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NEVADA COMMUNICATIONS 189 LONDON ROAD NORTH END PORTSMOUTH PO2 9AE
Cover: The IBM PC, or any of its many clones, is rapidly growing in popularity for shack use. Mike Richards, G4WNC, our Decode columnist, has just equipped himself with one of the Amstrad versions and has tried out PC-HF-FAX, the latest piece of radio software for this computer.

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Dear Sir

There were two letters in your March issue that caught my eye. Both Robin Clark’s and Edmee Kangai’s letters struck a note with me. All the more so as that issue was the first I’ve ever bought. When I was about thirteen I suddenly discovered short wave on my radio. At first it was like a revelation. To hear broadcasts from around the world seemed fantastic at the time and so my hobby grew and grew. I would stay up until the early hours trying to hear some elusive station usually only to hear static or interference! But sometimes you got to hear what you were after, hours later. One day though my old Eddysete set decided to call it a day and there was no one locally to me who could repair it. My father had a go but alas it came to no avail. My old set finally met its maker and so did all the other things that go into making a DXer. At 25 years old and some ten years since that sad day when my hobby ended I’ve finally got back to listening. For some reason I went into my local ‘Currys’ and saw a World Receiver for sale, the Saisco SW6000. After some time thinking about it I decided to buy it and in many ways it has re-opened my interest. I will never forget receiving my first QSL card (Radio Baghdad) and I hope I’ll be getting a few more. My only hope now is that this set lasts a little bit longer than the last one.

MARK ROBERTS
LARKHALL
BATH

Expedition Group.

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Annotations will be awarded to the Supreme Tartan Banner Award on a yearly basis for contacting a further six events in a year. The cost for this is £50, £1 or equivalent. Again, please quote the number of your Tartan Award.

Straight Key Day

The European CW Association’s Straight Key Day, organised on behalf of EUCW by the Scandinavian CW Activity Group (SCAG), will be held of Saturday 23 June 1990, and is open to all amateur c.w. operators who enjoy working on the hand key, whether regularly or just occasionally.

It is not a contest. The idea is to put aside the electronic keyer for the day and use a hand-key for relaxed QSOs! Those taking part should call CQ SKD on 3.570MHz, 7.020 and 7.040MHz, 14.050 frequencies between 3.540 and 14.070MHz, or anywhere on the 10MHz band.

what's new

Inner & Outer Hebrides DXpedition

Alan G1EUU and Colin G1JME will be using the callsign GM1WAB/M whilst on their inner and outer Hebrides DXpedition. Their timetable is as follows:

May 26 - Grantham to Ardrossan
May 27 - Arran, Gigha, arrive late on Islay
May 28 - Islay, Jura, Luining
May 29 - Mull, Iona,*, South Uist
May 30 - South Uist, Benbecula, North Uist, Baleshare, Grimsay, Berneray
May 31 - Skye, Harris
June 1 - Harris, Lewis, Great Berneray
June 2 & 3 - Activate NB, NC, ND, NH, NJ, NO, NT, NS, NX and NY squares. The timetables are as follows:

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June 2 & 3 - Activate NB, NC, ND, NH, NJ, NO, NT, NS, NX and NY squares. The frequencies in use will be 144.440 & 50.200MHz, 430MHz by arrangement on 144MHz.

The Isle of Iona may not be mobile operation. OSL via with s.a.e. via: G1EUU, 68 Aire Road, Grantham, NG31 7QP.

Eddystone Users’ Group

Mr W.E. Moore has decided to form an Eddystone Users’ Group. During a recent visit to the Eddystone factory, he obtained an agreement to use facts and data from their manuals in a group newsletter. This would be sent to members and would be operated on a non-profit basis, with only a nominal charge made for post and printing. Anyone interested should send an s.a.e. to: Mr W.E. Moore, 112 Edgeside Lane, Waterfoot, Rossendale BB4 9TR.

AMSAT-UK

The AMSAT-UK Colloquium will be held at the University of Surrey on July 26-29. Full details and a booking form can be obtained from: Ron Broadbent G3AAJ, AMSAT-UK, 94 Herongate Road, Wanstead Park, London E12 5EQ.

A WORD IN EDGewayS

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

The Editor reserves the right to shorten any letters for publication but will try not to alter their sense. Letters must be original and not have been submitted to other magazines.

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WHAT'S NEW

Stereo TV in South Wales

NICAM Digital Stereo comes to IVC and S4C in South Wales from April 27 as part of an IBA initiative to bring the new digital audio technology to almost 80% of British viewers by the end of this year. NICAM stands for Near Instantaneously Companded Audio Multiples. It adds a special digital signal to a standard television transmission to enable reception of stereo sound with quality similar to Compact Disc. The system can also be used to provide a second language soundtrack.

In order to receive NICAM, it is necessary to have a TV set or video cassette recorder incorporating a NICAM decoder. In the last year or two, a wide variety of receivers and v.c.r.s have been produced with the option of NICAM sound. Older sets with stereo speakers will probably not be suitably equipped.

Petrol Tokens

When you fill your car up with petrol or diesel, do you collect the vouchers that are on offer, or do you never seem to get enough for the 'gift' of your choice? Well, the Belfast RAIBC are collecting BP Lifestyle Tokens to provide their members with equipment. Last November they had two Trio TS-440 h.f. transceivers and accessories presented to them by BP and they are still collecting tokens. Send your unwanted ones to: RAIBC (NI), PO Box 87, Belfast BT12 5PU.

