appreciation for a really terrific publication. Congratulations and happy listening.

Stan Watkins
7 Carlisle Road
Brondesbury
London NW6 6TL
Tel: 0181-723 5781

We are pleased to announce the results of the Christmas competition.

The main prize of a Sangean ATS 818 portable short wave receiver kindly donated by Nevada Communications is winging its way to Martin Tiller of Bristol.

The three runners-up who receive a years subscription to SWM are A. J. Builder of Sondhosp, R. Bliss of Poole and D. Arman of Greenford. Congratulations to the successful entrants.

If you want to try your luck again, don't miss the competition to win an AOR AR7030 starting in this issue.
**rallies**

*March 31*: The Magnum Radio & Computer Rally will be held at the Carnival Centre, Harrow, Middlesex, open to the public from 11am. Organised by Cunningham & Boddie, the rally will feature a lively and enthusiastic crowd, all eager to learn more about the latest technology. There will be refreshments and a bar available. Admission is £5 for adults, £3 for children, and £1 for under 14s. Entry is only permitted to one level. Visitors can find a range of retailers, accessory suppliers, antenna suppliers, a Bring & Buy stall, and more. More information can be obtained from HD Promotions on (01949) 450504.

April 5: The Banger & District Amateur Radio Society will be hosting a talk by Rob Mannon (G3DFX), Editor of Practical Electronics & Technology in Exhibition Hall, Wetherby. It will commence at 8pm and all are welcome. The talk will be held in the Hotel Promotions on (01494) 450504. & Buy stall, etc. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

April 7: The Feltham and Hounslow Sea Cadets are holding their Computer and Radio Rally at Feltham and Hounslow Hotel Promotions on (01494) 450504. & Buy stall, etc. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

April 14: The Cambridgeshire Radio Group annual rally will be held at the University of Cambridge, St Andrews Road, Cambridge. The event will feature an auction sale, trade stands, Bring & Buy and a car boot trading area. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

April 14: Bury Radio Society Annual Rally will be held at the Cambridge College, Whittigham Road, Bury. Doors open at 11am and 10.30am for disabled visitors. More information can be obtained from Roy G OVE on (01541) 466482. A car boot trading area. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

April 14: The Swansea Amateur Radio Society are holding their Amateur Radio & Computer Show at the Swansea Leisure Centre. Doors open 10.30am to 5pm. Entrance fee for adults is £2, OAPs £1 and children under 14 free. There will be a wide range of new and second user goods, accessories, electronic components, multimedia, CDs, software, accessories, consumables, etc., there will also be a Bring & Buy, Sharward Promotions, Upland Centre, 2 Broadway, Whitchurch, Cardiff, G3XZO. Talk on in S22.

April 14: 10th Amateur Radio Rally is being held at the Laurencet College. There will be well-known traders, Bring & Buy, Morse test on demand (bring two passport photos and 50p) and hot snacks. Talk on in S22. Further details from Roger (GW4HSH) on (01795) 404422.

April 21: Lough Erne Amateur Radio Club will be holding their 15th rally at the Killykeen Hotel, Enniskillen at 12 noon. Attractions will include Icon & Alnico trade stands, the usual Bring & Buy, etc. Contact Kieran on (03853) 373133 (evening) or 07599 762222.

April 21: The White Rose Amateur Radio Society (PO Box 73, Leeds LS1 5AR) are holding their 29th Annual Radio, Electronics & Computer Rally at the Leeds & Yorkshire Sports & Leisure Centre (new venue). Doors open at 11am (10.15am for disabled visitors). For refreshments, please look for a sign. Parking available, opposite the venue. Further information can be obtained from Terry GLEGS on (01274) 742798.

April 27: The Feltman and Hounslow Sea Cadets are holding their Computer and Radio Rally at Feltham and Hounslow Hotel Promotions on (01494) 450504. & Buy stall, etc. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

April 28: The Feltman and Hounslow Sea Cadets are holding their Computer and Radio Rally at Feltham and Hounslow Hotel Promotions on (01494) 450504. & Buy stall, etc. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

April 29: The Feltman and Hounslow Sea Cadets are holding their Computer and Radio Rally at Feltham and Hounslow Hotel Promotions on (01494) 450504. & Buy stall, etc. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

April 30: The Feltman and Hounslow Sea Cadets are holding their Computer and Radio Rally at Feltham and Hounslow Hotel Promotions on (01494) 450504. & Buy stall, etc. More information can be obtained from Paul Dyke (GOLUC) on (01920) 821536.

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Have you ever fancied being a radio presenter? Well, I’ve heard of an unusual opportunity with a radio station called Splash FM. Between May 4 and 27, Splash FM will be on the air from the Bedford River Festival, with all proceeds going towards vital equipment for Hospital Radio Bedford. The frequency to keep an ear out on is 107MHz FM. The station is looking for presenters, fund raisers and advertisers, so if you are interested contact: Splash FM, c/o Hospital Radio Bedford, Bedford Hospital South Wing, Kempston Road, Bedford MK42 9DJ. Tel: (01234) 792272. Let me know if you hear the station broadcasting.

RCI Fights On

Radio Canada International (or RCI) is a very popular station with newcomers. Usually easy to receive, they have a wide range of programmes on offer and have sent out many attractive QSL cards over the years. Like many large international broadcasters, they have been under threat of closure due to financial pressure from their government. RCI are still fighting to prevent the station closing and have said how helpful the response from listeners has been. With a new Heritage Minister, the ‘Coalition to Restore Full RCI Funding’ group hopes that renewed pressure from listeners will aid their cause further. They want listeners to continue writing saying how much they enjoy RCI programmes, how effective their voice is internationally or how much you’ve learned about Canada from the programmes you’ve heard. If you would like to add your voice to those who’ve already written, then you can address your letter to The Right Hon. Jean Chretien, Prime Minister of Canada or The Hon. Sheila Copps, Heritage Minister. The address for both is Ottawa, Canada, K1A 0A6. It would be a huge shame if such an important international broadcaster were closed down just to save a government some money. Who knows how many other stations would follow?

Marine Radio Book

Listening to the radio traffic going on around the coast of the UK is very popular with short wave listeners. If you live near the coast, or have the opportunity to take your radio with you when visiting the coast then you can listen to a whole range of different signals - if you know where to look. I’ve been loaned a copy of Ship to Shore Radio Frequencies by Ken Davies to read and although it is written for the boating enthusiast as a radio guide book, it has got possibilities for the listener too. Unless you are likely to take your boat out into the coastal waters, then knowing the Southampton telephone number for weather forecasts won’t be of much use to the listener. But the VHF channel numbers for the Portland and Solent Coastguard is. So are the frequencies for Niten Radio - 2.628MHz as its working channel, and the channel numbers for things like the Lymington Marina (Ch. 80M). There are tables at the end of the book that tell you the frequencies for the various channel numbers (Ch. 80)
Solar Storms Linked To Disruptions On Earth

New findings, beneficial to the telecommunications and power industries in preparing for huge geomagnetic storms, were the topic of a press briefing held February 15, 1996, at NASA’s Jet Propulsion Laboratory (JPL), Pasadena, CA. The briefing was carried live on NASA TV, with two-way question-and-answer capability from participating NASA Centers.

The findings are the result of data from the Japan/U.S. Soft X-Ray & Imaging Telescope on the Yohkoh spacecraft and studies from the power industries. The findings presented at an international gathering of solar physicists, power and utilities representatives and members of the Department of Energy national laboratories, at JPL and sponsored by the American Geophysical Union and the National Science Foundation.

Participants in the briefing were:
- Hugh Hudson, University of Hawaii
- John Kappenman, Minnesota Power
- Douglas Hamilton, University of Maryland
- Bruce Tsurutani, JPL
- Mary Kappenman, National Science Foundation

Among the significant results reported:

- Scientists using data from the Yohkoh satellite have been able to draw a direct link between a dimming process occurring in the Sun’s corona which results in huge flares causing electrified particles to wash over Earth. Scientists predict they can now provide as much as 50 to 70 hours advance warning of these solar storms. That warning can give industries time to prepare vulnerable systems for the solar storm.

- The power industry has been able to directly link major geomagnetic storms with severe disruptions at power plants from Maine to California. This correlation could allow the industry to monitor the beginnings of storms on the Sun and prepare transmitters and power grids for the onset of these storms on Earth.

- Ionised oxygen is the culprit in creating huge energised rings in Earth’s atmosphere just before the onslaught of a geomagnetic storm. Knowing the composition of these highly energised rings is allowing scientists to better understand when they occur in the 11-year solar cycle and to anticipate periods of high energy activity.

- Understanding the nature of very high energy electrons will allow engineers to safeguard future spacecraft in high radiation environments with better protective shielding.

NASA is also a participant in the International Solar-Terrestrial Physics (ISTP) programme, involving a number of satellites which will help scientists better understand the Sun, leading to the ability to predict and provide advance warning of solar storms affecting the Earth. A launch in the series is NASA’s Polar spacecraft was scheduled for February 22.

Radio and TVDX News

The French ‘AB Channel’ 1 now downlinking on Eutelsat II F1 @ 15°E offers a family entertainment format and will during Spring 1996 enter the digital compression domain with at least ten more specialist channels intended for domestic reception (DTH). The Canal Satellite (Canal Plus) and TF1/France TV (HyperTV) programme packages will both be on air during 1996 using Eutelsat capacity. Luxembourg’s CLT have backed away from entering the digital DTH market on their own behalf and are considering joining the Canal Satellite package.

MPEG compression is now used by Sweden’s SVT-2 on the Tele X 5 East satellite, having now ceased analogue transmission - and the 0.6 West TV SAT blew two (out of five) of it’s onboards transponders. TV+ Norde moved to 12.05°G kHz hand circular and Denmark’s Canal 6 has moved onto the more stable Intelsat 702 @ 1°W 11.678°G horizontal.

The EU has loaned its grip on home produced TV material, previously 50% of channel content was European produced, now the directive has been rephrased to encourage use of home grown material wherever possible - enter more US made programmes!

America’s ABC is linking with NBC and News Corporation (Rupert Murdoch) to launch their own 24 hour international news channel, based in New York and to rival the CNNI news channel. ABC argues that CNNI moving ‘to the left’ where-as the new channel will be ‘truly objective’. Rupert has recently gained permission to downlink his own satellite programming into mainland China. The ABC news group hope to be on-air late 1996 - the estimated running costs will be £65 million annually.

Cologne based RTL intends opening an unscrambled German language 24 hour news channel Summer 1996 in conjunction with other German national broadcasters, using RTL’s own public affairs/news unit. Rupert Murdoch’s Star TV operation via the new AsiaSat-2 bird reckon to be on-air with digital programming from early April onwards building up to a 36 digital channel package. Star also open a Philippine based channel package - the first being Viva Cinemal A Japanese language Star programme opens April 1st ($) called Star Plus including music, sports and general entertainment. July sees a 24 hour Bahasa language movie channel open intended for Indonesia. Other regional channels to open are Star Chinese (Taiwan), Star Japanese (Waseda) and a Hong Kong (Cantonese) channel (May), subject to local authority approval.

The Serbo-Croat transponder lease on Eutelsat II F4 @ 1°E (11.178°G Hor.) is being sublet to the UK’s Global Access Telecommunications Services (GATS) for two years offering give GATS pan-European capacity for EBU contribution, news and outside broadcast feeds. GATS also book time on both PanSat and Orion, the former accessing the new Astra-4 68°E bird via the BTI Maritscham site into the GATS Singapore office.

The Malaysian MEASAT-1 is now testing from the 91°E slot having launched successfully January 9 via Ariane. A 20 channel package will open mid July including Star TV, HBO, Discovery, CNNI and several as yet un-named Malaysian channels - transmissions will be in C-Band via 12 transponders and five Ku-Band spot beams centred on Malaysia for digital transmissions using 500m dishes. The Ku beams can be reconfigured to focus into India and the Philippines. MeaSat-2 launches Autumn 1996 and will act as backup to MeaSat-1, loaded with six C-Band and ten Ku-Band spot beams transponders, these capable of alignment onto Vietnam, Indonesia and Southeast Asia.

A new satellite pay-TV sports channel opens September 1, a partnership between Danish Radio (DR), the commercial channel TV-2 and Tele Danmark. Exclusive rights have been signed for national soccer and European Cup matches. Intelsat 1°W will downlink the service via Nordic Satellite Distribution (NSD) who also provide subscriber management services.

A new arrival to Intelsat’s 15°E Hootbird 1 is the Italian 3rd national channel Rai-3 transmitting full time in the clear at 11.530GHz vertical, joining the established Rai-1 and Rai-2 services.

A press release from Intelsat advises that the launch of Intelsat 708 failed seconds after lift-off from the China Great Wall Industry launch site February 14. The satellite, rocket and launch was fully insured. An investigation will attempt to discover the cause of failure - the first major failure for Intelsat in ten years. One report suggests that the Long March rocket launched sideways!
**National Transmitter Scene**

**Television Stations**

**January 8 Tummel Bridge and Carrie, Perthshire**, two new television stations opened after a period of test transmissions.

Provided jointly by the BBC and NTL on behalf of the ITC, the relay is located on a mast about 1km north of Whaley Bridge. It is designed to bring good television and teletext to an additional 250 people in Canal Street, Bingswood Road, Bridge Street, George Street and Woodbrook areas of Whaley Bridge.

**Station Details**

<table>
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<td>BBC2</td>
<td>27</td>
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<tr>
<td></td>
<td>ITV (Granadian)</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Channel 4</td>
<td>31</td>
</tr>
</tbody>
</table>

**Antenna Group:** C/D

**Polarisation:** Vertical

**ERP:** 1W

**January 12 Whaley Bridge, Derbyshire**, a new television station was opened.

Provided jointly by the BBC and NTL on behalf of the ITC, the relay is located on a mast about 100m south of Whaley Bridge. It is designed to bring good television and teletext to an additional 1000 people in Moss Bank. This includes parts of Scafell Road, Moss Bank Road, Victoria Avenue, Queenway, Kingsway, Afrikaner Road, Bassendean Avenue, Lorton Avenue, Hillrise Avenue, Silverdale Grove, Devoke Avenue, Fell Grove, Buttermere Avenue, Windermere Place, Windermere Avenue, Royd Grove and Corinthian Grove. **Station Details**

<table>
<thead>
<tr>
<th>Channels:</th>
<th>BBC1 (North West)</th>
<th>39</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BBC2</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>ITV (Granadian)</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Channel 4</td>
<td>52</td>
</tr>
</tbody>
</table>

**Polarisation:** Vertical

**Antenna Group:** A

**ERP:** 1.25W

**January 18 Blackburn, Rotherham**, a new television station was opened.

Provided jointly by the BBC and NTL on behalf of the ITC, the relay is located on a mast about 100m north of Whaley Bridge. It is designed to bring good television and teletext to an additional 470 people in Lochportain, Blashaval and Chees Bay on North Uist; and to Borve and Bays Loch areas of Bemeray. **Station Details**

<table>
<thead>
<tr>
<th>Channels:</th>
<th>BBC1 (Scotland)</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BBC2</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>ITV (Granadian)</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Channel 4</td>
<td>52</td>
</tr>
</tbody>
</table>

**Antenna Group:** A

**Polarisation:** Horizontal and Vertical

**ERP:** 2W

**November 28 Nantyglo, Gwent**, a new television station was opened after a period of test transmissions.

The station has been built jointly by NTL on behalf of the ITC and the BBC, the relay is designed to bring the possibility of improved reception to about 300 people in a small area around the recreation ground in Nantyglo. **Station Details**

<table>
<thead>
<tr>
<th>Channels:</th>
<th>BBC1 (Scotland)</th>
<th>57</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BBC2</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>ITV (Granadian)</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Channel 4</td>
<td>53</td>
</tr>
</tbody>
</table>

**Polarisation:** Vertical

**Antenna Group:** A

**ERP:** 2W

**February 15 Widecombe in the Moor, Devon**, a new television station was opened.

Provided jointly by NTL on behalf of the ITC and the BBC, the relay is located on a mast about one mile south east of the centre of Widecombe in the Moor. It is designed to bring good television and teletext to an additional 210 people in the village. **Station Details**

<table>
<thead>
<tr>
<th>Channels:</th>
<th>BBC1 (South West)</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BBC2</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>ITV (Westcountry)</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Channel 4</td>
<td>50</td>
</tr>
</tbody>
</table>

**Polarisation:** Horizontal

**Antenna Group:** A

**ERP:** 10W

**New BBC FM Transmitters**

**February 15 Penalltol Downs, Cornwall**, a new station now brings good FM radio reception including stereo, to an area 5000 people in Bodmin, Wadebridge and surrounding area over a radius of about 8km. **Station Details**

<table>
<thead>
<tr>
<th>Channels:</th>
<th>BBC1 (Wales on 1)</th>
<th>57</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BBC2 (Wales on 2)</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>HTV Wales</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>S4C</td>
<td>53</td>
</tr>
</tbody>
</table>

**Polarisation:** Horizontal

**Antenna Group:** C/D

**ERP:** 125mW

**New Distributor**

**Hoka** are expanding the sales network for their range due to the demand for the newly announced 'Coded Gold' product aimed at both the v.h.f. and h.f. datamode enthusiasts. **Multicom** 2000 the St. Neots based company commented, "we are very pleased to include the Hoka range in our portfolio. We see the introduction of the Coded Gold as a very significant move in the high performance decoder market."

**Multicom 2000** can be contacted at Radio House, 37 Cunningham Way, Eaton Socon, St. Neots, Huntingdon, Cambridgeshire PE19 3NJ. Tel/FAX: (01480) 406770.
AOR BLOCKBUSTERS!

You have never heard an AR8000 like the AR8000DX.

Exclusive performance and feature modifications
- Switchable narrow AM filter for DX performance
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- Superior back-up and after sales service

All this for just £409.00 plus £10.00 carriage

PRO44
Wideband scanner
- 40 memories
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- Main pwr & phones
Just £119 + £10 Carr

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Civil and Military
- Full VHF & UHF airband ranges
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- NBFM for marine use
Just £269 + £10 Carr

AR8000
Wideband multimode monitor
- Advanced memory features
- Multifunction display
- Optional computer control
- 1000 memory channels
- 20 search bands
SPECIAL PRICE
Just £349 + £10 Carr

AR2700
Continuous coverage
- 500kHz-1600MHz
- AM/WFM/NBFM
- Optional computer control
- 1000 memories
- Auto mode tuning
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MVT7000
Wide range scanner
- AM/FM/WFM
- 200 memories
- Rotary tuner
- 10 search banks
- Priority channel
Just £289 + £10 Carr

MVT7100
Multimode scanner
- AM/WFM/NBFM
- USB/LSB
- Rotary dial tuning
- Signal strength ind
Just £349 + £10 Carr

SCANNER ANTENNAS
- Watson Regular Gainer £12.95
- Watson Super Gainer £19.95
- LoweScan resonant airband mobile antenna with mag mount base £29.95
- LSA700 Diskine 70-700MHz £39.95
- LSA1300 Diskine 25-1300MHz £59.95
- LSA1500 Vertical, 25-1500MHz £37.95

SCANNER BOOKS
- UK Scanning Directory £17.50
- Scanning Secrets £16.95
- Scanners 3 £10.95
- Airwaves 95 £7.95
- Understanding ACARS £9.95
- World Aeronautical Communications Directory £19.95

OPTO SCOUT
Automatic tuner and memory capture device
- Records 400 frequencies
- 255 hits on each frequency
- 10MHz to 1.4GHz coverage
- Optional computer interface
£399 + £10 car
The Lowe HF-250 is set to become the new world standard for mid-priced receivers. Building on the worldwide success of our HF-225 and HF-150 models, the new HF-250 combines Lowe's traditional high standards of performance and quality of construction together with the advanced facilities and control features required by today's discerning listener.

* Call or write for a brochure, or pop into your local Lowe shop for a demo *

FEATURES
* Frequency range from 30kHz to 30MHz
* Tuning step size 8Hz
* Back-lit display
* Display resolution now 100Hz
* 255 memory channels
* Memory channels also store frequency, mode, filter selection and attenuator setting.
* Computer control is standard via built-in RS232 port.
* RS-232 reads to and from the radio for upload/download of memory data. Free software included.
* Clock with two independent timers.

* Fixed level output for decoding and tape recording.
* Tape recorder switching output.
* Fast tuning in 10kHz steps.
* 1MHz up/down tuning.
* Mode selector carousel.

OPTIONS
* Infra-red remote commander ........................................£29.95
* Synchronous detector with selectable sideband .£49.95
* Whip amplifier ............................................................£35.00
* DC lead .................................................................£5.00
* RS232 control leads ...................................................£10.00

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Leeds
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Lowe in the South West
117 Beaumont Road
St. Judes
Plymouth
Tel 01752 257224

Lowe in the South
High Street
Handcross
West Sussex
Tel 01444 400786

Lowe in East Anglia
152 High Street
Cheshunt
Cambridge
Tel 01223 311230
World-wide email
info@lowe.co.uk
orders@lowe.co.uk

Lowe in Yorkshire
79 Gloucester Road
Patchway
Bristol
Tel 0117 931 5263

Lowe in the West & Wales
Plymouth
Tel 01223 311230

World Wide Web URL
http://www.lowe.co.uk/
Our old Mende receiver (a tuned radio frequency, model E38G), wasn't much of a radio. Even a new output valve, (RES164, 1.1W), and the separate, concert-type loudspeaker, where you adjusted the position of the cone and its magnet, didn't help.

There must have been an antenna once, before my time. A painted over piece of wire between window and radio was all that was left - and that probably just wasn't enough.

My father did not think much of these new-fangled gadgets. Being a bank manager, he stuck to his newspaper and the pages of economics rather than maltreating his ears with feedback howls and whistles. However, we had a working telephone, which was used in the manner of those times, that is rarely, almost reluctantly and for brief messages only.

I loved to open our radio by flapping out the chromium-plated levers on both sides, then pulling up the top. Three bright radio valves dominated the scene. A coil in a large copper cylinder, a wire-wound dropping resistor for the filament and, above all, a penetrating Bakelite smell gave this model a particular aura.

Humming & Snapping Noises
When the mains plug in the wall outlet - polarity marker on top (d.c. mains!) - and the hefty toggle switch on the front panel set in position 'EIN', very soon this apparatus would soon start humming and the speaker would make a snapping noise when the feedback control ('reaction') was turned up.

As for the hum, the local power system was responsible, my father had been told. As for me, I wanted the set to work properly and I was keen on receiving distant stations. Thus, I was always on the lookout for anything to do with radio.

High cost miraculous cures are nothing new for antenna problems. Jürgen F. Hemme HB9ANR takes a look at a 1943 solution that cost him dearly.

I spotted an advertisement in my mother's Illustrated Journal: "Satisfied Radio Listeners rely on our Little Wonder Mains Aerial. Also, you can enjoy radio programmes from far away - without a costly outdoor aerial! Only RM 17.50 by mail order, W. Wunderlich, Berlin W.57. Patents pending."

A tiny parcel from Berlin on the kitchen table awaited me on my return home from school. Contents: a matchbox sized grey apparatus with a three position lever switch, a terminal for the connection to the radio’s antenna input and a flimsy wire to be plugged into the power line output.

Deep Disappointment
Flushed with excitement, in no time I had the magic box connected up. Then, joyful expectation turned into deep disappointment. I only recall that: nearby Radio Hamburg was all I could hear - and that was weak. All my plugging and switching did not help.

Help came from Hähnchen, my school mate, whose parents owned fishponds with carp and kept chairs and tables in their yard. A tiny parcel from Berlin on the kitchen table awaited me on my return home from school. Contents: a matchbox sized grey apparatus with a three position lever switch, a terminal for the connection to the radio’s antenna input and a flimsy wire to be plugged into the power line output.

Latest Creation
Along the way I learned that a power line was neither antenna nor ground, nor both properly. He mentioned the term 'counter poise' and the hazard of fumbling with the mains' 'phase'. I listened to all his words with great respect.

Looking out of the window of his spacious study, a lofty pear tree stood out with an antenna wire tied to its uppermost branch and leading directly onto Dietrich's workbench. The master, now wearing a white laboratory coat, demonstrated his latest creation. A superheterodyne receiver using 'red' valves (1.26W filament power, Philips/Tungsrarn low-power design).

I must have tried it again several times. Illusions die hard!

Even much later, spectacular antennas have never quite worked as well as expected. But, hope always revives, in spite of painful experiences with that mains antenna.

Come To Life
The set came to life suddenly, station after station tuned in like beads on a string after he had connected his antenna to the radio. With the 'Little Wonder' in my pocket, I cycled home deep in thought. I must have tried it again several times. Illusions die hard!

Build the 'Little Wonder' Mains Aerial

Short Wave Magazine, April 1996
Two New HF Receivers from AKD

Filter and accessory manufacturer AKD have announced that they are developing two new h.f. communications receivers ready for an autumn launch. The first of these is a fully synthesised receiver with a phase lock loop v.c.o. to give stable and accurate signal reception. The frequency coverage will be continuous over the range 30kHz to 30MHz with u.s.b., l.s.b. and a.m. modes. Two filters will be provided - 6kHz and 4kHz and a quasi synchronous demodulator will be used. The ex-works target price is £160 including VAT.

The second set is aimed at the more discerning listener and, although based on the lower priced model, has some interesting extras. For a start it will be already to accept the optional AKD computer interface to enable the receiver to be controlled from a PC. Other extra features include 100 user programmable memories and a data output socket on the rear panel for FAX, RTTY, etc. The ex-works target price for this version is £210 including VAT.

Short Wave Magazine is looking forward to reviewing both of these receivers just as soon as AKD can let us have samples.

In the meantime, further information can be obtained from:
AKD, Unit 5,
Parsons Green Estate,
Boulton Road, Stevenage,
Herts SG1 4QG.
Tel: (01438) 351710.

You can look forward to the following special themed issues with your favourite radio read.

Antennas
We would be stuck without them. Not everyone has space for them. What is the ultimate? Read this issue and discover more!

Airband
Godfrey Manning takes a look at interesting matters airborne, airfield and Navairid.

Broadcast
In this issue we concentrate on the world's short wave entertainment and information media.

Utilities
Military comms, FAX and RTTY are the flavour of this special.

Numbers Stations
Spy station around the globe, who runs them, what function do they perform, how do they work? Find out more in SWM.

WXSATs
There are many WXSATs orbiting our blue planet. Lawrence Harris takes a look at the fascinating pictures available space.

Projects and Kits
Thought about building one yourself? It can be much more rewarding than just buying a ready made piece of kit. Look no further for inspiration and guidance.

Next Month our May Issue brings you
- British Radio History revisited with The Colossus Rebuild Project
- George Wheatley take GPS further.
- John Wilson concludes his Filters in Receivers
- The Scanning Alternative - Ben Nock looks at an easy on the pocket option.
- Part 2 of the Audio Signal Processor Project by Robert Penfold
- Second part of our star competition - WIN an AR7030

AND MUCH MUCH MORE!

Short Wave Magazine, April 1996
New Optoelectronics

**NEW OPTO SCOUT 3.1-Mk2**

Latest mini frequency finder from Optoelectronics. It will capture and memorise up to 400 frequencies that can be recalled directly into the AR-8000. Supplied with ant, nicads and fast charger. This month we are giving away a free DB-32 ant and case worth £46.

**OUR PRICE £399**

**NEW OPTO CUB**

The Cub is ideal for communication, surveillance and recreational monitoring applications. From 10MHz-2.8GHz. The Cub has maximised sensitivity for detecting RF in the near field and displaying the frequency detected. The cub features a digital filter that reduces false counts and random noise, digital auto capture for detecting RF in the near field and displaying the frequency detected. The cub features a digital filter that acts like an intelligent hold button allowing any frequency detected to remain displayed as long as needed.

**OUR PRICE £139**

**NEW DB-32**

A Miniature Wideband Antenna. Receives 30 - 1200 MHz. Transmits 2m/70cm, BNC fitting only 1.5" long its superb sensitivity.

**OUR PRICE £29.95**

**OPTO-SCOUT VIDEO**

See before you buy, send us £10 plus P&P and we will send you a six minute video of the Scout in action. Return the video and we will deduct £10 from the price.

**SCANNING RECEIVERS**

**PRO-2036**

Wideband Desktop Scanner with rotary tuning and tone encoder £249

**Limited Stock £249.95**

**AOR AR-5000**

New wideband all mode base receiver. 10kHz-2600MHz. The Ultimate machine. Why not part-ex your old receiver and move into the 21st century.

**OUR PRICE £1599**

**SCANNING BOOKS**

**UK Scan Directory** £17.50

Scanbusters £4.95

**SCANNING RECEIVERS**

**AOR PRICES SLASHED**

**AR-8000**

The ultimate handheld receiver. Inc. Nicads/Charger & antenna.

**OUR PRICE £349.95**

**NETSET PRO-44**

Want to get into scanning? Then this is ideal for you.

**OUR PRICE £199.95**

**YUPITERU MVT-7100**

Handheld scanner cover 100Hz-1650MHz. All mode.

**OUR PRICE £289.95**

**YUPITERU MVT-7200**

**OUR PRICE £299.95**

**YUPITERU MVT-7000**

**OUR PRICE £269.95**

**STAR BUY**

**REALISTIC PRO-25**

Listen to aircraft, ham, marine, mobile phones and much more.

**OUR PRICE £169.95**

**AOR 1500 EX**

0.5 - 1300MHz handheld scanner. (All mode)

AM, WFM, NFM, SSB. We have five pieces as new with 6 months warranty.

**Inc Nicads/Charger & Antenna**

**OUR PRICE £199.95**

**ACCESSORIES**

**EP-300**

Deluxe over the ear earpiece.

**£9.95+ £1 P&P**

**MA-339**

Mobile holder for handsets

**£9.99**

**QS-200**

Air vent holder

**£9.99**

**QS-300**

Desk Stand

**£19.95**

**TSA-6201**

Superb quality ext speaker with volume control.

**£14.99 P&P £1**

**CLIP ON MINI SPEAKER**

Ideal for portable scanners. Swivel clip attaches to collar or lapel whilst carrying your portable on a belt clip.

**£9.99 P&P £1**

**SCANNMASTER SP-55**

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

**£69.95 P&P £3.50**

**ANTENNAS**

**AIR-33**

Prof. quality armband base antenna, Civil & Military. Just over 1m long, Inc. Mounting brackets.

**£44.95 £4 P&P**

**DB-770H**

Telescopic antenna with broadband RX 25-1300MHz

**OUR PRICE £24.95 P&P £1**

**TSC-2602**

Flexible Wideband Antenna 25-1300MHz 14" Long

**OUR PRICE £22.95 P&P £1**

**TSC-2605**

An amazing broadband telescopic with 3 hinged adjustable telescopic ground radials. Ideal for any scanner/wideband Rcvr. or Tcvr. 120-1200MHz (BNC fitting)

**OUR PRICE £24.95 P&P £1**

**TSA-6671**

New ultra small BNC magmount. Amazing. Allows you to use any existing BNC antenna from your scanner to transceiver on your car without having to purchase a car antenna. (Supplied with 3m miniature coax + BNC fitted).

**OUR PRICE £22.95 P&P £1**

**DELIVERY (UK MAINLAND) 24HR £10**
NEW SHOP IN THE WEST MIDLANDS OPENING SOON.
SEND IN A S.A.E. FOR YOUR FREE PERSONAL INVITATION AND SPECIAL OFFER SHEET.

COMMUNICATION RECEIVERS

- **YAESU FRG-100**
  - RRP £449.00
  - **OUR PRICE** £449.00

- **KENWOOD R-5000**
  - RRP £929.95
  - **OUR PRICE** £929.95

- **AOR AR-7030**
  - RRP £749.95
  - **OUR PRICE** £749.95

- **TIMEWAVE DSP-59+**
  - As recently reviewed, this is far the best "DSP Audio Filter" available. We've sold hundreds and have had nothing but good reports. Isn't it about time you cleaned up your shack?
  - RRP £299
  - **OUR PRICE** £275

- **SONY SW-100E**
  - Award winning miniature SW receiver.
  - **OUR PRICE** £189.95

- **SWAN AT-100**
  - This is a superb self contained antenna system for inside the house/flat. For better results you can even connect a longwire antenna to the rear. Don't miss out! Add one of these to your Rx (built in preselector)
  - RRP £70.05
  - **P&P £4**

- **SONY AN-71**
  - Pull out and clip on compact shortwave antenna. Boost the performance of your portable with one of these
  - RRP £9.99
  - **P&P £1**

- **NEW SP-1 SPYWIRE**
  - World wide digital radio with clock and 20 presets.
  - **OUR PRICE** £34.95 **P&P £3**

- **SECONDHAND & EX DEMO BOARD**
  - LOWE HF-150
    - Immaculate condition.
    - **£349.95**
  - ICF-2001D
    - SW receiver + airband.
    - **£219.95**
  - YB-500
    - As new
    - **£219.95**
  - SW-7600
    - As new
    - **£399.95**
  - R-2000
    - As new
    - **£219.95**
  - R-8000
    - As new
    - **£399.95**
  - SW-7600E
    - As new
    - **£219.95**
  - SAT-100
    - As new
    - **£149.95**
  - AT-803A
    - As new
    - **£79.95**
  - AR-3000A
    - Scanner with SSB
    - **£349.95**
  - PRO-2032
    - As new
    - **£189.95**
  - Shinwa Scanner, mobile
    - **£249.95**

- **ACCESSORIES**
  - **NEW HOWES CT-U9**
    - 500kHz-30MHz ATU with built in balun.
    - **Ready built £69.00**
  - CT-8
    - Our price
    - **£49.00**
  - AT-2000 ATU with Qselector
    - **£95 P&P £5**
  - SWA-30
    - Passive (non-powered) desk or wall mount shortwave antenna. (0-30MHz) with a built in magnetic balun.
    - **OUR PRICE £44.95 P&P £4**

- **SHORT WIRE KIT**
  - DX and fed long wire kit, up to 150ft of copper wire. The Complete Package.
    - **OUR PRICE £24.95 P&P £3**

- **HF ACCESSORIES**
  - MLB Watson Wire Balun
    - **£19.95**
  - HD CW 50m hard drawn copper wire
    - **£10.99**
  - IS Nylon dog bone insulators
    - **99p ea**
  - PL-259/1 1m Patch lead (259-259)
    - **£4.99**
  - PL-259/5 5m Patch lead (259-259)
    - **£7.99**
The electronic age, which can be both a blessing or a curse. Our daily lives are governed by various types of timing devices which chime, beep or buzz at odd times of the day and night, dictating and controlling our progress throughout each 24 hours.

These digital clocks can be friendly when they turn on the coffee percolator or switch off your lights, or they can be terrorising when they go off at an unearthly hour on a cold winter's morning, as a reminder that another day at the office is imminent!

There is, however, one friendly use which can be of great benefit to the s.w.l. (short wave listener).

**Timing Devices**

Most VCRs have timing devices, which allow the recording or programs either in the early hours of the morning when you are in the land of dreams, or during periods away from home.

Kitchen stoves can be set to switch on or off at predetermined times, ensuring that the roast is cooked to perfection! However, the DX enthusiast generally does not have these facilities.

With a little ingenuity and no expertise, this problem can be easily overcome by the use of an ordinary domestic timing switch. The type which switches on and off the lights when you are out, plus a tape deck or portable tape recorder.

**Recording Material**

Short wave propagation conditions vary continuously. Fading is very common on the m.w. band and the tropical bands are frequently subject to snap, crackle and pop, particularly during the summer months.

There is also an immutable law which states that all IDs, no matter when they are transmitted, must be accompanied by either fading or QRM. To overcome these little problems, many DXers already use a tape recorder to record the material. By replacing the tape several times, it is often possible to defeat this evil law and decipher the information required.

Recorders are often useful when two interesting programmes overlap. A simple solution being to record one while listening to the other. These methods, however, generally require the listener to be at the controls until the programme has finished.

**Early Hours**

Most DXers are well aware that too many hours spent in front of the receiver is a sure way of creating domestic disharmony and any way of preventing marital discord will be a great plus factor in matters worse, only during the winter months.

It is an enthusiastic listener indeed who is prepared to emerge from under the blankets in the middle of a cold and frosty night to try and identify Radio 'Whatsit' transmitting with a power of 1kW between 2300 and 0300UTC. This is where the introduction of one of the 'friendly' timing devices comes to the rescue, enabling programmes to be recorded and played back automatically at more favourable times.

A combination of a domestic timer plus a tape recorder can be a painless way of obtaining hard to get stations without straining marital relations. Dick Moon explains all.

---

**Diagram showing a typical set-up for timed recording of that elusive DX.**

- Wallsocket
- Main timer
- Timed mains voltage feeds
- Audio signals to be recorded
- Radio receiver
- Tape recorder

---

Short Wave Magazine, April 1996
The Barlow Wadley XCR-30 Receiver

The Barlow Wadley XCR-30 at first sight looks like a domestic transistorised portable, indeed, the Mk II version with its f.m. unit resembles one even more so. This first impression, though, belies the fact that the XCR-30 is quite a good communications receiver, small, light weight and even good enough so that it could be used with a transmitter for QRP operation for instance.

The XCR-30 tunes between 0 and 30MHz, though in practice, 1 - 30MHz is a better statement. The Mk II version has an added v.h.f. tuner, 87 to 108MHz, which sits on top of the set under the carrying handle.

The receiver has switched modes, u.s.b., a.m., l.s.b., has a 'clarifier' telescopic whip antenna is quite effective for most listening and it is quite surprising just how many signals can be heard on it. It is fully tilt and adjustable for f.m. use as well. Although there is provision for plugging in an external antenna to the set, this does degrade the performance on some frequencies due to excessively strong signals.

Receiver Operation

The receiver has the same sort of tuning as the Racal RA17 type receiver, in fact the basic operation of the set is the same as the RA17. Two tuning controls are provided, with one knob amount of frequency covered for one turn of the tuning control, is the same for all frequencies. The more usual tuning methods usually have one band very sharp. No such problem with the Barlow Wadley.

The tuning is quite accurate and drift free. The main principal of operation was devised by Dr Trevor Wadley, a South African who during the war worked at the TRE Malvern (later known as RSRE and then DRA), the system being known as the Wadley Loop.

The principal of the Wadley Loop is complicated but a basic description is that a crystal oscillator is used to provide an accurate reference signal. This signal is used to produce harmonics. A free running

Ben Nock continues his look at some of the older receivers that you may well find at rallies and junk sales up and down the country. This month the rather different Barlow Wadley XCR-30 is the subject of his ramblings.

tuning in 1MHz steps, the other knob then providing the tuning between 0 and 1000kHz. In this way the entire spectrum between 0 and 30MHz is covered.

The nice thing with this form of tuning is that the tuning ratio, that's the covering perhaps 1.5 to 4MHz, a coverage of 3.5MHz for the full tuning range and another band, say 14 to 30MHz, now some 16MHz for the full tuning range. This means that the tuning of the higher bands, 20, 18, 15 and 10 is usually
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oscillator is mixed with the antenna signal to give a high (45MHz) first i.f. This free running v.f.o. is also mixed with the harmonics from the crystal oscillator, filtered and then mixed for the second time with the now high i.f.

This gives a much lower second i.f. A second v.f.o. now mixes yet again with the 2nd i.f. to give the final 3rd i.f. which is then demodulated and the audio recovered - I told you it was a complicated system.

The First v.f.o., the 1st and 2nd mixers, the crystal oscillator and harmonics, all go towards producing 1MHz slices of the spectrum. Those 1MHz slices are then tuned by the 2nd v.f.o. which produces the standard 455kHz i.f. for further processing.

The way the first v.f.o., running around 40 to 60MHz, is used means that it need not be super stable. In fact a high limit of plus or minus over 100kHz is acceptable and has no effect on the received signal stability.

One note of interest from the 60s period is the story that Eddystone, along with other major receiver builders of the time, turned down the Barlow Wadley loop principal when offered it. The only company to pursue the design was Racal, and we all know the outcome of that wise decision.

The r.f. amplifier stage has the novel feature that as the tuning control is rotated, not only does this slide a core within the antenna coils using a pulley system but, at preset positions, it switches between the different coils, three in all, using a small cam operating on microswitches.

In the field

The set is powered by internal batteries, six 'D'-cells, though an external supply can be used. As I mentioned, the set has a built-in whip and the case houses a single round loudspeaker.

Tuning around the bands is quite easy. The large thumbwheel type tuning knobs are a bit different to the usual style but are no more difficult to operate. The preset u.s.b. and l.s.b. positions on the mode switch make for easy tuning of single sideband
stations, always assuming you switch to the right one for the appropriate band that is!

The small ‘S meter’ is quite lively, and is useful for peaking the antenna tuning, though a small light, both in the meter and the main dial, would have been nice for late night tuning around.

Add-on f.m. for the Mk II

As stated earlier, the Mk II version of the XCR-30 has a built-in mono f.m. tuner. The tuner is self-contained with the exception that the main battery p.s.u. is still used and that the a.f. output is passed to the XCR-30 main output stage. Controls are a single push button on the f.m. unit switching between the h.f. set and the tuner and a separate tuning knob is also provided.

The single telescopic whip is also used to provide signal pick up for the f.m. unit and can be tilted and rotated to give best reception. An external f.m. dipole can be connected to the tuner to improve reception.

On top of the f.m. unit, under the carrying handle, sits a chart detailing the various commercial short wave and amateur bands, their wavelengths and frequencies. This is a useful aid memoir for those new to short wave listening. In all, this set is a very handy little receiver, ideal for taking on holiday to keep in touch with the bands. A small QRP transmitter would make an ideal accessory, creating a very useful holiday station.

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make no apology for often referring to the early history of radio, because it is only by getting back to the source material that many misconceptions can be corrected, leading hopefully to a proper understanding of the subject.

That way we should see an end to such printed statements as "The discone aerial, originally from Japan..." Really?, or "Some radios have their sensitivity reduced in this part of the spectrum (Medium Wave) to help improve the blocking performance at higher frequencies" - total nonsense founded firmly on ignorance, quoted from a recent publication (not by Short Wave Magazine, I hasten to add). In the certain knowledge that I will also transgress, I mention from time to time the FOUL Club, which is an invention of my own consisting of an informal group of those like myself (Few Of Us Left) who derive as much pleasure from reading and understanding circuit detail as we might from reading a good book. I rely on FOUL members to both keep me in line with the truth and provide snippets of information which I can include in future articles. There is no formal application procedure to join the Club, because those who qualify for membership know within themselves that they are kindred spirits and therefore self-qualifying. A filter, by its very definition, is a means of separation: the classic school from doing so. A set of traffic lights with a filter arrow allows some vehicles to filter to where they want to go whilst restricting the flow of 'unwanted' traffic. In radio receiver terms, the spectrum of signals spreading all the way from a few kilohertz to tens of megahertz (since my observations stop at 30MHz - my acronym for my own attitude is NATTY - Nothing Above Thirty Thank You) can be compared to that mass of traffic approaching the lights, or for those of you who read my article on preselectors, the herd of buffalo approaching across the open plains. The object of filtering is to pick out the signal (or car, or buffalo) that you want and reject all the others, and in the earliest days of radio all the filtering was done at the frequency of the incoming signal.

The original crystal detector was wide open to anything which came down the antenna at any frequency, but since the only signal you were likely to hear was the local broadcast station it didn't much matter.
about preselection (filtering). However, with the advent of the valve, which increased the sensitivity of the receiver and the increase in the number of stations broadcasting, some form of filtering one station from another became necessary, and this took the form of one or more tuned circuits between the antenna and the receiver.

As selectivity became more necessary and receivers became more complex, extra amplifying stages were added to the simple one valve t.r.f. (tuned radio frequency) receiver, all tuned to the frequency of the station you wanted to hear, in attempts to increase both sensitivity and selectivity at the same time. The main difficulty of this approach was that in order to obtain best performance it was necessary to have all the resonant circuits involved tuned exactly to the same frequency which meant that the user had several tuning controls to peak up every time the listening frequency was changed, or a multi-section variable capacitor had to be used which brought design problems in tracking all the tuned circuits over the frequency ranges involved.

A second problem was that if you had a multi-stage receiver with lots of gain, you also had, potentially, a very good power oscillator, and the slightest hint of electrical feedback from output to input caused the whole receiver to go into fierce oscillation at the frequency to which it was tuned.

Incidentally, unwanted electrical coupling along the shaft of a multi-section variable capacitor was often a prime cause of such instability, which is why such care was taken in providing multiple earthing 'fingers' along the shaft: go on, get a capacitor and take a look.

A third and more difficult problem was that tuning a receiver with a variable capacitor resulted in a change in the L/C ratio of the tuned circuits involved which meant that the actual selectivity of the receiver changed with frequency. This was serious enough when receivers were tuning lower frequencies in the medium and long wave bands, but was a major headache as wavelengths shortened, and a way had to be found to solve the problems.

Supersonic - and not a Concorde in sight

The solution was the invention of the superhet (a contraction of supersonic heterodyne) principle by an American, Major E.H. Armstrong. The term 'supersonic heterodyne' describes the method by which an incoming signal can be 'heterodyned' or mixed down (or up) to a fixed intermediate frequency (i.f.) at which all the selectivity can be achieved at a single frequency. References in the early 1920s (Wireless Weekly, November 28th, 1923, for example) described this 'desirable' development and how it resolved the problems of providing selectivity between stations by having all the selective components operating at a fixed frequency. Members of the FOUL Club will be reminding each other that the superhet, whilst solving problems of selectivity also introduced other problems that still plague the receiver designer - but these can be covered as a separate topic. Someone will surely mention the direct conversion receiver, which is effectively a superhet with a zero frequency i.f. makes your brain hurt doesn’t it?

Intermediate frequency selectivity was initially obtained - and still can be - by tuned circuits, usually also providing inter-stage d.c. isolation in the form of i.f. transformers. As a simple rule, the more tuned circuits used the better the selectivity, and the higher the Q of each tuned element, the sharper the 'nose' of the selectivity peak. For narrow bandwidths all tuned circuits had to be aligned at exactly the same frequency, whilst broadening the selectivity could be achieved by 'stagger' tuning each element to a slightly different frequency around the nominal i.f. centre.

Many ingenious methods have been used to achieve variable bandwidth ranging from the electrical, such as 'pulling' the resonant frequency of each tuned circuit or electrically varying the coupling between them, to the mechanical as best exemplified by the Eddystone variable coupling i.f. transformers used for years and years in their receivers. However, selectivity derived from the use of tuned circuits tended to be limited by the attainable Q of the tuned elements and as early as the 1930s, receiver users, particularly radio amateurs were seeking better and better selectivity for their receivers. A landmark in design technique came with the publication in 1932 of articles by James Lamb, the technical editor of QST magazine in which he described (amongst many other things) the use of a crystal filter to achieve 'single signal' characteristics in the i.f. stages of a superhet receiver.

"Worthy is the Lamb"

For you newer fellows, the crystal filter Lamb described, and which was incorporated into every serious communications receiver right up to the 1960s, was not...
a little metal box containing multiple crystal elements labelled with a German or Japanese name, but a single quartz crystal effectively in series with the i.f. signal and made to have very narrow, but variable, passband characteristics by clever use of the pole and zero of the crystal in conjunction with a 'phasing' control sometimes brought out to the front panel - classically in the HRO receiver. This allowed a skilled operator to peak wanted signals (usually c.w.) and reject other unwanted signals alongside, and if you can watch such an expert at work, you will be astonished at how well the single crystal filter can make a signal stand out from all the noise and interference ... but not everyone is an expert, and many people simply don't want to be bothered to learn the techniques. I am indebted to a correspondent member of FOUL from Northampton for reminding me of lost skills. Many receivers which incorporated a 'Lamb' filter did not have the phasing controls brought out to the panel but, instead, had a series of fixed components giving different bandwidths selected by positions on the bandwidth switch. A receiver of this type considered contemporary to the HRO (although its design was considerably later than the HRO) was the AR-88 in which the two broader i.f. bandwidths were achieved by changes to transformer coupling and the three narrowest bandwidths by inclusion of a single crystal filter. The operators of the AR-88, therefore, did not have to display the skills necessary to 'drive' the HRO, but neither did they achieve the ultimate performance from the filter. Perhaps the best late example of the drop of performance out of the single crystal filter could not cope with the demands of an increasingly crowded spectrum, and the main failing of this type of filter was that although it could provide narrow bandwidths at the 'nose', its ability to reject adjacent signals was not outstanding. As an example, the SP-600 has an i.f. bandwidth (using the crystal filter) of 3kHz at the 6dB points of the i.f. response but at 60dB, if the published curves are correct, this widens to 18kHz. In today's terms, this is quite

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As Sophie Tucker might have said “Shape ain’t everythin’ Baby”
poor because there are many adjacent signals which could bounce through at the skirts of such a filter and cause serious interference to a wanted signal.

**Shape Factor**

The commonly used method of denoting a filter's performance is 'Shape Factor', which is simply the ratio between the bandwidth measured at the 60dB and 6dB points on a filter passband. Thus the SP-600 would have a shape factor of 18:3 or 6:1. By comparison a modern crystal filter could have a shape factor of 1.2:1 which tells you that its bandwidth at 60dB down on a 3kHz passband would be only 3.6kHz; quite a difference in the ability of a receiver to reject adjacent channel interference. Before you gallop off and choose a receiver by assuming that a lower shape factor is always better, just remember I've said before that every silver lining has a cloud, and simple quotation of shape factors may not make the receiver audio any more pleasant - but that's a more advanced story and not yet for the telling, although I'll give you a little hint by asking you why the audio from the Drake R-8A sounds so nice even though not a crystal filter is in sight and the quoted shape factors are about 2.2:1?

Seemingly with the appearance of s.s.b. on the amateur radio scene in the 1950s, receiver users began to look for the 'ideal' rectangular i.f. bandwidth implying a shape factor of as close to 1:1 as possible, and the Collins company devoted great research efforts to laying down an 'ideal' specification for communications channels, finally settling on a bandwidth of 2.1kHz. This figure has since been treated as though engraved on stone tablets and carried down from the mountain by Moses, but in fact Collins were only concerned with specifying a bandwidth for communications speech using s.s.b., and a 2.1kHz bandwidth corresponding to an audio bandwidth from 300Hz to 2400Hz proves quite unsatisfactory for other modes still in use today. Just try listening to Radio Nederland through a steep sided 2.1kHz filter and you will understand what I mean. It makes Jonathan Marks sound like he's talking from the inside of a very woolly teddy bear.

**Bit Removed**

As an historical aside, don't think that s.s.b. was new in the 1950s; J.R. Carson lodged a British Patent in 1915 for a method of eliminating the carrier and selecting one sideband of an a.m. signal (and remember that s.s.b. is actually a.m. with bits removed, rather like my favourite tomcat who vaguely remembers having both sidebands present), and s.s.b. came into regular commercial transatlantic use in 1927. Amateur radio s.s.b. tests were carried out between Britain and America in 1933 and 1934, so you can see that it didn't all start with Collins or Yaesu Musen!!

**Ye tak' the high road, an' I'll tak' the low**

Be that as it may, the search for better, or should I say more closely defined filtering carried on and went down different paths. The original single crystal filter expanded to use two crystal elements in what became known as the 'Half Lattice' filter, and four crystal elements as the 'Full Lattice', and it is true to say that amateur radio experimenters played a significant part in the development of practical filters in the 1950s, although the basic principles had been laid down in the mid 1930s. Further development of large multi-element crystal filters was carried out by well known commercial companies such as Marconi for use in their professional radio communication systems, and many commercial multi channel telephony systems which use 'stacked' s.s.b. channels employed crystal filters.

In the wider hobby field, the German company KVG began to produce low cost crystal filters with a variety of bandwidths, and these are still available today. Modern crystal filters are usually made using multiple quartz resonators or what is known as the 'monolithic' approach in which a single slab of quartz has several conductive elements deposited on to its surface producing multiple resonators within the slab, but the technique is limited in the number of elements that can be used, and the high performance quartz filters still use the separate resonator approach. This is one reason why there is such a price difference between the good performance 8.83MHz i.f. filters in some Kenwood equipment (monolithic construction) and the superb performance 455kHz filters in the same set (multi-element construction). It has become commonplace for h.f. receivers to incorporate crystal filters for i.f. selectivity, - but I said there were other paths.

Collins (again) developed in the late 1940s and early 1950s a new type of filter which used mechanical resonance of pieces of metal as the selective mechanism rather than the mechanical resonance of quartz crystals. In these filters, a series of metal elements resonant at the frequencies to be passed, are coupled together and driven by a transducer which converts the incoming electrical signal (the i.f.) into mechanical movement. At the output end of the filter the movement is translated back to an electrical signal by a similar transducer.

**Byword**

I could devote pages of text to the mechanical filter, but there isn't space available and in any case the whole subject has been written up by people infinitely better qualified than I. Let's just say that the Collins mechanical filter became a byword for ease of use, guaranteed repeatable performance without alignment, and quite outstanding shape factor. The only major restriction on its application is that being dependent upon mechanical action, it is limited by production techniques to being used only at relatively low frequencies, whereas the multi element quartz filter can be produced for much higher frequencies - 9MHz being a common filter frequency in use. Although Collins protected the design by patents, the Japanese firm Kokusai began producing mechanical filters in the 1960s and I am told that the way in which the patent was circumvented was by use of a piezo electric transducer rather than the magnetostrictive driver used by Collins - but this may be utter rubbish, and I am relying on hearsay rather than original source information.

A further more recent development in i.f. filter technology employs piezo electric ceramic filter elements as an alternative to quartz, and the most often met name among manufacturers of this type of filter is Murata. Production techniques have been refined to the point where piezo electric ceramic filters (usually referred to as simply...
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’ceramic’) can be very cost effective and there is scarcely a receiver produced today which does not include one or more ceramic filters. Although shape factors do not approach those of the best mechanical filters, they are very close, and the ceramic filter has characteristics which often make it a better choice for the hobby listener than the apparently superior mechanical or quartz crystal filter. I’ll explain in a follow up article.

And so to bed...

Let’s try and summarise what I have written so far. The ability to select wanted and reject unwanted signals on nearby frequencies in a receiver is called selectivity. In the early days of radio, selectivity was obtained at the signal frequency itself, but with the invention of the superhet principle it was possible to concentrate the selective elements at a single frequency, commonly known as the Intermediate Frequency (i.f.). Originally the selective element was the tuned circuit, and a succession of tuned circuits could be used to provide high performance, albeit at a cost in complexity and component count. Later developments using quartz crystals, mechanical resonators and piezo electric resonators meant that the selectivity could be determined in what was in effect a single magic box, which led to overall simplification of i.f. section design.

Conveniently ignoring more recent developments in digital signal processing, we see today in most receivers likely to be used by readers of this magazine one or more of the four types of filtering mentioned above, and each has particular advantages and disadvantages depending on the intended use of the receiver. When judging a receiver’s published performance specification, always bear in mind that the designers have made the best compromises they could in making their pride and joy fit the widest possible market, and those with very special listening demands should realise that what may seem essential to them may make a receiver virtually unusable for someone else.

I had a friend in Pontefract (hello Brian) who was so devoted to 40m c.w. that he made his own receiver that only tuned the bottom 10kHz of the band and had an i.f. selectivity about 20Hz wide. Although perfect for his own use, that receiver would have been totally worthless to a general listener. In the same way, the selection of a particular type of i.f. filter will be affected by what you are going to do with the receiver in everyday use.

My next article will explain my cryptic comments about the selection of filter types for different requirements and also delve deeper into topics such as variable bandwidth systems and pass band tuning. Those of you who own a Kenwood R-820 will then appreciate why I consider that particular receiver to be one of the design landmarks of recent times - actually not so recent now that I think of it!
Many receivers do not quite ‘shape-up’ to listeners’ expectations. Robert Penfold has designed this home-build audio signal processor to sharpen up your receiver’s performance. In part 1 he explains the operation of the unit.

In an ideal world I suppose that there would be no need to bother with audio signal processing. The built-in intermediate frequency filtering of communications receivers would provide the best possible audio output signal under the prevailing conditions, making any further filtering superfluous. Some modern receivers, plus a few ‘golden oldies’, have top quality built-in filtering which limits the possibilities of producing improved results using add-on external filtering. However, there are a great many receivers, ancient and modern, which do not quite ‘shape-up’ to expectations.

These days a wide range of audio processes can be used in an attempt to reduce various types of interference. These range from simple tone controls to complex digital signal processors (DSPs). Apart from digital processors, which attempt to reduce background ‘hiss’ while leaving everything else intact, the function of all these signal processors is to provide some form of frequency selective filtering.

This form of filtering is intended to counteract various forms of QRM, and is not effective at reducing background ‘hiss’.

This audio processor provides three types of frequency selective filtering. Firstly, a low-pass filter can be used to reduce the high frequency response. For s.s.b. reception this combats interference from signals close to the carrier frequency, where the i.f. filtering often provides a relatively limited amount of attenuation. This low frequency interference tends to be less noticeable than the high frequency variety, but you certainly notice it once it has gone! The third type of filtering is a tunable notch which can be used to attenuate a narrow band of frequencies. This is useful for reducing interference from carrier heterodynes, c.w. signals, RTTY signals, etc.

Adjustable Cut-off

Audio filters which provide high-pass and low-pass filtering often furnish a relatively limited improvement in performance. One reason for this is that simple audio filters offer attenuation rates which are quite modest in comparison to the effective rates of even mediocre i.f. filtering. The high-pass filter used in this design provides an attenuation rate of 48dB per octave, and the low-pass filter has a roll-off rate of 60dB per octave. While these roll-off rates are something less than phenomenal, they are high enough to give a very worthwhile level of performance.

Performance is improved still further by having the cut-off frequencies of both filters adjustable. The bandwidth of normal filtering, whether audio or intermediate frequency, has to be something of a compromise. The frequencies in a voice signal cover a wide range of frequencies, but the highest and lowest frequencies can be removed without significantly reducing intelligibility. Using a very narrow bandwidth at the receiver is obviously desirable, as it reduces problems with adjacent channel interference and general QRM. On the other hand, making the bandwidth too narrow will impair the intelligibility of the signal.

Although the impression is often given that there is an ‘ideal’ bandwidth that will always give optimum results, this is not really the case. The frequency content of individual voices varies considerably, as does the importance of each component to the overall intelligibility of the signal. In most voice communications systems frequencies below about 200Hz and above 3kHz are attenuated, although the modern trend seems to be to use a slightly narrower bandwidth than this. Whatever frequency limits are chosen, a fixed bandwidth will always be something of a compromise.

The ideal limits depend on the particular voice being processed.

The ideal frequency limits also depend on the interference, if any, present on the input signal. Take the example of Fig. 1.1(a) where the solid lines represent the frequency components in a voice signal, and the broken lines represent the components of an interfering signal. The voice signal will have had its bandwidth restricted at the transmitter, and in the normal way of things the receiver will provide a bandwidth that is just sufficient to accommodate all the frequencies in the signal. This leaves an audio output signal that contains strong high frequency components produced by the interfering signal.

With adjustable cut-off frequencies it is possible to reduce the high frequency response, as in Fig. 1.1(b), so that the interference is greatly reduced. Clearly this will also remove high frequency components from the voice signal, but this will not necessarily reduce intelligibility to a significant degree. The effectiveness of the reduced bandwidth obviously depends on factors such as the characteristics of the voice signal, and the strength of the interference. Practical experience with this audio processor suggests that in many cases the reduction in bandwidth will have only a marginal affect on intelligibility, while the reduction in interference will make the signal much easier to copy.

Continued on page 33
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possible, but very fatiguing. Reduced bandwidth with a much lower level of interference seems to make it very much easier to copy signals for long periods.

The cut-off frequency of the high pass filter is adjustable from approximately 200 to 550Hz, and that of the low-pass filter can be varied from about 1.25 to 3.5kHz. With the controls set for maximum bandwidth the filter behaves as a conventional audio band-pass filter, and it will then provide a worthwhile improvement in performance with many receivers. When the going gets tough the bandwidth can be reduced at high or low frequencies (or both), and the unit should then provide a significant improvement with any receiver. The notch filter is tunable from about just below 300Hz to a little over 2.8kHz, and it can be switched out when it is not required. A Q control permits the bandwidth of the notch filter to be varied. Normally a very narrow notch is best, as it has a minimal affect on the voice signal. A slightly wider notch can be better when combating a signal that covers a small range of frequencies, rather than the single frequency of a simple heterodyne.

**Switched Capacitor Filters**

Achieving fairly high roll-off rates using conventional active filter circuits is not difficult, but only if a fixed cut-off frequency is required, as an active CR filter having an adjustable cut-off frequency is by no means impossible, but it is impractical where high attenuation rates are involved. For example, a 60dB per octave roll-off rate would require the use of a ten-gang potentiometer. Using an integrated circuit switched capacitor filter is a more practical approach. This type of filter has similarities to a conventional CR filter, such as the basic low-pass type of Fig. 1.2(a). The resistor is replaced with a small capacitor and a switch, as in Fig. 1.2(b). In a practical filter the switch is invariably an electronic type which is controlled by a clock oscillator.

If we first consider the operation of the CR filter, R1 limits the rate at which C1 can be charged and discharged by the input signal. At low frequencies the input voltage changes so slowly that the current flow through R1 is sufficient to maintain a charge on C1 that is virtually equal to the input voltage. If the input frequency is steadily increased, a point will be reached where C1 can no longer charge and discharge at a fast enough rate to accurately track the input signal. This results in a phase lag through the circuit, plus a drop in the signal level. The higher the input frequency is taken, the greater the losses through the circuit. The increase in attenuation is quite gradual at first, but the attenuation rate ultimately reaches 6dB per octave. In other words, every doubling of the input frequency results in the losses through the circuit being doubled.

In Fig. 1.2(b) C1 and S1 replace the resistor, and C1 is the normal filter capacitor. Like the resistor of Fig. 1.2(a), S1 and C1 provide a means of coupling the input signal through to the output. Remember that S1 is continuously switched from one position to the other at a high rate. If the input voltage increases, C1 first charges to this new voltage, and then discharges into C2. In this way C2 is charged up to virtually the same potential as the input signal, but as the value of C1 is low in comparison to that of C2, it takes several clock cycles for the circuit to respond to large changes at the input. A fall in the input level results in C1 charging from C2, and then discharging into the signal source. This gives a reduction in the output voltage, but again, it takes a number of cycles for the circuit to respond to large changes.

The output will accurately track the input signal provided the input signal is at a very much lower frequency than the clock signal. With the input frequency at a higher frequency, but still well below the clock rate, the switch and capacitor will not provide a high enough current flow from the input to the output. As was the case for the CR filter, this results in a phase lag and losses through the circuit. Also like a CR filter, the initial roll-off is very gradual, with an ultimate rate of 6dB per octave.

The cut-off frequency of a CR filter is controlled by the values of R1 and C1. The cut-off frequency of a switched capacitor filter is governed by the values of C1 and C2, and the clock frequency. The higher the clock frequency, the faster a change in input voltage can be passed through to the output, and the higher the filter's cut-off frequency. It the ability to vary the cut-off frequency via the clock rate that makes switched capacitor filters an attractive proposition where a variable cut-off frequency is required. Varying the frequency of a clock signal is much simpler than varying the values of numerous capacitive or resistive filter elements.

Practical switched capacitor filters are usually designed to have the cut-off frequency at one fiftieth or one hundredth of the clock frequency. 'Real world' switched capacitor filters almost invariably have several filter stages connected in an active filter configuration. This gives a much better response, with a more abrupt introduction of the roll-off, and a higher ultimate attenuation rate. Filters having a variable cut-off frequency and as many as ten stages are a practical proposition.

**System Operation**

The block diagram of Fig. 1.3 shows the general arrangement used in this signal processor. A buffer stage at the input ensures that the subsequent stage, a low-pass filter, is fed from a suitably low source impedance. This filter improves the performance of the processor at higher audio frequencies, but this is not its

---

**Fig. 1.1:** The interference on the signal in (a) is removed by the reduced bandwidth in (b).

**Fig. 1.2:** (a) A conventional CR low-pass filter and (b) a switched capacitor low-pass filter.
main purpose. It ensures that any high frequency components on the input signal are not allowed to pass through to the switched capacitor filters where they could heterodyne with the clock signal to produce audio tones at the output.

The output of this low-pass filter is coupled to the first of the two switched capacitor filters. The first filter provides the high pass filtering. This filter is a two-stage type in that it is based on two integrated circuits, but each device contains two filters, and each of these is a two-stage type having an attenuation rate of 48dB per octave. Overall this gives an 8-pole filter having an attenuation rate of 48dB per octave.

Originally the four filter blocks were simply wired in series, but there seemed to be an interaction between the filters that resulted in a rather low maximum attenuation. A low-pass filter between blocks two and three avoids this interaction, and ensures that a very high degree of attenuation is achieved on signals well below the cut-off frequency. All eight poles of the high-pass filter are controlled by a single variable frequency clock oscillator which is used to set the desired cut-off frequency.

Another low-pass filter is used at the output of the high-pass filter. One purpose of this filter is to remove any residual clock signal which manages to break through to the output of the filter. Another is to smooth out the steps in the output waveform. The output does not vary continuously, but jumps to a new level each time an input sample is connected through to the output. This gives a sort of pseudo-digitised output signal, which is modulated by the clock signal. The low-pass filter removes traces of the clock signal so that they can not produce problems with heterodynes in the second switched capacitor filter.

This second switched capacitor filter provides the low-pass filtering, and like the high-pass type it is based on two integrated circuits. Each of these contains a single filter block, but it is a five-pole type. Overall this gives ten stages of filtering, and a roll-off rate of 60dB per octave. Once again, all the filter stages are controlled by a single variable frequency clock oscillator which enables the cut-off frequency to be adjusted. An ordinary low-pass filter smooths the output signal and removes any clock breakthrough.

The notch filter is basically a conventional state variable filter, but only the notch output is utilised in this case. The timing resistors are provided by a dual gang potentiometer which enables the filter to be tuned over the frequency range stated previously. A Q control enables the bandwidth of the notch to be varied, and a bypass switch enables the notch filtering to be switched out when it is not required. A power amplifier at the output of the circuit enables any normal type of headphones or earphone to be driven at good volume. The circuit can easily be modified to drive an eight ohm loudspeaker if preferred.

High-pass Filter

The circuit diagram for the input buffer and high-pass filter stages of the processor is shown in Fig. 1.4. IC1 is used as the basis of the input buffer amplifier. It does actually have a small amount of voltage gain (about five times), which helps to give an improved signal-to-noise ratio by ensuring that the filter circuits are driven a suitable level. Some receivers have relatively high audio output levels from their headphone sockets, and with receivers of this type it would probably be best to omit R4 and C3. This reduces IC1 to a straightforward non-inverting buffer stage. The input filter is a conventional three-stage type based on IC2, and having its cut-off frequency at approximately 4kHz.

The high-pass filter is based on two MF10CN switched capacitor filters (IC3 and IC6). These each contain a pair of two-stage filters, with each two pole filter connected into a form of state variable filter. Several state variable configurations can be used, but most of these do not provide the required high-pass action. All four filter blocks are used in what the MF10CN data sheet calls 'mode 3', which is the only one that provides the required high-pass filter action without the aid of a discrete operational amplifier. One slight problem with this configuration is that it provides slight Q enhancement, which gives a small peak just above the cut-off frequency. Fortunately, this 'hump' in the response, even for all four filters in series, is not very great at about 2dB or so, and it does not significantly detract from results obtained using the filter.

Resistors R12, R13 and capacitor C7 provide a half supply voltage bias for IC3 and IC6. The MF10CN has several control inputs which must be connected to the positive supply, negative supply, or mid-supply bias voltage in order to set the appropriate internal connections. In this case the device is set for operation in 'mode 3' with a clock signal at CMOS signal voltages and for operation with the clock frequency at 100 times the cut-off frequency. The alternative clock to cut-off frequency ratio is 50 to 1, but with a 200Hz cut-off frequency this would bring the clock frequency down to just 10kHz, which is uncomfortably close to the maximum signal frequency.

The clock signal is provided by IC4 which is a CMOS 4048BE 'micro-power' phase locked loop. In this circuit only the voltage controlled oscillator is used, and no connections are made to the...
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**Low-pass Filter**

Fig. 1.5 shows the circuit diagram for the low-pass filter, together with its input and output filters. The latter are based on IC7 and IC10, and are three-stage filters that are identical to the filter used ahead of the high-pass filter. The filter between the two high-pass filters is essentially the same as the other three low-pass filters, but it has a slightly lower Q. This gives a slightly flatter overall frequency response.

The switched capacitor low-pass filter is based on IC8 and IC9, which are both LTC1063CN8 five pole filters. Unlike the MF10CN, this device is primarily designed for use as a low-pass filter, and can only be used for other types of filtering with the aid of external active circuitry. Of course, in this case it is low-pass filtering that is required, and few discrete components are therefore needed.

The response of each filter block is a close approximation to that of a five-stage Butterworth low-pass filter. This type of filter has low losses below the cut-off frequency, plus a rapid introduction of the full attenuation rate. This makes it possible to connect two filters in series without seriously compromising performance at frequencies just below the cut-off frequency.

Resistors R37, R38 together with capacitors C20, and C22 provide a half supply bias voltage for IC7 and IC8. The LT1063CN8 is primarily designed for use with dual
balanced supplies, but it works well with the ground terminal (pin 2) connected to a simple bias circuit. Pin 8 of LTC1063CN8 is also biased to mid-supply. This pin can be used to introduce an offset voltage at the output, or to trim voltage at the output, or to trim mid-supply. This pin can be (pin 2) connected to a simple well with the ground terminal balanced supplies, but it works

Continued from page 37

**Fig. 1.6:** Approximate frequency response for the high-pass and low-pass filters with -6dB points at 300Hz and 2.5kHz.

**Fig. 1.7:** Circuit diagram of the notch filter and output stage.

**Fig. 1.8:** The notch filter responses with high and low Q settings and an 800Hz centre frequency.

Switch S1 enables the notch filter to be bypassed when it is not required. From S1 the signal is coupled to an attenuator and then to the output amplifier. This amplifier is based on an LM386N-1, which requires few discrete components. In this case it is operated at minimum gain, and the only discrete components required are a d.c. blocking capacitor at the output (C32) and a supply decoupling capacitor (C33). Resistor R59 is used to reduce the maximum drive current to a level that suits most headphones. For sensitive headphones a higher value of about 390Ω will give better results. If the unit is used with insensitive headphones, or to drive a loudspeaker having an impedance of 8Ω or more, R59 should be replaced with a shorting link.

**Notch Filter**

The circuit diagram for the notch filter and output stage appears in Fig. 1.7. The notch filter is based on IC11 and IC12, which are used in a conventional state variable filter. In this case it is only the notch output at pin 7 of IC12 that is utilised. Ganged potentiometers R49 and R53 form the tuning control, and R56 is the balance control. The latter is adjusted to optimise the attenuation at the centre of the notch, and around 40dB to 60dB of attenuation can be achieved.

The resistor R52 enables the Q of the filter to be varied. A high Q value gives a relatively narrow notch, with little attenuation well away from the notch frequency. This type of response is best for dealing with heterodyne tones, as it enables the tone to be dealt with effectively while leaving the wanted signal largely intact. A low Q gives a somewhat wider notch, and also tends to give significant losses well away from the notch frequency. This obviously has a more detrimental affect on the main signal, but it is more effective at combatting interference that covers a small range of frequencies (such as an RTTY signal) with a shift of 170Hz. **Fig. 1.8** shows example frequency responses with maximum and minimum Q at a centre frequency of 800Hz.

In Part 2 we will cover the power supply and construction of the unit.
AOR AR7030

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A look through the Waters and Stanton catalogue will soon reveal that MFJ manufacture a very wide range of products designed to make life a little easier for the radio enthusiast. One of their latest offerings is the MFJ-784B Tuneable DSP Filter. This is a very comprehensive audio filtering system that's been designed specifically for processing audio signals from communications receivers. As such, its operation is limited to the 300-3400Hz frequency band. However, within this narrow range of frequencies lies a vast range of signals from voice communications through to all manner of digital and utility modes.

By employing sophisticated DSP technology, MFJ have been able to create a filter that is not only extremely versatile but is able to remember and recall up to ten filter settings. This makes the MFJ-784B a formidable tool in the hands of novice and experienced operators.

DSP Outline

Before I go on to describe the filter's features and performance, it might be useful to give an insight into Digital Signal Processing (DSP). In simplest terms all that happens is the incoming audio signal is converted into digital format, i.e. numbers these numbers are worked-on by a microprocessor and the output converted back into an audio signal. Let's now look at each stage in a little more detail. The conversion of the audio signal in to a series of numbers is done by what's known as an analogue to digital converter (A-D) or Coder/Decoder (CODEC). This special device measures the signal voltage and converts the result to a number. In order to create a realistic representation of the signal, this measurement has to be taken at least twice as frequently as the highest frequency you want to convert. So, if you want to convert a communications audio signal with a top frequency of 3kHz the A-D converter would have to take measurements 6000 times per second!

Having created our digital signal, a special microprocessor analyses the numbers and can work out all the important features of the signal. The software running on the microcomputer can then be set to pass or exclude certain ranges of frequencies. The routines to achieve all this are based on complex mathematical formula, in fact the DSP revolution has effectively opened-up a new branch of mathematics. As all this has to happen in real time, the processor has to run very quickly indeed.

The MFJ unit uses the ADSP-2105 specialist DSP microprocessor from Analog Devices. In addition to operating on 16-bit data at 12MHz this device has a specialised instruction set that simplifies the program code for DSP work. Once all the processing is complete, the resultant digital output is passed to a second A-D unit for conversion back to an audio signal. I suppose one of the most impressive aspects is that all this is done with a time delay from input to output of just 23ms!

So, what's so special about digital signal processing. There are two main advantages, flexibility and performance. Whereas conventional analogue filters require sophisticated circuitry that's hard to change and adapt, the DSP filter's parameters are completely controlled by the software. So by changing the programs or parameters, just about every type of filter can be produced. From a performance point of view, a good DSP filter has a very flat pass-band and the response plummets like a stone to very high rejection outside the pass-band. This type of performance is almost impossible from conventional filtering techniques. The MFJ-784B reviewed here is a classic example of how DSP technology can be adapted to our hobby.

Ins & Outs

To use the MFJ-784B with a receiver or transceiver it needs to intercept the audio signal. As to where you place the filter, this rather depends on the type of listening you do. For most, the easiest place to intercept the audio is via the external speaker jack. In most cases, inserting a jack in this socket automatically disconnects any internal speaker and passes the audio to the external unit. You then need a straightforward 3.5mm jack to phono lead to make the connection to the audio input of the MFJ filter.

To hear the filtered output (essential) you can connect an external speaker to the filter via a standard 3.5mm jack on the rear panel. The MFJ-784B's audio stages are able to deliver around 2.5W in a 6Ω load - plenty enough for most external speaker systems. There's a separate volume control on the front panel so once the main input level has been set, you can use the filter's volume adjustment to set the best listening levels. You can also monitor using headphones via the 6.3mm jack also on the rear panel.

A second option for connecting the filter would
be to use the line or tape output socket on your receiver. This feeds a fairly constant level signal that's unaffected by the receiver's volume control setting. The only limitation here is likely to be the lack of drive from the receiver. The MFJ-784B requires a fairly high output level of approximately 2.8V p-p which is somewhat higher than some receivers can deliver.

One of the advantages of using the receiver's line output is that you can perform an easy comparison between filtered and unfiltered audio simply by turning-up the receiver's volume control. Getting the signal level right is helped by the ten-way switch. Of the two options the first five are tuneable filters whilst the remainder are specialist filters set-up for particular receive modes. The first manual mode is called L/HR which means low reject and high reject. This lets you set the lowest and highest frequencies that the filter will pass. The two settings are independently adjustable using the two uncalibrated tuning knobs on the front panel. A typical example of where this filter would be useful is to reduce interference from an adjacent station. If, for example, you were suffering a lot of high frequency splatter you could gradually wind-in the high frequency rejection to get the best compromise between signal readability and interference rejection.

The next filter was a straightforward band-pass filter. In this case one of the tuning knobs was used to set the centre frequency, whilst the other set the bandwidth. The adjustment range was extremely wide with bandwidths from 40Hz to 2.1kHz and a centre frequency from 300Hz through to 3.4kHz. This filter was further enhanced by a pair of band-pass filters that interacted with the single band-pass filter. To use this feature you first set the required bandwidth with the ordinary band-pass filter. Once set you then switch to 2BP and used the two tuning knobs to set the centre frequencies of the two filters. The bandwidth setting have been remembered from that last used by the band-pass filter - ingenious!

Next comes the first specialist filter, which in this case has been optimised for c.w. signals. This is much the same as the BP filter except the centre frequency range is restricted to 300 to 1kHz thus making adjustment of the centre frequency very much easier. Operation is further simplified by the inclusion of what MFJ call a c.w. spotting tone. This is activated by pressing and holding the PROGRAM button and injecting an audio tone that matches the centre frequency of the band-pass filter. All you have to do is either adjust your receiver or the filter centre frequency for a zero beat and the filter is accurately aligned. I thought this was a great idea and certainly made c.w. operation very easy. Single sideband (s.s.b.) was also very well catered for through a customised BP filter with a centre frequency range of 600 to 1700Hz and bandwidth adjustable between 1 and 2.5kHz. The settings are chosen so that the best starting point is likely to be with both controls centred.

Pre-set Specialist Filters

The next set of filters have pre-set characteristics optimised to suit specialist data modes. These filters were essentially band-pass filters with the pass-bands chosen for the following trans-missions and speeds. RTTY 45 baud 170Hz shift, h.f. packet 300 baud 170Hz shift, AMTOR 100 baud 170Hz shift and PACTOR 200 baud 170Hz shift. Each of these modes was also pre-set to use the frequency filters are the heart of the MFJ-784B and basically let the operator choose which band or bands of frequencies are to be passed. Selection of the type of filter to use is determined by the ten-way switch. Of the two options the first five are tuneable filters whilst the remainder are specialist filters set-up for particular receive modes. The first manual mode is called L/HR which means low reject and high reject. This lets you set the lowest and highest frequencies that the filter will pass. The two settings are independently adjustable using the two uncalibrated tuning knobs on the front panel. A typical example of where this filter would be useful is to reduce interference from an adjacent station. If, for example, you were suffering a lot of high frequency splatter you could gradually wind-in the high frequency rejection to get the best compromise between signal readability and interference rejection.

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For those of you that do not require the reaction time of the scout, the new Cub frequency counter is the ideal scanner companion.
US high tone set of 2125-2295Hz. However, this could be changed through a special programming sequence that I'll cover later.

The final pre-set filter was marked SSTV/FAX/WE/EFAX which was a little surprising as the filter requirements of these modes are quite different. Despite the panel markings the filter was actually set-up for SSTV. The arrangement was two band-pass filters, the first of which passed 1050-1350Hz for the sync. tone and vertical arrangement was two band-pass actually set-up for SSTV. The markings the filter was different. Despite the panel these modes are quite as the filter requirements of I'll cover later.

Continued from page 41

Filter 784B incorporates a DSP denoiser. This is one of the specialities of DSP and uses the power of the microprocessor to tackle random or white noise. It does this by analysing the incoming signal to identify coherent signals such as speech or data. It then creates sets of constantly varying band-pass filters specifically designed to pass only the coherent components. This narrow, specialised, filtering provides rejection of the random noise components. In the MFJ implementation a front panel control is provided to vary the degree of reduction. Under ideal conditions the denoiser can provide up to 20dB of random noise reduction.

**Noise Reduction**

In addition to noise reduction from good filtering the MFJ-784B incorporates a DSP denoiser. This is one of the specialities of DSP and uses the power of the microprocessor to tackle random or white noise. It does this by analysing the incoming signal to identify coherent signals such as speech or data. It then creates sets of constantly varying band-pass filters specifically designed to pass only the coherent components. This narrow, specialised, filtering provides rejection of the random noise components. In the MFJ implementation a front panel control is provided to vary the degree of reduction. Under ideal conditions the denoiser can provide up to 20dB of random noise reduction.

**Programmable Filters**

Just to conclude an impressive array of features, the MFJ-784B has ten programmable filter memories. This is an extremely powerful feature that lets you store up to ten filters settings for later recall. You can, therefore, use the MFJ-784B's filter controls to build custom responses and store them in one of the ten memories for later use.

**Performance**

Quite simply this is one of the very best DSP unit I've encountered. MFJ have taken all the advantages of a conventional analogue filter unit and brought it right up-to-date through the clever use of DSP technology. When first used it's very easy to get in a mess and you really do need to spend a little time to familiarise yourself with the filter's controls. To help with this the manual contained a very handy beginner's section that guided you through the basic settings for c.w. or s.s.b. reception.

One of the notable points about this DSP filter is the lack of audio distortion. Some of the earlier filters caused quite severe distortion of the filtered audio that made it sound rather like a cheap speech synthesiser. The MFJ filter exhibited no such problem, even with quite severe filter settings.

Throughout my tests, I was impressed by the very steep sides of the filter responses. A check of the specification shows that the rejection was 47dB or at 60Hz, away from the filter edge that is really quite staggering performance. What's also impressive is the very flat response within the pass-band which was generally within 0.5dB! These sorts of performance figures were totally unattainable on the amateur market just a few years ago.

Other than the factory defaults using the US high tones I had a job to find any complaints. The golden rule, as with all filter systems, is not to over-filter.

**Summary**

What more can I say - The MFJ-784B is a very capable audio filter with staggering technical performance. The filter responses were near theoretical perfection and the convenience features such as c.w. spot tone and filter memories just make the whole unit a pleasure to use.

Although not specifically designed for broadcast use, the filter will prove invaluable for broadcast DXers as you will be able to pull signals out from the mush. I can confidently recommend the MFJ-784B as an excellent state-of-the-art filter. I wonder if I could persuade Santa to come early this year! The MFJ-784B costs £259.00 and is available from Waters & Stanton, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (01702) 206835. Fax: (01702) 205843.

My thanks to Waters & Stanton for the loan of the review model.
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Get the Most Out of Your Radio
If you are a regular radio listener, then at one time or another you have probably wished that there was an audio equivalent of the video recorder to tape your favourite programmes. Help could be at hand with the launch of Sony's new ICF-SW1000T, a radio that thinks it's a cassette recorder. Or is it a cassette recorder that thinks it's a radio? Peter Shore has been trying to find out.

At first glance the ICF-SW1000T, the latest Sony digital short wave receiver, looks similar to the family of radio sets that has borne the name '7600' over the past few years. It is about the size of a small paperback book, has a loudspeaker on the left hand side of the front, and the liquid crystal display and most of the control buttons to the right.

Take a closer look, though, and you will find some controls that are not found on other Sony models. The giveaway is the switch marked MODE: RADIO/REC. Those clever people at Sony's design department have managed to combine a world band radio with a cassette recorder. But where on earth is the cassette? Turn over the set to where you might normally find the battery compartment and a stand, and you'll see a cassette window. Slide along a button above the window, and it opens to reveal the capstans and recording head, neatly attached to the base of the window.

Unique selling point?

If you have followed the short wave radio market for a number of years, you will know that attempts to incorporate cassette recorders into short wave radios have been few and far between. Sony have produced a couple, including the most recent WA-8000 (which can still be found in some retailers). Sangean still make a table-top radio cassette - recently restyled - marketed in Britain under the Roberts name, and in Germany as Siemens.

So what stops manufacturers producing radios that record? Nothing, it seems, except the public's reluctance to part with cash to buy such a beast. There are plenty of combination stereo systems that offer a cassette player along with a tuner, but few record directly from radio, and none have short wave bands worth anyone's while. Speak to keen radio listeners, and you'll find many people who want to record The Archers in order to listen at a more convenient time. Maybe the manufacturers need to be prodded.

Through its paces

Meanwhile, back at the new Sony product, let's look at what it can do. Essentially, it seems to be a hybrid of the ICF-7600G and the tiny ICF-SW100 (reviewed in the May '94 issue of SWM). The radio offers the standard continuous coverage from the very bottom of long wave, at 150kHz, to the top of the short wave, at 29.999MHz. There is also f.m., running from 76 to 108MHz. Tuning steps are 1kHz on long, medium and short wave, plus 9kHz on both long and medium wave and 5kHz on short wave. The medium wave steps can be switched to 10kHz to take account of channel spacing in the Americas. Rather than hiding a tiny step control switch away in the battery compartment, step change is conveniently achieved using the keypad.

Stations can be tuned by entering the frequency. The set uses the standard Sony convention of a single press of the DIRECT key, followed by the frequency in kilohertz on the calculator-like keypad and then a single press of the ENTER key. Alternatively you can tune up and down the bands by means of the four up and down keys. The outer buttons change frequency in the larger steps, the inner in the 1kHz steps. The user can also step through the broadcast bands by holding the AM BAND button and simultaneously pressing either one of the up or down keys.

Like all radios with clocks, this set has a sleep function to turn it off automatically after a pre-determined time. You can choose a switch-off time in ten minute steps between 90 and ten minutes and the display shows the duration chosen. This sleep facility has been cunningly designed also to control part of the recording function.

Continued on page 49
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Shop: SRP Radio Centre, 1686 Bristol Road South, Rednall, Birmingham B45 9TZ. Tel: 0121-460 1581/0121-457 7788
Synchronicity rules, OK?

The ICF-SW1000T provides standard a.m. reception, although disappointingly the bandwidth cannot be switched between wide and narrow. In addition, signals transmitted in single sideband can be resolved using the selectable upper and lower sideband control. The now ubiquitous synchronous detection mode is also included in this Sony digital. If the short wave broadcast you are listening to has another station on a neighbouring frequency causing interference, you can select the synchronous detector and the set will lock on to whichever of the two sideband components of the broadcast signal that carry the audio unaffected by the interfering station. Reception can often be greatly improved using this facility.

Synchronous detection can also help to counter the deep fading effects which can mar short wave reception. It does this by generating a pure carrier that is synchronised with the broadcast signal’s carrier. This compensates for the distortion problems caused by fading of the original transmitted carrier signal as it travels through the ether.

What’s on display?

The frequency that the receiver is tuned to is displayed in megahertz in the liquid crystal display; the figures are clear and easy to read. The display can be illuminated by pressing a button on the right hand edge of the front face. To save battery power, it switches itself off after around 20 seconds. On the test model, the light faded gently instead of switching off suddenly. In the top left of the display is a rudimentary signal strength meter - if the word TUNE is shown, the set believes that it is locked to a strong signal. If part of the display is blank, the signal is very weak or non-existent.

The other radio-related information in the display concerns memory functions. Up to 30 frequencies can be stored in three pages of ten memories each. Programming the memory is simple: call up the frequency and press ENTER and the memory preset number is shown. If you want to assign that station to Switching through the three pages is done using a simple toggle switch marked PAGE. To aid rapid selection of stations at home and abroad, you might want to save local f.m. stations in page one, favourite international broadcasters on page two and BBC World Service on page three. In addition to frequency, the memory presets also store reception mode (standard a.m., synchronous detection or one of the sidebands).

Recording

Let’s flip the set over and see how the cassette recorder works. Slide the release key to open the cassette window, and slip in a cassette. Gently close the unit (bear in mind that the window itself houses part of the cassette mechanism - I wonder how robust this arrangement is?) and press the play button on the top of the set. The cassette motor comes on, and the display changes from clock or frequency to show the word PLAY, and an arrow provides information on the direction the tape is travelling as this is an auto-reverse system. Tapping the play button again changes the direction of tape travel. Recording a programme can be manual or automatic in operation. If you are listening to a radio station and want to record it, the procedure is identical to any other cassette machine: just slide the record button and the recorder starts to work. You can choose which side of the cassette you want to record using a combination of buttons.

If you want to set the machine to record at a later time, the procedure is more complicated, but can be mastered quite quickly, and it works on the same principle as setting the radio to wake you up. There are two ‘standby memories’ which can be programmed with a frequency and wake-up or start time in addition to the 30 conventional presets and either one or both of these can be chosen to start the record (or wake-up) function. The digital display confirms your choice with the word STANDBY followed by ‘a’ or ‘b’. Once you have selected the time, it is necessary to choose the record duration using the sleep facility. A single press of the sleep button, immediately beneath the radio on/off switch, selects 60 minutes, then further presses switch through 10 minute intervals down to ten minutes, then back up to 90 minutes. This seems confusing on first examination, but it has probably been chosen by the Sony engineers as a C-60 cassette is the preferred recording medium, and an hour is probably the length of programmes most often recorded by listeners.

The final step to ensure that record mode is selected is switching the MODE knob on the front panel from RADIO (use this for a radio alarm function) to REC. While the display indicates that the standby mode is selected, there is no visual confirmation that the recording function is set to operate except for a tiny little window alongside the MODE knob which changes to a red colour when RECORD is chosen.

Sony have included a tiny stereo microphone that can be clipped to clothing and this provides good audio for recording speech. Note, however, that the Sony microphone is ‘phantom-powered’ from the set’s battery and therefore other microphones may not be suitable for connection to the ICF-SW1000T.

How well does it work?

On short wave, the ICF-SW1000T is good, and in some cases better than other

Continued on page 50
receivers made by Sony. It seems to have consistently good sensitivity on all parts of the broadcast bands. On long wave and medium wave the sensitivity is only fair. Reception on f.m. is going to be most troublesome as the set overloads when presented with strong signals. There is a sensitivity control on the set and if you live in an area where there are a number of local high power f.m. transmitters you will need to switch this to LOCAL, but remember to change it back to DX when listening to a.m. signals. An external antenna can be connected for a.m. listening and the handbook suggests connecting Sony's AN-100A active antenna, but in practice I do not believe that this is needed for listening in Europe.

Selectivity on short wave is very good, and use of the synchronous detection facility makes listening on this receiver quite pleasurable except in the most extreme conditions. However, the filter has clearly been optimised for short wave reception, and is perhaps too narrow to allow good audio on medium and long wave stations. On f.m. selectivity is, as in all Sony portables, too wide to cope with the large number of stations closely spaced in metropolitan - and increasingly in rural - areas. This is disappointing, especially in a set aimed at radio enthusiasts who may well want to DX the f.m. bands.

**Conclusions**

Overall, this new radio cassette recorder performs well on short wave, and offers reasonable reception on other bands. It is well designed, and once the comprehensive handbook has been digested (there are some interesting translations from the original Japanese into English), easy to operate. Incredibly, just three AA-size batteries are needed to run this machine, and just one of those powers the cassette section. In practice you can expect around 18 hours listening and up to five hours of cassette operation on one set of batteries. An external 3V d.c. adapter (not supplied) can be connected to save battery consumption. The audio quality is high even though the loudspeaker is not enormous, and recording using the stereo microphone supplied is high quality. Stereo mini-

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**Specifications**

**Radio Section**

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>LW</th>
<th>MW</th>
<th>SW</th>
<th>VHF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>150 - 529kHz</td>
<td>530 - 1620kHz</td>
<td>1.621 - 29.999MHz</td>
<td>76 - 108MHz</td>
</tr>
</tbody>
</table>

| Modes | a.m., s.s.b., c.w., f.m. stereo |

| Audio output | 250mW (10% t.h.d.) mono. |

**Cassette-Corder Section**

| System | Compact cassette stereo |

| Frequency response | Playback 20Hz - 18kHz | Record/Playback 70Hz - 8kHz |

| Power | 3 x AA batteries (two for radio, one for cassette) 3V d.c. external |

| Size | 176 x 105 x 40mm |

| Weight | 599g with batteries and a cassette |

| Sockets | Microphone, earphones, 3V d.c. power, external antenna |

| Accessories | Stereo lapel microphone, Stereo mini-headphones, "Washing-line" antenna, Carrying case and strap |

| Options | Mains adapter, Active antenna |

headphones come with the set, and offer excellent reproduction. Surprisingly no noise reduction has been included in the cassette. I had a minor niggle about the cassette window opening knob: it is very small and is located too close to the upper opening edge of the window. Consequently I found that my fingers prevented the window from swinging open. I am also doubtful about the concept of incorporating the expensive parts of the cassette recorder in the opening window. Some engineers I showed the set to expressed reservations about the ruggedness of the arrangement. The watchwords are: treat it gently!

Having said all that, I found the ICF-SW1000T a pleasure to use, and was impressed with its capability on short wave and the flexibility of its recorder. Audio quality is good, too.

**Who's it for?**

If you asked me who I think would be the prime customers for this set, I would say anyone who wants a convenient, pocket-sized receiver with built-in cassette function. And that means a huge number of people who enjoy radio but complain that there is no sensible radio equivalent to the video recorder. But I have to say that when I first learnt the retail price of this piece of kit, I was amazed. The UK retail price is £429.99, which is more than a wide range of sophisticated NICAM stereo video recorders. The advantage is clearly the size, and miniaturisation of components costs money. So does it offer good value for money? I'm not entirely certain, but if you have spare cash and are in the market for something that has this many functions, go for it! My thanks to Sony UK and Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4OS. Tel: (01702) 206835 for supplying the sets for review.
Well, Christmas has come and gone and fortunately so has the pirate radio silly season. Reports regularly arrive here with suggestions new Radio Caroline ships are being prepared to do battle with the DTI. Another seemingly unlikely story was the equipping of a former lightship in Portsmouth harbour for use as a pirate station off Israel. The Israeli government have legislated against offshore stations and are establishing licensed commercial radio. The business potential of any offshore broadcaster would be seriously reduced. As light vessels don't have their own motive power I would suggest the towing charges would have exceeded the value of the entire project and the surrounding publicity an enticement to the DTI to do something.

Caroline Haunts Agency

Colin Clark kindly sent me a copy of DTI News, this is the in-house newspaper of the Department of Trade and Industry. The Radiocommuniations Agency moved into their new offices at SouthQuay 3 during October to find Radio Caroline's Ross Revenge docked almost outside their front door. The director of the Radio Investigation Service, Barry Maxwell is pictured standing by the Ross after having exchanged memories with the crew. It was officers from his department that, in August 1989, were involved in raid on the Ross Revenge in which they systematically stripped the entire vessel of all its broadcasting equipment while in international waters. In a by-gone age pirates treated their adversaries of the past. perhaps some sort of atonement is in order.

East Coast Commercial

There will be few short wave pirate listeners that will have failed to notice the absence of East Coast Commercial. Sadly Norman Nelson the station operator died of a brain tumour on 22 November 1995, he was 49. He will be remembered for his popular first Sunday in the month DX Programme and his enthusiastic efforts towards providing information and entertainment for minority tastes by small s.w. stations. It is by no small coincidence that the logs provided by the Free Radio Monitoring Service are now a thing of the past.

Feedback

Horizon Sales have announced a change in name. For years John and Jenny Knight have sold Radio Caroline merchandise from their home near Ramsgate. Now, to establish a fresh corporate image and clearer indication of where their revenue goes, Horizon has become Radio Caroline Sales. The radio trade magazine Playback has amalgamated with Marketing News. This merger has increased the size of the publication to include employment opportunities for broadcasting staff.

The anticipated surge of community radio licences, to replace the urban f.m. pirates, seems now to be on hold. Some proposed mini-stations have suggested using volunteers to staff their stations, at least at off peak hours. While others may pay token wages to part time employees so their salaries can be topped up by social security benefits. This could undermine the wages in the broadcasting industry and also give a new meaning to the words Free Radio!

Short Wave Radio Switzerland is now relaying former pirates over the 10kW transmitters of the Italian Radio Relay Service (IRRS) in Milan. The attraction is that it is totally legal with Europe-wide coverage and a choice of two different frequencies. Charges are priced in US dollars and are approximately £50 per hour. A rate card can be obtained from SWR Switzerland, PO Box 35, CH-6027 Romerswil, Switzerland.

RPA AMSTERDAM

This actually stands for Rose Panter Amsterdam. It is Pink Panther Amsterdam. This station started in December 1994 and broadcasts on occasional Sundays in the 48 metre band. Using just 25W RPA has regular listeners throughout Europe, identification is given in English. Operator Piet says he likes to experiment with home-built transmitters and commercial free programming. He also says that SWM is available in Amsterdam at the English Book Shop.

Underground Music

Living in Folkestone I frequently get asked about radio in the Channel Tunnel. Clearly reception is impossible underground, however, the Shuttle trains that carry cars and light vehicles are equipped with two on-board f.m. stations. One is in French, the other English, the frequencies are advertised in the carriages and programmes are recorded by a French company. Other information is provided on an illuminated moving message display in each compartment.

The UK terminal has an eight year RSL 'Channel Travel Radio' on 107.6MHz (mono) that comes from the Eurotunnel control building. The information includes departure times, currency exchange rates, duty free offers and both pop and classical music. Presentation is mostly live, 24 hours a day with staff on air approximately eight hours each shift. Future plans include low power roadside relay stations along the M20 towards Maidstone. One does wonder about the vulnerability of these repeaters to vandalism or theft. The address for Channel Travel Radio is PO Box 2000, Folkestone, Kent CT18 8XY.

Angel Nicked?

A communiqué received from Angel FM says that they informed the Radio Investigation Service of their intended final broadcast on Sunday 14 January 1996. This last programme was interrupted halfway through by the RIS who decided to attend this final celebration, they triumphantly departed with almost £4000 worth of confiscable equipment. Angel hope to secure a community radio licence for the Portsmouth area, however, persons convicted of pirate broadcasting offences face an automatic five year ban on any involvement in legal radio. Short wave listeners should remember that the Angel Radio relays carried by WNKRF and Radio Zodiac on Sundays.
Very state in Europe, from Portugal in the west to Russia in the east, and from Spain in the south to Norway in the north, has an international radio station and consequently the continent has the highest concentration of international broadcasters compared with any other region of the world. But European countries, like almost every other area of the world, are having to tighten their belts when it comes to public expenditure and the budgets of state-funded broadcasters are feeling the pinch.

**Budget cuts**

Britain's BBC World Service has been told by the government that it's budget is to be cut by up to 20% over the next three years by up to £20 million. Capital expenditure - that's the money spent on buildings, transmitters, tape recorders and computers, for example - is to be reduced and the BBC will have to use the Public Finance Initiative to fund the rebuilding of its transmitting station in Oman. In addition, the revenue budget - the money that goes on staff salaries, travel, paper and recording tape - is to be cut.

This news incensed many MPs across all parties and in January the Labour Opposition called a debate that protested against the planned cuts which, it said, could reduce the station's effectiveness globally. The debate caused the Foreign Office that administers the World Service budget to give an assurance that if actual programmes were affected by the cuts, it would re-examine the situation.

Meanwhile in February, BBC World Service announced that its audience had reached a new peak. 140 million people now tune to BBC World Service at least once a week in English or one of the other 41 languages that are broadcast from Bush House.

**Deutsche Welle**

In order to trim costs, many stations are rationalising their use of energy-hungry short wave transmitters. Deutsche Welle has operated a relay station on the Mediterranean island of Malta for the past 20 years, but during January transmissions from Cyclops ended as DW's contract, which ended at the end of December 1995, was not renewed.

The reason? DW has over capacity in terms of short wave transmitting at its own sites in Germany. The Jülich station near Cologne (where DW's headquarters are located) will close during 1997, and the Voice of America has stopped using the Wetachtal station. It will probably lease out spare time on its domestic short wave facilities, and investigate the hire of medium wave transmitters on the European mainland to distribute some of its programmes.

As if to prove the point, Radio Víñius began relays from DW transmitters at the beginning of January, replacing the relay from Russian facilities. The North American service at 0000UTC is carried from Germany on 5.91MHz. The first 30 minutes is in Lithuanian, followed by English.

**Global Expansion**

The story across Europe is not entirely one of gloom, however. The budget of Radio France Internationale is being increased by the French media authorities, drawing on an increased portion of the domestic TV licence fee. And Italy is in the throes of a major global expansion of state international radio services around the world. Regular readers will recall that RAI is beaming Italian language programmes to South America, and is produced by a team split between Bush House in London and the WGBH studios in Boston. Listeners in Europe who want to practise their Portuguese language skills can tune in on Monday to Friday, 1700-2000 on 6.130, 9.780 and 9.815MHz.

**Takeover Bid?**

It could be said that Americans are trying to take over Europe. BBC World Service launched a co-production, one hour long news programme in January with WGBH, the public radio station in Boston (which is also a TV station - you may have seen the call letters on the closing credits of TV programmes including many of the BBC's natural history productions).

The programme, called The World, is aired on a small number of public radio stations in the US at present, and will expand in the Spring.

It aims to bring a different perspective on global news to that usually heard in the US, even on the less tabloid public radio stations, and is produced by a team split between Bush House in London and the WGBH studios in Boston. Listeners in Europe have the chance to listen via the World Network satellite channel on Astra.

And WRN is now carrying America One throughout the day on Astra's transponder 22 at the audio subcarrier on 7.740MHz. Programming comes from National Public Radio (famous for All Things Considered, the drive-time equivalent to Radio 4's PM that could be heard on short wave via AFRTS until a few years ago) and Public Radio International. The launch of the new service means that WRN's schedule has altered a little (it's also on Astra transponder 22, but uses the audio subcarrier on 7.380MHz). NPR has moved from the 1900-2100 slot, replaced by the Voice of America, then VOA Radio Finland and Deutsche Welle.

For full information about America One, contact: the station at Bernt-Notke-Weg 2, 81927 Munich, Germany. World Radio Network is at Wyvil Court, 10 Wyvil Road, London SW8 2TG, UK.

That's just about all for this time, except to note that it seems public service broadcasting still has a place in Europe. Rupert Murdoch put forward a bid for television coverage of the Olympic Games to the year 2008, but was beaten by a negotiating team from the European Broadcasting Union who offered less money but guaranteed more viewers, as EBU members are the national terrestrial broadcasters in each European country. Maybe that means there is hope for everyone who believes that commercially run stations are not the be all and end all of broadcasting.
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The long-awaited Quadrantids meteor-shower activity in early January was masked by some Sporadic-E reception! Openings occurred on January 3 and 4 with signals from central and south-east Europe, notably from Germany on Channels E2 and E3, Slovenia E3, Serbia E3 and Croatia E4. On the 7th there were signals on Channel R2 from Hungary (MTV-1) and possibly Moldova, while on the 8th the Danish PM5534 test card made a brief appearance on Channel E3.

Serbian TV was identified on the 8th the Danish PM5534 test card made a brief appearance on Channel E3. To round off the month, a short Sporadic-E opening from the east materialised on Channel R1 around mid-morning on the 31st.

An unusual short-lived tropospheric opening also occurred on the 4th from the Netherlands at around 1740 with NED-1 on Channels E4, E6 and E7 and NED-3 on Channel E30. By 1815, the signals had completely disappeared!

Reception Reports

On January 4, Paul Logan (County Fermanagh) noted strong Sporadic-E signals from Eastern Europe between 1230 and 1315. A nature programme from TVP-1 (Poland) on Channel R2 was present with colour and sound being resolved for most of the time. At around 1330, ARD-1 (Germany) put in a brief appearance on Channel E2. TV Nova (Czech Republic) was present on Channel R1 with ‘Married With Children’ and possibly Cheers. Paul comments, "I wonder what the Czech audience make of these programmes!" It seems that TV Nova shows mostly American programmes. They also have a Czech version of Spitting Image complete with a latex puppet of Vlastav Havel!

Stephen Michie (Bristol) logged different signals to Paul during the opening on the 4th. At 1340, RAIUNO (Italy) was present on Channel IA, while on E2 only weak line synces were present; pictures could not be resolved. Text pages from Slovenia were seen on Channel E3, identified by the SLO-1 logo and Telertext page headers. By mid-afternoon, German widescreen programmes had appeared on Channels E2 and E4 and by 1513 an episode of Star Trek was seen via Austrian TV on E4 from the ORF-1 Patscherkofel transmitter.

Slovenia was later noticed superimposing its own SLO-1 logo over Austria’s ORF-1 logo during a basketball game. Around 1525 HRT-1 programmes from Croatia were resolved on Channel E4 from the Psunj transmitter. Slovenian and Croatian signals continued after the midday opening to the south-east.

Tom Crane (Hawwell, Essex) used a scanner to monitor Sporadic-E signals late in the afternoon on the 7th. Channels R1, R2, E3 and E4 were particularly active between 1630 and 1750. Channel R2 signals came up to ‘TV level’ and at 1630 Tom noticed a logo in the top-left corner of the screen resembling the TV Moldova ‘RM’ logo. The scanner frequency read 59.239MHz.

Peter Barber (Coventry) has submitted an excellent log for January 4, 7 and 9 with entries resembling most DXers’ summer logs! On the 4th, signals were received between 1512 and 2156, although the later reception was due to Nederland-1 signals from Lopik that are present for most of the time. Peter identified RAIUNO at around 1500 on Channel IA and German sound from ARD-1 on E2 at 1530. A Sporadic-E opening on the 7th between 1238 and 1615 brought in Slovenia on E3 with subtitles. By 1320, the E3 signals were coming from Serbia, identified by the PTCB1 logo in the top-left of the screen (the shape of a satellite dish is part of the logo). German ARD-1 signals on Channel E2 were also identified. A late-morning opening on the 9th also produced Channel E3 signals from the south-east, notably from Slovenia and Serbia; the latter was showing a dog listening to a choir.

Since retiring from work, Peter is into TV DXing in a big way and is able to devote plenty of time to monitoring signals with his TV sets and a scanner. Apart from keeping a traditional log, a graph of real-time activity (between 0500 and midnight) against days of the year is carefully plotted with a fine-tip pen to enable the incidents of reception and their duration to be seen at a glance. This type of useful information is difficult to deduce from a normal written log.

Examining a copy of the graph that Peter has submitted, it clearly shows that Sporadic-E openings suddenly increased in intensity and duration during the last few days of May 1995 with sustained activity throughout June and July but with a drop-off around mid-August. This type of chart also shows that several openings can occur on any particular day. Of course, channel details cannot easily be shown unless a separate chart is produced for each Band I channel.

News From France

Lionel Michelland (La Rochette, France) has supplied some information about the current TV scene in France. A possible merger between ‘La Cinquième’ and ‘Arte’ may take place in three years’ time, currently part of the current leader board.
producing a network called 'France 5'. At the moment 'La Cinquième' is available from 1500-2300UTC in the Paris area (also Epinal and Cannes via cable) while 'Arte' broadcasts between 1800-0100UTC.

The regional TV service '8 Mont Blanc' that serves the Savoie Haute region, located to the east of Geneva, frequently exchanges programmes with the Swiss TSR network. There are also plans to launch a joint Swiss/French TV regional service in the Lac Leman/Geneva area, that includes the Swiss cities of Geneva and Lausanne and the French resort of Annecy. The station will be called 'Tala Leman' and may be based in Lyon. The decision has still to be made as to whether the French system L (SECAM) or the Swiss system B/G (PAL) will be adopted.

Digital terrestrial TV tests will take place in September 1996 in Nantes and an evaluation committee has suggested that a 7th terrestrial TV service may be feasible in some French cities, depending upon the availability of spare terrestrial channels.

A microwave-distributed TV service (MMDS) has commenced in the south of France with Taladiffusion de France (TDF) offering 12 programmes. Frequencies in the range 3.6 - 3.8GHz have been chosen for the transmissions rather than the more common 2.5 - 2.7GHz range used by MMDS in other countries.

The Pay-TV service 'Canal Plus' now has four million subscribers in France. Meanwhile in New Caledonia the former 'Canal Caledonie' TV service has been renamed 'Canal Plus Caledonie'. Similarly in Polynesia the 'Canal Polynesie' service is now known as 'Canal Plus Polynesie'. Service name changes have also taken place in Quebec, Canada, where the French language network has changed from 'Radio Quebec' to 'Tala Quebec'.

Belgium: RTBF-1 (French-language service) shows various text pages throughout the night plus programme schedules in the 16:9 widescreen format; programme trailers are frequently shown during the daytime.

BRTN-1 (Flemish language service) shows a widescreen PM5544 through the night with text pages after 0900. Last December, BRTN-2 were seen transmitting a widescreen PM5544 during the late afternoon on Channel E52.

Netherlands: During the transmission closedown sequence, Nederland-1 uses a blank clock and the standard PM5544 test card switching to the appropriate transmitter location name.

Nederland-2 radiates a clock caption with '2 Einde' superimposed. This is followed by the widescreen PM5544, then the FuBK test card with the transmitter name. A 'Pauze 2' caption is sometimes aired during the day.

Nederland-3 usually radiates sample pages of text throughout the night, but sometimes a stylised caption is transmitted.

Stephen also advises that Breakfast TV is now shown via the Nederland-3 network and not Nederland-2.

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First of a three part competition with the star prize of the superb top flight AR7030 communications receiver.

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You will need to complete the form below with the answers to all three questions, affix the competition corner flashes from the May and June issues and return your completed entry to AR7030 Competition, Short Wave Magazine, Arrowsmith Court, Station Approach. Broadstone. Dorset BH18 8PW.

Only fully completed entries on the form below can be accepted.

Closing date for this competition is 26 June 1996 and the draw will take place 27 June 1996 the winner will be announced in the August issue of SWM.

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Short Wave Magazine, April 1996

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Short Wave Magazine, April 1996

Satellite TV News

Heavenly Sightings.....

Thursday February 15 saw the Sea Empress come into rocks at St. Ann's Head, Milford Haven in South Wales. One of the largest tugs in the world, a Chinese crewed vessel lay nearby in the bird disaster, having scoured the local Chinese restaurants for a Cantonese speaking interpreter to help with communications, refloating after several hours of radio talkthrough - the tug remained at rest.

The media, aware of the impending disaster, were soon on the cliffs at St. Ann's Head. SNG van UKI-149 appeared February 18 with early morning five inserts into Sky News advancing the 12.536GHz vertical transponder on Eutelsat II F3 at 18°E. UKI-149 stayed atop the cliffs for several days reporting progress of the refloating attempts. Gale force winds seemed to move the uplink dish from correct boresight as sudden short-lived fades were apparent from time to time. At 16.00hrs of the 18th the ident "TSG95" appeared and the 19th at 0745 both 'TSG95 and UKI 149 TANKER' appeared with News at Ten inserts (Sky) from Powys 'on top of the Brecons' featuring snow blocked villages, snow drifts and more snow. The next morning UKI 49 was again busy for the 0800 Sky News from a layby in a pine forest, more snow and a camera zoom in to a caption 'propped on an engineer's feet '3 day old wet feet'!

Odd to see a card held up for a camera white balance in an area where 95% was virgin white, untrudden snow! And UKI 49 on the 9th has motored North and appeared in a Dumfries street, snow piled up several feet and fears of flooding from thawing snows and a nearby river. Eutelsat II F3 12.536GHz vertical worked overtime during this period.

Good to hear from Alan Smith, our Thailand contact, who received signals from the recently launched PAS-3R slotted at 43°W.

Another of the varied offerings via Intelsat K.

Intelsat K 21°W with many programme/feed sources familiar to UK zappers, in C Band on the 870mm dish he views BrasilSat 81 and watches 16 unscrambled using threshold extension, in addition though invisible on 81 are 12 scrambled digital channels and five scrambled analogue channels. Previously Paulo had a 2 metre C Band dish but removed it from the balcony as it was becoming too crowded!

John Locker (Wirral) has now received signals from the recently launched PAS-3R slotted at 43°W (in position 18 days after launch) though as yet only S Band beacons have been monitored. Both John and myself have watched with interest the Russian Express satellite at 11°W that in recent times during early Ramadan has been downlinking Saudi TV at 11.525GHz circular. Ramadan has - as ever - been carried extensively by the Arabic stations, ART on Eutelsat 16°E featured live daily Saudi TV outside broadcasts with both English and Arabic commentaries.

Did anyone watch the later afternoon Ramadan 'programming'? Shots of the temple area showed the evening sky, yet within a matter of a few minutes the sun had set and the sky was completely black, a very rapid sunset which is (I'm told) a feature of those regions near to the Equator? Ramadan continues into February, ending typically mid-month.

Good to see the famous Eurovision logo recently when an ORF-Austrian outside broadcast unit covered Snowboarding at Lein Januar 28, this the FIS World Cup. The Eurovision March music was played out and the programme ran with on-site commentary and links, this on Eutelsat II F3 11.635GHz horizontal at lunchtime. It was good once more seeing a traditional outside broadcast programme rather than the usual pictures with commentary fed into a broadcaster for packaging/presentation at a main studio base. TV as it used to be!

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Intelsat K 21°W carried a programme package recently from Haiti.

Intelsat K also carries computer seminars into Europe whilst the event is simulcast across the US on the SBS-6 domsat.

Another of the varied offerings via Intelsat K.

Roger Bunny, 33 Chervil Street, Romsey, Hants S051 8F8

(pictures by John Locker, Wirral and Roger Bunny)

A gritty low level uplink signal from a Spanish outside broadcast site on Eutelsat II F2 at 10°E.

A sparkle free clean identification signal ex Baghdad - Eutelsat 16°E.

The AB-1 programme logo via the Hot Bird 1 at 13°E.
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.
I believe that it is still essential that those readers who have an ongoing interest in propagation still have access to the various pieces of information collated by Ron Ham. I have asked Ron to continue to provide his monthly barometric pressure charts in the same format as before. In the meantime I am trying to arrange for a regular supply of sunspot charts and other similar information. If there are any readers who would be prepared to provide such information on a regular basis, please get in touch with me at the Editorial Offices, Broadstone.

Ron has provided two barometric pressure charts for this issue. Fig. 1 covers the month of January 1995, Fig. 2 covers February 1996. In future each chart will cover one calendar month.

**Fig. 1: Barometric pressure chart for December 1995 taken by Ron Ham at Storrington, E. Sussex.**

**Fig. 2: Barometric pressure chart for January 1996 taken by Ron Ham at Storrington, E. Sussex.**

**Fig. 2: Barometric pressure chart for January 1996 taken by Ron Ham at Storrington, E. Sussex.**

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Short Wave Magazine, April 1996
A copy of Practical Wireless, arrived a couple of days ago, and an article in it was remarking how much more sensitive a solid-state receiver was than a valved equivalent. "So what?" I ask. It was known as far back as the thirties that a receiver could be made more sensitive than could be justified, at least in the range between medium wave and around 20MHz. This was simply because the natural background noise level, due to such things as static, was far higher than the receiver sensitivity. That ignored man-made noise, of course; nowadays, man-made pollution is rampant up to 200MHz or more. An attenuator is more to the point, as any proper s.w.i.knows. Anyway, measured sensivities haven't changed much since 1930 in the up-to-30MHz region. If you happen to live in a pad where your nearest neighbour is a mile away, your nearest electricity distribution line several miles away and not a thermostat or a computer in the place, maybe the noise picture might be different...and I would be envious!

Letters
An interesting point arises in the letter from Karl Drage who lives near Kettering. Karl remarks on how he can pick out DX on 7MHz even though the noise level is above 59. This is where we find that steadily winding down the r.f. gain (and so desensitising the receiver) will at some point cause the noise to drop considerably and leave many previously inaudible signals clearly readable! Karl notes four new countries on Top Band, 16 on 3.7MHz, 13 on 7MHz but alas none on 14MHz, and asks why he hasn't copied me. Apart from the PARC nets on Sundays at 1100 on around 3.795, and Top Band on Tuesdays 1800 around 1.937, most activity is either c.w. or on v.h.f. Mainly, of course, listening rather than operating. As to my own score, I've long since lost count. All current ones have been logged as a listener.

A strong silent chap is Geoff Wallis from Chippenham; a log put no letter. On 14MHz we find a lone VK7CW, but 7MHz seems to have been given a thorough going-over, to result in 3Y4GR, 3V8B. VE8RCS, KP4AM, 9A1TB, 9H1CW, 4NE7CCP, VK3AM, ZS6GPW, VP2AN, KP2J, HC2BN, W9LMT, VY7TN, P77WA, E8ATB, 9L1GG, a questionable YE2IN (could it have been an Indonesian "special"?), KQ4AV, JA5, 7X4AN, N6LG, AD4AI, K4COC, TAD3, W5GM, PJ6UT, KP4FO, AL7AN/457, 8P6ER, VK3APN, 9S1GP for a possible Zairean special prefix, HP7HDO, 421JS, W2LAJ, AP2MC, CO2HT, AG6KD, VY4DTG, HJP7HPK, KZ3UE, KN4AL, K7/H5SMV, KB2FK, 457CF plus the Europeans. Just goes to show what a new world opens up when you learn to copy Morse well!

After struggling with the amateur bands for years, Tom Parrotte in Weston-super-Mare has lashed out on a FRG-100 receiver and at the time of writing had this bucketed to around twenty metres of wire from the roof down to the gate. First trials showed 3.5MHz to contain SV1DP, YL1ANO, HJ7TLU, JXZSP, 6J6MV, KQ4MN, KP2AD, OSSSB, OYJD, SU2MT, TA3BN, KB9F/G in Amsterdam, TK5BF, UX9GK, UN9LM, VPZVF, PK5V/KY, VAI1K, V44NK, W67, WP4JTB, YBCB, ZA7AJ, ZASB, 4ZBFP (=4ZB), 4LJK, 7J6CCU, 9K2MU and 9Y4NW. At 7MHz Colin logged FP4J, FS5J, 6YC, JA1XUL, TB5XU, UK9A, ZS6P, 5A1A and 5N9L/GP. On a different line, Jon wonders about the ex-USSR countries lying in Asia. UA9 and UAO and the variants sporting 9 or 0; Azerbaijan was UD or 4J4K; Georgia was UF or now 4L1; Kyrgyzstan was UM or now EX2-6-7-8-9; Tadjikistan was UJ or now EY4-5-6-7-8-9; Kazakhstan was UL; now seems to be UN2. That represents the state of play as I know it; I'm not entirely convinced it's all in tabs of stone!

Sheerness in the Isle of Sheppey is home to E. H. Trowell and his antenna farm. Ted got on Top band around 0600 for FIAC, TX2C, TS3PJ, OY6UD, ZB2X, K1ZM, K3ANS, OH6MFP and EA6CC. Around the same time 3.5MHz produced KA3RS, 4AJQ, W4BQF, EA9B and 8PJHT. 7MHz was worked over on 0600 ZL4AJU, PR70, Z8VAS, then around 1600 JA0KM and 425BZ, and 1900 for VK6VZ, 3A0ANX, JS7FKP, VK2KM, EAEBU, TA4ZM, ZA1AJ, V4IT. Ted noted VU2PAI and VK3MR, at 2100 PY7XC, YA9XL, KP2J, and at 2200 the day was rounded off by FG5GH and VS6W0. 14MHz was investigated around 1600 to find 9H4AC, W6THN, 79JUD, D685E, WATDNB, EABP1, TUN7TF, FY5E and 7Z2GR: around the same time 18MHz yielded CO1CL, N0TM, TR8DF, 6YSL, DL1GK/H0, DL2G/H0, 3G3A0X/6Y9, HK0DL/M4EH and 8P9HT. Finally 21MHz and here operations around noon put a few in the log, like J2LUA, P40W, SU2MT, Z86W, TA3D, 9O3ARC, VP5FC, PY0FF, 3A0DNX, TA4ZM, 7BDOO, ZA1AJ; at 1500 LU0SGP, C08LY, 4M5X, ZW5B, HK0DL/M4EH, VP9NN, EAB1OSM, WX8R, 3I5JU/HI, Z2PRF and ZG0DC. All on c.w.

Top Band
Our anonymous contributor popped up again, to ask about Top Band in suburbia. The gear, of course, is no problem; a receiver that covers the band. On the antenna side most of us just do the best we can. Some things we can do to help. First, if we are proposing a system involving a ground connection, bear in mind that "earth" isn't a spike a couple of feet into the deck, and also that modern waterpipes have a nasty habit of being made from plastics!

Basically, you need either lots of buried radials and/or some quarter-wave above-ground radials. Buried ones, any length but lots of 'em; above-ground ones possibly bent along the property and not resonant on the band. As for the part up above, bear in mind that the useful work is done by the high-current portions. Now, this portion is about a quarter-wave - say forty metres - back from the far end; so now you know which bit of the wire should be up in the clear. Add whatever is needed to get the thing to your tuner; use the latter to bring to resonance as a system. Always remember that with these 'funny' antenna systems you are trying to reduce the losses, the "finals" noise; thermostats can usually be suppressed, and most of the line-time base noise seems to be amenable to mains leads.

Fine so far. Now remember that the DX on this band is, in the main, to be found late at night through until morning, implying a path that is all the worse. Tune everything up in the daytime when it won't upset anyone, then use it at night. The majority of DX is on c.w. of course, around 1.825MHz.
A Royal Navy 'Rescue' Sea King helicopter. It is painted grey and red with white lettering.

Brian Heath reports hearing 'Magic 52' working 'DHN68' on 8.980MHz, requesting a weather forecast for various airfields, the data was transmitted by RTTY a few moments later. Another 'unlisted' frequency used regularly by 'Magic/NATO' aircraft is 6.754MHz. They usually contact station '14P', which sometimes answers as 'Magic Command', but they often pass messages in code. They always refer to airfields by their 4-letter ICAO codes (e.g., LGP2 is Preveza in Greece, and ENTG is Gelenkirchen), and they always refer to frequencies by 2-letter codes. The most often quoted listing of frequencies and codes is as follows:

<table>
<thead>
<tr>
<th>Code</th>
<th>Frequency (MHz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>6.700</td>
</tr>
<tr>
<td>AB</td>
<td>11.228</td>
</tr>
<tr>
<td>KD</td>
<td>6.708</td>
</tr>
<tr>
<td>KF</td>
<td>6.699</td>
</tr>
<tr>
<td>NC</td>
<td>3.729</td>
</tr>
<tr>
<td>NE</td>
<td>4.542</td>
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<tr>
<td>NF</td>
<td>4.720</td>
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<tr>
<td>NG</td>
<td>4.758</td>
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<td>NQ</td>
<td>6.765</td>
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<td>NJ</td>
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<td>NK</td>
<td>11.2705</td>
</tr>
<tr>
<td>NL</td>
<td>15.050</td>
</tr>
<tr>
<td>NM</td>
<td>19.9995</td>
</tr>
</tbody>
</table>

Brian reports hearing 'Magic 57' working 'Magic Command', and asks that they QSY to 'XE'. Does anyone know which frequency this is?

Questions
I have almost run out of readers' questions, so now is the time to write-in if you have any burning questions that you want answered concerning H.F. s.b.b. communications.

The questions covered in the past few years have been very wide-ranging, so don't worry if you think that 'your' question is too simple or obscure. If I don't know the answer (which is most likely), one of the readers is bound to know!
I still haven’t discovered the routes flown by, and purposes of, the various military helicopters seen near Aylesbury (where Chris, our photographer, lives). There are often Chinooks that possibly originate at Odiham. The other weekend we saw a flight of Lynx east-to-west (prior to the airshow season). Who can tell us more?

One I do know is the new yellow-and-black helicopter jointly operated by Thames Valley, Bedfordshire and Hertfordshire Police. It will perform casualty evacuation as well as law enforcement duties, and is based at Luton. If I see it over Aylesbury, I’ll tell you more. They previously had an MBB-105 of the Police Air Service, you can tell this company’s fleet by the registrations in the G-PAS series.

On the Air (and In It, Too!)

Tim Pilling (Ashton-under-Lyne) is one of many who are interested in ACARS data transmission between aircraft and ground. Certainly, 131.725 and 131.525 carry these short, noisy bursts of data but 131.568MHz might also (in some countries). Now, I don't have access to this data myself so I'll have to ask if someone working in this field can answer do airports have their own identifiers on ACARS? If so, what form do they take?

What is the format of the data (bits, parity, baud rate, etc.)? I.R. Burkinshaw (Basingstoke) can't find this in any publication. You could write direct to ARINC, 2551 Riva Road, Annapolis, MD 21401, USA, enclosing an international reply coupon - and tell us the result. IRB still uses a Sinclair QL and if he succeeds in writing ACARS software for it, perhaps others would like to obtain a copy? Let me know how you get on. All replies to readers' letters are via this column.

While flying by Caledonian Tristar, Tim had a look at the passengers' entertainment system. Tim hopes to hear the pilot and controller talking when flying by B.777 as one of the passengers' entertainment channels is linked to the radio. But, which one? There are probably two v.h.f. and at least one h.f. set! Some earlier aircraft already offer this facility.

Anonymous (postmark Doncaster) saw a report in Newsweek (8/1/96 page 45) about the crash of American flight 985. I, too, was confused about 'releasing airbrakes' but I think they mean 'retracting the spoilers' because the Americans call them 'speed brakes'. The article shows that a navigational mistake is a plausible theory, and there's a clear diagram to back this up. Here's the theory. The aircraft passed abeam (instead of overflying) a radio beacon while descending along a valley between mountains. When trying to correct the error, the aircraft was turned back towards the beacon - the circumference of the turn being enough to bring the B.757 too close to the surrounding high terrain.

Receiver Hardware

A tip from Tim about the way scanners work. If you want to cycle through just a few frequencies repeatedly, you could place them in sequence throughout the memories. For example, Memory 1 = Frequency A, Memory 2 = Frequency B. Then you'd start again: Memory 3 = Frequency A, 4 = B, and so on. Some scanners delay when they jump from the highest numbered memory back to the lowest. Tim's technique reduces the number of times the jump has to be made.

I'm not so sure about making antennas from coat-hanger wire, although it worked for Tim. If the material contains iron (can be attracted to a magnet) then radio-frequencies will be attenuated. Copper is best! How about using a microbronate to central heating pipe?

You Fly

Mrs. B. (Isle of Man) tried to predict the route when a friend of hers visited South Africa. Although slightly too far east, it was a good guess. Her computer simulations helped, but now she hopes to try the real thing: let us know how you get on with the Private Pilot's Licence course in the USA.

Information Sources

Roger announces the continuing meeting programme for the London Society of Air-Britain. Doors open at 1900 on the second Wednesday of most months, at The Victory Club, 83-79 Seymour Street, London, W2 and there is a £4 entrance fee for non-members of the Society. For more details, send a stamped, addressed envelope to Charles Oman, Orchards, Mill Lane, Balcombe, West Sussex, RH17 8NP.

R. Frost (Felixstowe) wants a list of aircraft transiting Stansted, Heathrow, Gatwick... Sorry, not here! This would fill more space than I'm given each month. But, Air-Britain will tell you much of this. They have nationally-published magazines and there are also local branches (including one at Stansted). You'll find the London Society address in the previous paragraph, so I suggest you start by writing to Charles Oman (enclose a stamped, addressed envelope) and see what he suggests.

In March I suggested that the map of the new COWLY and WELIN sectors (A/F 112/1995) would be clearer than my written description, so readers will be pleased that you can now obtain individual copies of A/Cs from: Aerodainatic Information Services, NATS, Room 163, 607, Control Tower Building, London Heathrow Airport, Hounslow, Middlesex TW6 1JJ. You must provide a stamped, addressed envelope. Most A/Cs weigh less than 90g.

Also in March, I told you about a list of n.d.b.s from Robert

In Port Elizabeth, RSA (now also famed for its cricket!) J.B. Chamen enjoyed the International Military Airshow at Waterloof (1908), celebrating 75 years of the country's Air Force. Also, one of JBC's neighbours is retired from the Army and has just celebrated 50 years of marriage to a lady who, during the War, was one of Winston Churchill's personal secretaries!

As you can see from the photos, taken by Christine Mlynek, I met Roger Preston, a reader from Rickmansworth. He proudly showed me his yellow 1944 Piper Cub G-HEWI (various previous identities prior to 1987). Having started life in the US Army, the aircraft is now owned by a consortium at Denham.

Roger recently spent a flying holiday in the French Alps. The 'airstrip' was at 6600ft, circuits flown at just 400ft above this! Aircraft was again a Super Cub. Circuits are unconventional, taking off down-slope and landing up-slope (touching down on a short level threshold prior to running uphill). No brakes - skis! Having landed, a full-stop is enforced. The aircraft can't climb away steeply enough to get over the runway's slope.

Roger had difficulty on the radio. Chris and I are just beginning to understand French air traffic control jargon, holidaying as we do in Brittany. This year I hope to attend the Air Meet at Quiberon, hopefully on one of the first two weekends of August. If any reader will also be there, write to me in advance.

Roger Preston shows Godfrey the yellow 1944 Piper Cub G-HEWI - which is his part owner.
The Pocket UK VHF/UHF Radio. Will appeal to everyone interested in aviation from beginner to advanced. You will be amazed at the information gained - but also the interfering signals!

Please to see that the LW Maritime Radio Beacons' column in this magazine gets a mention. The basic tables look sound, and that's really what you'd buy the book for. It's a shame that I can't check the tables for accuracy but our recent foray into identifying beacons shows that the book does seem to do its job. Like so many recent references, I recommend keeping this book for its primary purpose - the beacon tables, in this case - and don't worry about the introductory text.

A database of flights to/from the UK is being compiled for ICM compatible by Len Woolley and you can have the latest copy by sending £1, a formatted 3.5in 720Kb disk and a postage/addressed envelope to him at 3 Furze Gardens, Morwenstow, Bude, Cornwall, EX23 9SX. Information on the disk includes flight numbers, day/time and some frequencies.

There's a misconception about propagation. Robert talks about the effect of high pressure weather that does indeed enhance v.h.f., etc. wavelengths - of day is the important factor as the absorbing ionospheric D-layer disappears at night, hence enhancing the propagation - but also the interfering signals!

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In a previous column I mentioned Mr David Savage and an organisation known as The Federation of Communication Services. Information now to hand reveals the gentleman in question is, in reality, the Chairman of this group. What's more, he is also Managing Director of Astec - a Vodaphone group cellular provider - and a well-known figure in the cellular world. Surprise, surprise! I can now see a motive behind the not very factual and certainly half-knowledgeable attack on scanner owners during the programme aired on BBC Radio 4 sometime back and mentioned in this column.

The type of equipment I think Mr Savage was after is a far more sophisticated piece of kit that makes even an all-singin', all-dancin' high tech radio scanner look like a baby's 'phone! The cloning scanner is connected to a computer system to obtain the off-air data that allows mobile 'phones to be cloned. This is a huge business and if Mr Savage had stated that it is this area he was interested in then fair enough. However, he did launch a major attack on a group who, in my opinion, should be put down. It's because one dog's bitten, all owner. It's a bit like saying because one dog's been attacked you must put down all the dogs. It's a bit like saying because one dog's bitten, all owner. It's a bit like saying because one dog's bitten, all owner. It's a bit like saying because one dog's bitten, all owner. It's a bit like saying because one dog's bitten, all owner.

I am indebted to JM S-H for the background to this issue.

Air to Air

Onton other matters! Oxford Ears - who does more monitoring than GCHQ! - reports air to air heard on 242.5MHz, in this case Harriers on CAPS and using 'Brown' callsigns. Also, a three ship 'Malard' formation of Hercules aircraft spotted over the Abingdon area and using Lyneham Approach on 359.5MHz. OE always informs me if anything interesting is in the area but, on this occasion, I was unable to catch the contacts he listed.

Further military news concerns the U-2s out of RAF Fairford - or rather the news that they will no longer be heard as the squadron rotated to France amidst great secrecy during the Christmas and New Year period. All three aircraft are now based on French soil, however, this is a loss for those of us in this area who regularly monitored them. Fairford, it seems, will be host to the odd B-52 and the usual annual tattoo - and that's it. Have to look elsewhere for my catches now.

Good News

More good news for milt airband monitors. A letter from Andy Chetwyn of Derby informs me of a new attempt to collate information for sharing has just taken off. With the loss of Intercept and Signet, and also Logbook - all journals of the BCAG and intercept aviation groups - military and civil airband info got sucked into a big black hole. Andy has, with some of those responsible for putting together Logbook, begun a new venture entitled The Monitor for those interested in aviation communications. Having seen the issue I can report that it is more than adequately fills in the loss of information and is well produced and informative. There is no membership subscription but - and I stress this - to join you must send in a log book sheet concerned with communications in this area plus a £1 remittance to cover costs and postage. This is an important point that needs to be stressed!

Information can only come from monitors and, by self-perpetuating, the journal could well prove to be a winner. It does need your help, though! If you are serious about airband and want to keep up with what's happening, then get a log and with the all important £1 off to:

Andy Chetwyn, 9 Gleadmoss Lane, Oakwood, Derby DE21 2BP.

If you are interested - and who isn't - then support this group and, by doing so, support your interest in the hobby likewise. More Military news from 'Anonymous Scotland' now who sent in a TADS list from that area covering Buchan, Lechers, Boulder and Neatishead. However, I cannot publish the TADS list due to official infringements of military communications and can only say that it is comprehensive! Dilemma! How can I get around that one? Possibly by saying that I'll work on it for a future issue! Thanks to 'Anonymous Scotland' for the list and also the other gen regarding ENIGMA and my other passion of numbers stations.

Constitution

A frequency heard in Charbury by Mike Dodds - 379.125MHz - via Brize Radar - caused a bit of consternation here as no publication I had listed it. In this case, F-15s were being routed to a training area in Wales. The frequency was also noted by OE and myself, but with RAF aircraft. Perhaps this is a local TADS/STUD? Whatever, it shows up now and again and is usually very interesting. I believe it is a stand-by used when work is being carried out on the main Brize Radar frequency. Anyone else any ideas?

Antennas

David Brigham - and others - request information regarding the best type of antenna to use...
for civil/military airband monitoring. I use both a 'Scanmaster' base and an Air-33 for my sets here and can honestly say the 33 knocks the other into the proverbial cocked hat. Then again, it should do. The Scanmaster is a broadband antenna designed to perform anywhere between short wave and the lower airbands up to 1300MHz. The Air-33 is an airband antenna cut for optimum performance on the air bands. It follows that the 33 will be sharper and more tuned than the other. I can put the 33 or myself spend hours in our shacks trying to filter out the mush for better quality audio!

Craig Guthrie requires more pinpoint info on the following frequencies heard in the Glasgow area:

161.325, 161.855, 165.350, 80.785, 81.075MHz. I have sent Craig a short list, but the IDs are general. Someone specific in Glasgow or surrounds may be able to pinpoint the users with more accuracy. Craig also asks if there are any clubs in the Glasgow/Prestwick/Cumbernauld areas concerned with aviation radio listeners? All replies to here, please.

Help

Can anyone help me and the aforementioned OE on the identification of the two following frequencies heard in the mush for better quality audio?

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Internet

News for Tech Heads next. If you are wired to the Internet - and I am hot - then the next bit could interest you. There is a page on the 'net concerned with bugging frequencies - yes, you heard that right - and I am indebted to anonymous for the following gen. Apparently - and I have a print out before me - this is of US origin. It covers such juicy areas of activity as 'Tactical Bugs' (e.g. 30-500MHz Tactical repeaters) as Spread spectrum/hopping bugging frequencies (902-928MHz very popular ISM Band A), as Law Enforcement bugging frequencies (37-952MHz). Surveillance Satellites (e.g. 1.7-1.9GHz very active on 1.76 and 1.84GHz). And so on. Those Tech Heads who would like to know more can point their browsers at:


Alternatively, you can E-Mail jmatk@tscm.com Lesser mortals can write to: James M. Atkinson, TSCM.COM, 127 Eastern Avenue 291, Gloucester, MA 01931-8008, USA.

As for me....what can I say but I’ll stick to cheap and cheerful h.f. with all of its whistles and crackles and the magnetic voices of the likes of The Lincolnshire Poacher and her mob!

Operating Standards

That about wraps it up for another month! I may get into the local RAE in May if I can find the time - I’m on placement with college when the RAE comes up so it could prove difficult to get to an examination centre and I did want to have a bash - but am having second thoughts due to the childish standards effected by some 144MHz ops in this area and the use of the band as a sort of glorified CB. I can pick up a CB at Tandy for £60, a license from the PO in the village and be able to do the same as the majority of amateur ops in this area do. To think that there is a lobby protesting against lowering of standards as well! Takes all sorts, I suppose!

Take care - be good and be aware! Catch you all again next month.
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For people reading this column for the first time, it reflects events in the WXSAT world. Listening to the 137MHz band (see frequency list at end), we monitor American (NOAA) and Russian/CIS (METEOR) craft. It is welcome to see the enormous interest in WXSATs, the Shuttle and satellites in general, as reflected in my postbag. Doors continue to open ever wider into the world of the CIS community, data on the operations of their WXSATs, as Russian scientists make available to the global community, data on the operations of their WXSATs. This edition of 'Info' includes more details about the OKEAN and SICH oceanographic satellites, as well as letters of general interest. For those unable to connect to the CIS GOMS satellite home page address on the Internet, given last month, the correct address is:
http://smis.iki.rssi.ru/goms_2.htm (not html).

Current WXSATs
The CIS satellite METEOR 2-21 was satisfactorily on for only a few weeks from February 1, while METEOR 3-5, which performs rather better, went through its own period of low solar illumination. The latter was re-activated on February 21. Satellites NOAA-12 and 14 continued nominal operations on 137.50 and 137.62MHz respectively. OKEAN-4 and SICH-1 continue transmissions on 137.40MHz, following a schedule now available via this column - see later.

Satellite Instrument Status on the NOAA's
Although only NOAA-12 and 14 are currently transmitting, some of the other satellites in the group remain active. Here is the latest summary of the status of the constellation:

NOAA-9 was launched on 12 December 1984 and some of its instrumentation is still functioning - the HIRS, SSU, DCS, and SARR - a previous edition gave further details of these instruments. Officially it is in semi-standby; consequently, we can sometimes receive TIP (Telemetry Information Processor) data from its 137.77MHz beacon.

NOAA-10 was launched on 17 September 1987; several of its systems continue to function, but there is no a.p.t. available, and I have not heard its beacon for some time. It is in standby mode.

NOAA-11 was launched on 24 September 1988 and, like NOAA-10, its AVHRR is non-operational. It is also in standby mode; some subsystems function properly and the Control Centre takes one pass per week to check its health.

NOAA-12 was launched on 14 May 1991 and operates normally, providing us with a.p.t. (images) on 137.50MHz. Some on-board systems exhibit problems occasionally.

NOAA-14 is the most recently launched polar WXSAT, which celebrated its first birthday on 30 December 1995. Most of its systems operate normally.

NOAA-K Readiness
The next NOAA WXSAT in the series - NOAA-K - continues to be tested and modified. The flight-worthiness of the stainless steel propulsion system fittings currently on NOAA-K has not yet been fully resolved. NASA Flight Safety has insisted on an additional test on at least one fitting from the same lot of material as used on NOAA-K. Flight Safety is concerned about the possibility of a catastrophic failure of these possibly suspect fittings. The impact of needing to change-out the system (again), now, would mean a delay of many months. My thanks to NOAA for providing this update.

OKEAN & SICH Secrets Revealed!
Perhaps as a sign of the improving flow of information coming out of the Commonwealth of Independent States, much detailed information about the oceanographic satellites of the OKEAN and SICH series has been provided by Alex Ivanov via the Internet. As well as a detailed description of the satellites' onboard equipment, he now provides a weekly transmission schedule, as intimated in last month's column - see later.

I am grateful for the opportunity to publish more details about the craft, kindly provided by Alex, who works partly with RPA (Research and Production Association) PLANETA, a state institution responsible for planning the work of Russian weather and environmental satellites, processing and distribution of the satellites data - something like NOAA/LESDIS (the American equivalent). Alex is also involved with RD Center SCAN, basically a private firm producing a.p.t., h.r.p.t. and WEFAX ground stations.

In the last two years SCAN developed some instrumentation and software for PLANETA, including a demodulator and digital terminal for an OKEAN f.m. receiver (operating at 485MHz).

NOAA WXSAT - current generation.

Peter Bartlett's Shuttle Retransmissions OSL 'certificate' from W3NAN.


NOAA picture from Antonio Frattesi of Roma (Italy).

NOAA image taken on 19 April 1995, showing Britain under almost clear skies. George Newport.

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the effect that people monitoring OKEAN/SICH transmissions see when changes occur in the picture content.

OKEAN/SICH Transmission Schedules

A schedule for OKEAN transmissions is created in PLANETA, and for SICH - in Ukrainian PLANETA's counterpart (ORBITA). Alex converts this to the transmission schedule that he now issues weekly. Typically, the latest one (February 22) includes those passing "live" data, and those when a playback of previously recorded data is planned. The format of the transmission to be expected is given; that is, what combination of radar, microwave or visible-light data, is scheduled for transmission. This list is of great interest to many WXSAT monitors so I have been considering the best way for me to make it available for SWM readers. I shall produce a copy of the weekly list, containing not only the schedule but also a summary of the systems producing the various image components. This can be obtained by sending an s.a.e. plus one extra stamp (or 20p coin). Few readers are likely to want every week's schedule so I shall wait to see what the response is.

Short transmission intervals are due to system design features. He quotes: 'MSUS permanent operation time must not exceed 15 minutes, with the following pause not less than 30 minutes... and so on.'

Applications for OKEAN/SICH Data

The satellites were designed for internal use in the USSR meteorological service (ice cover in polar regions being the main scope). Any Russian organisation may order a transmission and/or processed data via a certain bureaucratic procedure. PLANETA deputy director Dr. Zhupanov said that there were few transmissions over North America in a framework of demonstrative joint projects in the past and something like that may happen in the future - it will depend on NDIS initiatives.

Except for OKEAN and METEOR there are no Russian satellites working on 137 or 137.4MHz now. GOMS is being prepared now to transmit its own WEFAX and re-transmit that from METEOSAT. Some tests were made a couple of weeks ago.

My thanks to Alex for this valuable information - a copy of this article is being forwarded to him. Much of the above forms extracts from his e-mails. Minor changes were made by me to reflect language translation.

Letters

Steve Reed G7DZX has returned to satellite reception after a gap of some years. He tells me that he bought a system back in 1969 while at school. That system was based on a Wireless World article, in which a modified v.h.f. receiver was used to form a circulating 'live' data. Steve Reed G7DZX observed an oscilloscope. By modulating the brightness level of the beam, a picture was slowly built up on the screen. In 1969 I was doing exactly the same thing, with colleagues at the Radio and Space Research Station in Slough! I did the v.h.f. mods and my colleague set up the antenna and oscilloscope. The real problem was knowing when the satellites were coming over. We had access to a mainframe computer, but no suitable predictions software was to hand to solve the problem. A newcomer to the hobby of WXSAT monitoring Peter Best of Bognor Regis, like others in this position, has experienced the problem of updating Kepler elements for those satellites that he monitors. Very original! Peter sent Kepler listings (see end) he asked about the variation between two-line elements and conventional Kepler listings. In fact, the two types contain the same data but in different formats. NASA's two-line elements consist of sequences of numbers that are the normal parameters - epoch, orbit, inclination, etc. - positioned in two separate lines. My printouts are obtained from a large file containing elements for over 4000 satellites, in two-line format. I obtained a program that strips out selections of these satellites, formats the numbers, then prints out the WXSAT file. It contains all the full parameter details for easy interpretation.

Robert Weyth of Swansley is a retired Communications Officer studying for the IAE exams. He monitors WXSAT images via his h.f. receiver, from a network, apparently operated by Brian G3OLI on 137.85MHz. He uses a Yaesu FRG-100 h.f. receiver fed by a long wire and noise blanker, and decoded on his 486SX using JVFAX. I understand that his h.f. network is used for WXSAT image dissemination.

Shuttle Monitoring

Peter Bartlett of Pinner became interested in listening to satellite communications during Helen Sharman's mission on MIR, the manned Russian space station. He recorded most of her transmissions by using his Kenwood 5000 receiver and external 2m vertical antenna, tuned to 145.550MHz, fed by a 2m longwire and a.t.u. Tracking of MIR was done using an earlier version of PCTrack. Since then, Peter has monitored Shuttle re-transmissions from W3AN3N, using mostly 14.295 and 21.395MHz, according to propagation conditions.

Peter kindly enclosed his QSL cards, one being a special certificate for monitoring the Tenth Anniversary Transmission Event from W3AN3N. Peter's latest venture involves monitoring MIR on 145.550MHz, using the packet receiving software PktMON12. Peter has also heard the licensed cosmonauts speaking using the amateur radio frequency 145.550MHz, in English. I understand from Peter's information that QSL cards acknowledging MIR monitoring can be obtained from the QSL manager at WA3NAN at Box 86, Greencelt, Maryland, USA 21783.

The entire manifest schedule for 2003, together with the frequencies used for both direct and re-transmissions of Shuttle audio and telemetry is available as a 'Shuttle Pack'. A section about obtaining passes to watch launches is included amongst the eight sides of A4. Please enclose 50p and an s.a.e.

Peter Schoen sent several prints obtained from his setup in Germany. Peter has both a.h.p. and h.r.p.t. equipment and sends prints of each type, from which I have included Fig. 3, a NOAA-14 high resolution image from channel 2 (visible-light), obtained last August. Detail is crisp and the ground shadows of individual clouds can be seen, amongst other features.

Antonio Frattesi of Roma (Italy) sent two images on disk, one from a METER, the other a NOAA picture - see Fig. 4. Antonio also monitors MIR, send an s.a.e. and 20p coin or separate, extra stamp. Transmission frequencies are given when operating. This data originates from NASA and is totally up-to-date.

1: I also send monthly Kepler print-outs to many people. To join the list please send a 'subscription' of £1 (plus four self-addressed, stamped envelopes) for four editions.

2: You can have a computer disk file containing recent elements for the WXSATs, and a large ASCII file holding elements for thousands of satellites. A print-out is included, identifying NASA catalogue numbers, ideal for automatic updating of your tracking software. Please enclose £1 with your PC- formatted disk and stamped envelope.

Frequencies

NOAA 14 a.p.t. on 137.62MHz; NOAA 12 a.p.t. on 137.50MHz; NOAA beacons on 136.77 and 137.77MHz; METER 3-5 uses 137.85MHz; OKEAN-4 and SICH-1 137.40MHz for scheduled transmissions and METEOSAT WEFAX is on 1681 and 1694.5MHz.

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NAME _______________________________________
ADDRESS ___________________________________
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Short Wave Magazine, April 1996
Decode
All the Data Modes

Please note that I now have a new Internet E-mail address. As you can see I've signed-up with Pipex to provide my service. The decision was based on their very good network reliability over the past year (Pipex provided the network for the BBC club) combined with a good deal for ex-BBC Networking Club members. Another attraction was the offer the keep my old E-mail address active until November '96 - so I shouldn't lose any messages.

High-Low Tones

Just recently I've had a number of letters asking what is meant by high tones and low tones when dealing with data decoders. The letters reminded me that this is an important topic but I've not covered for quite some time. So what's it all about? You will all, no doubt, be aware that to receive the data, modulated the transmission is first converted into an audio signal by the receiver.

Now most h.f. utility transmissions use either frequency shift keying or frequency modulation. Both systems are very similar for our purposes and mention that the transmitter changes frequency in line with the data it's transmitting. In the case of a RTTY press broadcast, the transmitter would alternate between two frequencies spaced just 400Hz apart. At the receiver, use of the s.s.b. mode would modulate the signal as a pair of audio tones spaced just 400Hz apart. The actual frequency of the tones will vary as you tune the receiver across the signal, depending on whether you start above or below, the tones will probably first be audible at around 300-400Hz and rise in frequency until they disappear at around 2.5-3kHz. If you want to try it, just set your receiver to s.s.b. and tune to 4.469MHz you should hear the Bracknell Met 75 baud RTTY transmission.

When it comes to connecting your decoder you will find it needs to see specific tones from the receiver and can't usually handle a very wide spread. This is why most decoders have some form of tuning indicator. This is to ensure the correct tones are presented to the decoder which, in turn, can only be done with the correct receiver tuning. To help receiver and decoder designers make equipment that will work together successfully, some form of standard is required. Just to keep life interesting, there are two such standards for the decoding tones! In the UK and most of Europe it is common to use what have become known as low tones whilst the Americans and Japanese favour high tones. The exact tones used depends on the required shift but for the common 170Hz shift the respective tones are 1275 and 1445Hz for low tones and 2125 and 2295Hz for high tones.

So why make a fuss? My personal preference is to use low tones simply because they sit more comfortably within the audio filtering of most communications receivers - they're kinder on the ears too! The low tones also gives plenty of scope for making good use of any built-in filtering options such as pass-band tuning or the narrow 2.1kHz filters that are available for s.s.b. on some receivers.

IRM Medical Rome

A few months ago I asked if anyone could explain the role played by the Rome Medical station IRM. Peter from Crewe sent me an E-mail explaining that the IRM is part of a network of services that are available to mariners. Their main role is to provide medical advice and support to ships at sea. A typical example would be where a crew member is taken ill and the ships master has to take emergency action. IRM would help him decide what to do and guide him through 'till the patient could be brought ashore. This is a clearly a vital role - thanks Peter.

SSTV Introduction

Although SSTV is essentially an amateur radio mode, so many listeners' have written asking how to receive SSTV, that it warrants some column space.

One of the main reasons for the increased interest is the popularity of decoding systems such as JVFAX that include a good range of SSTV facilities. To make sure I cover most of the key points, I used a particularly comprehensive letter and series of questions from John Meakin of North Allerton Before I go roaring into the technicalities, let's have a look at the origins.

The early amateur work on sending TV images over the h.f. bands occurred back in 1958. As with most new systems, it was the availability of appropriate technology that spurred the development. For SSTV, the problem was to find a way to send a picture that would normally need several megahertz of bandwidth in the 3kHz or so available on h.f. The early solution centred around the use of long persistence radar display units. With these displays, a dot will remain on the screen for several seconds after the signal has been removed. By using this feature, it became possible to send enough information to create a 120 line picture using the limited bandwidth in just 8 seconds. The long persistence of the display tube meant that the image from the first line was still visible as the final line was sent - 8 seconds later. Having just managed to receive a picture, it promptly disappeared as the display's persistence exhausted. The only way to keep a record of the transmission was to photograph the screen! Sending the picture

Table 1 - JVFAX SSTV Modes

<table>
<thead>
<tr>
<th>Name</th>
<th>Frame Time (sec)</th>
<th>Type</th>
<th>Lines</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>8s</td>
<td>8</td>
<td>bw</td>
<td>120</td>
<td>original system</td>
</tr>
<tr>
<td>16s</td>
<td>16</td>
<td>bw</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>WR24/128</td>
<td>24</td>
<td>rgb</td>
<td>128</td>
<td>European's most popular</td>
</tr>
<tr>
<td>WR48/128</td>
<td>48</td>
<td>rgb</td>
<td>128</td>
<td></td>
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<td>256</td>
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<td>96</td>
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<td></td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>WR180</td>
<td>180</td>
<td></td>
<td>256</td>
<td>USA's most popular</td>
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<tr>
<td>M1</td>
<td>114</td>
<td>rgb</td>
<td>256</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>56</td>
<td>rgb</td>
<td>256</td>
<td></td>
</tr>
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<td>Rob72C</td>
<td>72</td>
<td>y+c</td>
<td>240</td>
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</tr>
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</table>

information for this early SSTV system relied on the use of audio tones between 1500 and 2300Hz to represent black, white, and the shades of grey in between. The picture was still sent in lines and a short 1200Hz tone was used to mark the start of each scan with a longer burst used to signal the beginning of a new picture. The next step was to experiment with colour transmission. This was initially done by sending a picture three times, each time cycling between red, blue and green filtered pictures. At the receiving end a long exposure photograph was made through the appropriate coloured filter to capture the colour picture.

Although it was possible to send a picture using this system, it was very cumbersome and time consuming. The real breakthrough for SSTV came with the development of solid state memory and affordable colour television. This meant that the three primary colour images could be stored and displayed on the colour TV as they're received. Although this made the system very much more usable, there were still lots of problems. Particularly troublesome was interference, that could ruin one of the colour frames and spoil the registration of the whole picture. To overcome this
shortcoming, the line sequential system was developed. This system, instead of sending three primary colour pictures (known as frame sequential), each picture line is made up from three separately filtered scans carrying red, green and blue picture information. With this transmission system, pictures could be seen building-up in full colour - a great improvement on earlier methods.

The main shortcoming of this method occurred when tuning-in to one of these SSTV signals. There was no way the receiving decoder could work out which of the colour scans was being received so the first image was received so the first picture was obtained. One of the most reliable places to look is on the 14MHz amateur band around 14.23MHz. By far the busiest time is Sunday morning, but you can find signals at just about any time of day or night. SSTV signals have a characteristic musical sound that's very easy to spot in amongst the s.s.b. signals. It's also worth listening to a few of the s.s.b. signals around that frequency as amateurs often chat in between sending SSTV pictures. The next thing you need to do is run-up your SSTV program and select the appropriate mode.

The best starting point is Martin M1 for listeners based in Europe or Scottie S1 in the USA. Both of these modes are very similar - there's just a timing difference. The only other modes you may come across are Robotics 36 and 72, but these are mainly used by Japanese stations. If you're using JVFAX, select 5 for SSTV from the main menu and you will be presented with the SSTV main screen. This shows all the available modes and usually defects to Martin 1. If you manage to catch the start of a transmission, picture reception will start automatically otherwise you will have to press F to start the picture reception manually. Next comes that tuning indicator with two displays that conflicts so much! If you recall earlier in this feature, I explained that the black through to white is equally from B through to W.

It's a good idea to run-through a quick list of the shortwave listeners that can be received under the prevailing propagation conditions. The frequency list for this month comes with thanks from a number of readers including Day Watson, Lee Williams and Geoff Allogg. Please keep those logs rolling in. Remember, they don't have to be full of rare DX - I'm particularly looking for reliable stations that can be received under the prevailing propagation conditions.

**Frequency List**

The frequency list for this month comes with thanks from a number of readers including Day Watson, Lee Williams and Geoff Allogg. Please keep those logs rolling in. Remember, they don't have to be full of rare DX - I'm particularly looking for reliable stations that can be received under the prevailing propagation conditions.

<table>
<thead>
<tr>
<th>Freq.</th>
<th>Mode</th>
<th>Speed</th>
<th>Shift</th>
<th>Call</th>
<th>Time</th>
<th>Comments</th>
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<td>DCF 54</td>
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<td>96</td>
<td>170</td>
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<td>GYA</td>
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<td>VSG</td>
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<td>KTHAURMUR AIR</td>
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<td>400</td>
<td>STK</td>
<td>-</td>
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<td>FAX</td>
<td>120</td>
<td>576</td>
<td>NRR</td>
<td>-</td>
<td>USN ROOSEVELT ROADS</td>
</tr>
</tbody>
</table>

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Readers' Special Offers

Here's the latest list of reader's special offers. Whilst I do my best to return orders promptly, please allow up to two weeks for delivery.

- IBM PC Software (1.44MB disks):
  - Disk A (Order Code: DKA) - JVFAX 7.9, HAMCOMM 3.0 and WXFAX 3.2
  - Disk B (Order Code: DBX) - Starter plus Texas device selection software
  - Disk C (Order Code: DCC) - NuMate 1.3
  - Disk D (Order Code: DKD) - UltraPak 4.0

- IBM PC Software (1.44MB disks):
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Uniden 9000XLT

Looking for something for the home? Interested in searching out those elusive UHF Air to Air you can never find? The new 9000XLT has full 25-550 & 760-1300MHz coverage, 500 memory channels of which 250 can have “alpha tags” but will scan/search 100 channels per second. Searching 550.00-400.00MHz in 25kHz steps takes 20 seconds, searching the entire UHF airband in one go takes a little over 60 seconds!! Use 50kHz steps and that time is halved. Good sensitivity and good looks. We also have the handheld equivalent UBC3000XLT which has all the same scan/search features as the desktop model but with 400 memory channels.

If you have Internet WWW access then surf along to our Web Site at:- http://www.demon.co.uk/javiation/
When British Summer Time (BST) commences on March 31, clocks throughout the UK will be one hour ahead of Universal Time Co-ordinated (UTC), which is quoted in broadcast schedules and the data hereafter.

To compensate for seasonal changes in propagation some short wave broadcasters may alter their schedules soon after this issue is published.

Long Wave Reports

Note: I.w. & m.w. frequencies in kHz; s.w. in MHz; Time in UTC (=GMT).

Unless otherwise stated, all logs were compiled during January.

The sky waves from the Radio-televisione Italiana (RAI) 10kW outlet at Caltanissetta, Italy on 189kHz were rated SI0222 at night by Kenneth Buck, Edinburgh. All other entries were logged during daylight or at dawn/dusk.

Listeners—

(AP) Paul Bowery, Burnham-on-Crouch.
(J) Tony Stickells, Thornton Heath.
(N) Andrew Stokes, Leicester.
(T) Ted Harris, Manchester. 
(V) Simon Hockenhill.
(E) Brian Oddy G3FEX, Three Corners, Merryfield Way, Storrington, West Sussex RH20 4NS.


time! It came from WTOP in Washington, DC in December but propagation from that area was less favourable in January. He did hear a transmission on 189 but at best it was just audible at 0722 in Bushey Heath. Also noted during the morning R.Australia via Darwin 15.420 (Eng to E.USA, Eur 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 44233 at 1645 in Macclesfield; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 1500-1600) 4423
## Medium Wave Chart

<table>
<thead>
<tr>
<th>Station</th>
<th>Country</th>
<th>Power (kW)</th>
<th>Listener</th>
</tr>
</thead>
<tbody>
<tr>
<td>920</td>
<td>HR Radio Berlin</td>
<td>Germany</td>
<td>600</td>
</tr>
<tr>
<td>931</td>
<td>Radio Bremen</td>
<td>Germany</td>
<td>100</td>
</tr>
<tr>
<td>941</td>
<td>NWZ Rennes</td>
<td>France</td>
<td>500</td>
</tr>
<tr>
<td>950</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>300</td>
</tr>
<tr>
<td>954</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>200</td>
</tr>
<tr>
<td>964</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>100</td>
</tr>
<tr>
<td>966</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>50</td>
</tr>
<tr>
<td>970</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>10</td>
</tr>
<tr>
<td>972</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>5</td>
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<tr>
<td>974</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>1</td>
</tr>
<tr>
<td>980</td>
<td>ABY Radio</td>
<td>Germany</td>
<td>300</td>
</tr>
<tr>
<td>982</td>
<td>Ondas (Brazil)</td>
<td>Brazil</td>
<td>150</td>
</tr>
<tr>
<td>983</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>1</td>
</tr>
<tr>
<td>990</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>10</td>
</tr>
<tr>
<td>992</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
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<td>994</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>1</td>
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<tr>
<td>996</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>0.5</td>
</tr>
<tr>
<td>1000</td>
<td>Radio Luxembourg</td>
<td>Germany</td>
<td>0.5</td>
</tr>
</tbody>
</table>

### Notes
- Countries marked with asterisks (*) were logged during air trials. All entries written in black text were logged during daylight hours or at dawn/dusk.

### Listeners
- **A** Tino Afriky, Miltiadoustr 130, Athens, Greece
- **B** Richard Reynolds, Guildford
- **C** Withington, Manchester
- **D** Garry Havens, white @ Telgarten, Dutch
- **E** Simon Hicks/Linday, E. Brazil
- **F** Thomas Williams, Truro
- **G** Gibraltar, VYFR via Okechobee 15.465 (Eng to Eur 1600-1800) 44333 at 1649 in Oxted.
- **L** VOX via Botswana 15.445 (Eng to Africa 1630-1800) was S3320 1700 in Co.Fernaghman; RB Brazil 15.265 (Eng to Ger 1800-2000) heard at 1800 by Tom Hambley in Hove; R.Netherlands via Bonaire 15.315 (to S.E.Europe 1800-2000) 36433 at 1930 in Chester, RA.Europax in Argentina 15.325 (Eng to It, Fr. Ger to Eur, Africa 1800-2300) 24333 at 1955 in Storrington; VOX via Morocco 15.410 (Eng to Africa 1600-2200) S0433 at 1910 in Woking; RA.Europax Aries 15.345 (Sp to S.America 0000-0100) 04353 at 0025 in Monterrey.
- **N** Broadcasts from several continents can usually be heard in the 13MHz (22m) band. Noted before noon were SRI via Sottens? 13.665 (It, Eng, Fr, Port to Austin, Texas Pacific Broadcasting, 111111 at 0930 in Co.Fernaghman; Monitor R via KBH Saigon, N. Mariana is 13.615 (Eng to Oceania 0800-1000/10-Tue-Sun) S0222 at 0925 in Mascefield; UAEB, Dubai 13.675 (Eng to 1030-1056) 54334 at 1035 in Hersenmouzak; R.Austria int via Moolbrunn 12.730 (Ger, Eng, Fr, Sp to
### Local Radio Chart

<table>
<thead>
<tr>
<th>Station</th>
<th>Frequency (kHz)</th>
<th>Power (kW)</th>
<th>Listener Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>WTOP</td>
<td>1500</td>
<td>1.0</td>
<td>1234</td>
</tr>
<tr>
<td>WABC</td>
<td>880</td>
<td>0.5</td>
<td>0.1234</td>
</tr>
<tr>
<td>WABC</td>
<td>1026</td>
<td>2.0</td>
<td>2345</td>
</tr>
<tr>
<td>WABC</td>
<td>1026</td>
<td>0.5</td>
<td>0.01234</td>
</tr>
<tr>
<td>WABC</td>
<td>1026</td>
<td>1.0</td>
<td>12345</td>
</tr>
</tbody>
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### Transatlantic DX Chart

<table>
<thead>
<tr>
<th>Frequency (kHz)</th>
<th>Station</th>
<th>Power (kW)</th>
<th>Listener Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>WWCR</td>
<td>1.0</td>
<td>1234</td>
</tr>
<tr>
<td>1026</td>
<td>WWCR</td>
<td>2.0</td>
<td>2345</td>
</tr>
<tr>
<td>1026</td>
<td>WWCR</td>
<td>0.5</td>
<td>0.1234</td>
</tr>
<tr>
<td>1026</td>
<td>WWCR</td>
<td>1.0</td>
<td>12345</td>
</tr>
</tbody>
</table>

### Notes on Gathering Listener Data

- "logged" after station name indicates listeners have been logged during broadcast.
- Other entries are listener counts logged at different times.

### Listeners

- Tony Stickells, Thornton Heath
- Stephen Jones, Oswestry
- Sam Hargreaves, Scarborough

### Transatlantic DX Chart

<table>
<thead>
<tr>
<th>Frequency (kHz)</th>
<th>Station</th>
<th>Power (kW)</th>
<th>Listener Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>WWCR</td>
<td>1.0</td>
<td>1234</td>
</tr>
<tr>
<td>1026</td>
<td>WWCR</td>
<td>2.0</td>
<td>2345</td>
</tr>
<tr>
<td>1026</td>
<td>WWCR</td>
<td>0.5</td>
<td>0.1234</td>
</tr>
<tr>
<td>1026</td>
<td>WWCR</td>
<td>1.0</td>
<td>12345</td>
</tr>
</tbody>
</table>

### Listener Information

- Tony Stickells, Thornton Heath
- Sam Hargreaves, Scarborough
- John Storey, Stourmthorpe
- Sheila Hughes, Morden, London
- Tony Stickells, Thornton Heath
- Sam Hargreaves, Scarborough

---

**Kosztolanyi 11.990 (Eng to Australia 0830-0857) 04434 at 0846 by Francis Hearne in Bristol: KTW (IWR) Agana, Guam 11.850 (Eng to South Pacific 0855-1000) 33333 at 0900 in Morden; Voice of Vietnam 11.600 (Eng to South Pacific 0900-1045) 33333 at 1000 in Morden.**

In the afternoon, China Radio Int Beijing, 1200 (Eng to South Pacific 1100-1200) was rated 33384 at 1255 by John Perry in Larne, Cyprus; VORIL Tehran 11.930 (Eng to East Asia 1130-1230) 33333 at 1130 in Tokyo; HCJB Quito 12.055 (Eng to Caribean 1100-1500) 43434 at 1200 in Penmaanwar. In the afternoon, China Radio Int Beijing, 1200 (Eng to South Pacific 1100-1200) was rated 33384 at 1255 by John Perry in Larne, Cyprus; VORIL Tehran 11.930 (Eng to East Asia 1130-1230) 33333 at 1130 in Tokyo; HCJB Quito 12.055 (Eng to Caribean 1100-1500) 43434 at 1200 in Penmaanwar.
<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>Station</th>
<th>Country</th>
<th>UTC</th>
<th>Frequency (MHz)</th>
<th>Station</th>
<th>Country</th>
<th>UTC</th>
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<tbody>
<tr>
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<td>Australia</td>
<td>3.005</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.500</td>
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<td>225</td>
<td>ABC Adelaide</td>
<td>Australia</td>
<td>3.150</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.585</td>
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<td>ABC Sydney</td>
<td>Australia</td>
<td>3.275</td>
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<td>Myanmar</td>
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<td>245</td>
<td>ABC Melbourne</td>
<td>Australia</td>
<td>3.320</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.550</td>
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<tr>
<td>258</td>
<td>VOR</td>
<td>Thailand</td>
<td>3.418</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.520</td>
</tr>
<tr>
<td>271</td>
<td>VOR</td>
<td>Thailand</td>
<td>3.520</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.540</td>
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<td>285</td>
<td>ABC Brisbane</td>
<td>Australia</td>
<td>3.625</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.510</td>
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<td>299</td>
<td>ABC</td>
<td>Australia</td>
<td>3.720</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.610</td>
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<tr>
<td>313</td>
<td>ABC Adelaide</td>
<td>Australia</td>
<td>3.825</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.580</td>
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<tr>
<td>326</td>
<td>ABC Sydney</td>
<td>Australia</td>
<td>3.920</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.550</td>
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<td>340</td>
<td>ABC Melbourne</td>
<td>Australia</td>
<td>4.025</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.520</td>
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<tr>
<td>354</td>
<td>ABC Brisbane</td>
<td>Australia</td>
<td>4.120</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.510</td>
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<td>368</td>
<td>ABC</td>
<td>Australia</td>
<td>4.215</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.580</td>
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<tr>
<td>382</td>
<td>ABC Adelaide</td>
<td>Australia</td>
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<td>MUR</td>
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<td>ABC Sydney</td>
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<td>Myanmar</td>
<td>19.520</td>
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<td>410</td>
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<td>4.500</td>
<td>2000</td>
<td>MUR</td>
<td>Myanmar</td>
<td>19.510</td>
</tr>
</tbody>
</table>

**Quarterly List of Equipment Used**

**Notes:**
- The table above represents the quarterly list of equipment used by various stations.
- The list includes details such as frequency, station name, country, and UTC time.
- The table spans from 1 February to 31 May, April '96.

---

**Radio Stations:**
- **Australia:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Thailand:** VOR, ABC, ABC Brisbane.
- **Myanmar:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Myanmar:** VOR, ABC, ABC Brisbane.
- **Thailand:** ABC, ABC Brisbane.
- **Australia:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Myanmar:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Thailand:** VOR, ABC, ABC Brisbane.
- **Australia:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Myanmar:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Thailand:** VOR, ABC, ABC Brisbane.
- **Australia:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Myanmar:** ABC, ABC Adelaide, ABC Sydney, ABC Melbourne, ABC Brisbane.
- **Thailand:** VOR, ABC, ABC Brisbane.

---

**Notes on the Table:**
- The table includes a list of radio stations and their corresponding frequencies and UTC times.
- The data spans from February to May, April '96.
- The table serves as a reference for radio enthusiasts.

---

**Reference:**
- The data is sourced from an incomplete document titled "Quarterly List of Equipment Used."
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Alinco DJ-X1 hand-held receiver 2-900MHz, 718266. owners manuals, box, mobile mount and d.c. supply. Icom IC-7000 all mode communication offers invited. Reed, Mahon. Tel: (01653) A122, beautiful and Ultra R786 mains/batt, help? Peter, Surrey. Tel: (03741128170 anytime. Northampton (01604) 34504. £675. ERA Microreader (version 4.1), £80. Tel: Oxford (01865) 749374. edition, £40. Tel: Peter, Saundersfoot. power supply, speaker, coax, leads, requires decoding card, Turnstile antenna, preamplifier, receiving system. Proscan receiver, Prosat2 make an offer. Tel: W. Midlands (01543) 378513 of coils, two speakers, valves and spares, collection, seven sets, five power packs, tons of etc., both mint condition or exchange for

For Sale

Short Wave Magazine, April 1996
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<table>
<thead>
<tr>
<th>Service</th>
<th>UK</th>
<th>Europe</th>
<th>Rest of World</th>
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</thead>
<tbody>
<tr>
<td>SHORT WAVE MAGAZINE - 6 MONTHS</td>
<td>£13.15</td>
<td>£15.00</td>
<td>£16.00</td>
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**SHORT WAVE MAGAZINE - 1 YEAR**

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<th>Service</th>
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<tr>
<td>SPECIAL JOINT SUBSCRIPTION WITH</td>
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<tr>
<td>PRACTICAL WIRELESS (1 YEAR)</td>
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</tbody>
</table>

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**SUBS CLUB page 59**

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<table>
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<tr>
<th>(30)</th>
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**CONTACT DETAILS**

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<thead>
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<th>Address</th>
<th>Telephone</th>
<th>Postcode</th>
</tr>
</thead>
</table>

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**SHORT WAVE MAGAZINE, April 1996**
LISTENING GUIDES

Airband

AIR BAND RADIO HANDBOOK 5th Edition
David J Smith
Air band radio listening means to listen in on the conversations between aircraft and those on the ground who control them, and is an increasingly popular and fascinating hobby. A new chapter on military air band has been added to this definitive guide.

AIR & METED CODE MANUAL 14th Edition
Jorge Klingenfuss
Dedicated to the whole of the World Meteorological Organisation Global Telecommunication System operating FAX and RTTY, metres stations, and its manual format with binding options. Also detailed recollections of the Aeronautical Fixed Vectors Network among others.

AIRWAYS
The Complete Air/FAX/VHF Aviation Frequency Directory
Much like the recent version (especially military), information is a great boon for this volume. Not only are frequencies listed, giving their frequencies, but also there are reverse look-ups - when the frequency is known, the related vehicle can be identified.

Airways series are listed to much more clearly than in the Supplements. The most transponder code groups are included. In fact, the book covers all the way from 61 up to 285.

AN INTRODUCTION TO AMATEUR COMMUNICATIONS
Peter Rouse GU1DKD
This book explains all about weather satellites, how they work and how you can this book provides the most accurate and detailed information in calls to be used. In addition to the two subscription lists provided there is information on the various satellite communications modes used by ships today.

Broadcast

A GUIDE TO THE WORLD'S RADIO STATIONS 2015
Peter Shore
In ESRA, the largest country he has added this book out in world wide, providing the listener with a reference work designed to guide the listener through the ever-changing satellite radio bands. There are sections covering English language transmission, programmes for affiliates and c.q.s, along with sections on Licences etc. Published in 2015 £5.95

POCKET THE WARPED PIPES
Keith Smith
This book introduces the fascinating world of Pirates Radio. Thanks to The Warp The Pipes. The author is a people seeking to provide a professional alternative to radio, under whose supervision transmission, we are uninterested. I support us will not be the first to hear the tale of an. £15.95

AIRWAYS

GUIDE TO LANES
14th Edition
Jorge Klingenfuss
This book gives you the information to explore and enjoy the world of broadcast entertainment, from radio programs and programmes of special interest to our special radio listeners.

AIRWAYS

GUIDE TO UTILITIES STATIONS
15th Edition
Jorge Klingenfuss
This book covers the complete short wave range from 3 to 20 MHz and 20 MHz to 1500 MHz. It includes details of all types of utility stations including FAX and RTTY. There are 1054 entries in the Frequency list and 194 in the alphabetical callsign list plus print services and entertainment stations. Includes also the L-band radio beacons.

SATELLITE

Space pictures and satellite data are broadcast around the world, on a variety of radio frequencies. The book gives detailed descriptive of the various stations and their frequencies on world bands.

AIRWAYS

GUIDE TO SATellite STATIONS
16th Edition
Jorge Klingenfuss
A variety of broadcast stations transmit material to the public and industry, allowing information to be received by various audiences.

SATELLITE

Air Band Radio Handbook

SATELLITE TELEVISION INSTALLATION GUIDE
D. Pickard
This book deals almost exclusively with the various types of satellite antenna, with a comprehensive review of the various types of satellite dish and their installation. It is aimed at the user who is not experienced in the installation of satellite dish antennas. It is suitable for the average amateur, but is not ideal for a radio amateur.

SATELLITE

SATELLITE TELEVISION
Peter Pearson
This book contains detailed information on the various types of satellite dish and their installation. It is aimed at the average amateur, but is not suitable for a radio amateur.

SATELLITE

SATELLITE TELEVISION INSTALLATION GUIDE
D. Pickard
This book is aimed at the average satellite enthusiast, and is aimed to assist you in setting up a satellite dish.

SATELLITE

SATELLITE TELEVISION
Peter Pearson
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Past Reviews - Part 1

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