Cirkit Catalogue

Cirkit have recently published their Summer 1990 catalogue. The 184-pages feature more than 3000 product lines, arranged alphabetically in sections for quick, easy reference - from batteries to test equipment and tools. The mail order service runs so that all orders received by 4pm are dispatched that same afternoon. Cirkit, Park Lane, Broxbourne, Herts EN10 7NW. Tel: (0992) 441306.

PRO-2004 Upgrade Kit

If you own a PRO-2004 you will be well aware that it has 300 memory channels. This modification kit gives you the opportunity of increasing this by 100, like the 2005. For just £2.50 you get the two necessary diodes and a new keypad overlay and full, detailed instructions. Also included with the package is an A4 sheet of other mods you may wish to do, such as fitting a mains socket, 30MHz stepping, etc. The instructions for the modification should be straightforward enough for most users to be able to do. Although, as you are warned, if your set is still under guarantee this modification will invalidate that guarantee.

P. Beckett, 3 Pasture Close, Whitmore, Newcastle, Staffs ST5 5DQ.

Subscriptions

Subscriptions are available at £19 per annum to UK addresses £21 in Europe and £22 overseas. Subscription copies are despatched by Accelerated Surface Post outside Europe. For further details see the announcement elsewhere in this issue. Airmail rates for overseas subscriptions can be quoted on request. Joint subscriptions to both Short Wave Magazine and Practical Wireless are available at £32 (UK) and £37 (overseas).

Components for SWM Projects

In general all components used in constructing SWM projects are available from a variety of component suppliers.
LISTEN OUT FOR

International Marconi Day 1990

Following the tremendous success of the world-wide events held in recent years, the Cornwall Radio Amateur Club are once again co-ordinating International Marconi Day on April 21.

The event will run from 0001Z through to 2359Z and the stations participating are:

K1VV/IMD - Operation of this station is under the Direction of 'Whitey' and our other good friends in the Cape Cod area, where the first Europe to USA contact was made.

W3E8B - Operation of this station is by our colleagues in Nova Scotia - at the Marconi site where the new Marconi Museum has been opened recently.

VO1IMD - This station will be operated from St Johns, Newfoundland, as this is the area where the first transatlantic contact was made.

E21IMD - No Marconi Day would be complete without our good friends working the official Marconi Club Station in Italy. This station is located in Villa Grifone, near the village of Pontecchio, and it was at this site that the very first transmission in the history of radio was made by the Young Marconi in 1895.

GB80IMD - Under the direction of Vernon, a keen Marconi Historian, this station will operate from the area on the Isle of Wight where many early experimental transmissions were made by Marconi and his associates.

GB4IMD - This is the Cornish RAC station operating from the original Marconi site on the top of the cliffs on Poldhu Cove in Cornwall, and very close to England’s most southerly point. This was the European station site when the first transatlantic transmissions were made.

GB2IMD - The Marconi station for Northern Ireland will be under the direction of Ivo GI4WRI. The site is near Rathlin Island, the well-known Marconi experimental site in that area.

IY0TCI - Last year, Pat worked as a guest only, but this year will operate as an official Marconi Day station in Civitavecchia. It was near this site that Marconi carried out his first experiments on 500MHz.

IY1TTM - Last year, this station worked as a guest only, but will participate fully in 1990 working from the Tigullio Tower, Marconi. The location of the tower is at Sestri Levante on the Italian Riviera near Genoa. It was from this tower that the early experiments on v.h.f. and u.h.f. for marine direction finding purposes and propagation studies were carried out.

ZS6RSA - This station is representing the South African influence of Marconi. It was from the site in Poldhu, Cornwall that the first transmissions to South Africa were made. During the event last year, special broadcasts were made on the radio station the Voice of South Africa and the SARL held a very successful open day to celebrate International Marconi Day.

DAO1IMD - Greg DL1BFE actually came to visit Cornwall last year and this year will be in charge of this station on the north German coast. It is interesting to note that the first ever 'Marconigram' was sent from Bourkmun Island on 28 February 1900 and the German PTT officially opened the world’s first wireless service at this site on 15 May 1900.

GB2MDI - John and his colleagues in the Salisbury Radio Club will be operating from the area near Salisbury where in 1896 and March 1897 Marconi conducted his early field experiments for the benefit of the British Army. This site is where the old Roman road meets the A30, just south of Figsbury Rings.

GB4MDI - David and his friends hope to operate their station from Fatholm Island in the Bristol Channel, a famous Marconi experimental site. They will, in fact, be on the island for about five days using the call GB2FI and will change the call to GB4MDI for the 24 hour period of the International Marconi Day. If the weather prevents access to the island then the station will work from the Marconi site on the Welsh mainland, near Barry.

F(I?)IMD - Associates in northern France will be operating for the first time this year to represent their Marconi Contribution.

Operations this year will be voice only and the following table gives the various band segments on which to listen:

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7 - 3.8MHz</td>
<td>7.05 - 7.1MHz</td>
</tr>
<tr>
<td>14.15 - 14.35MHz</td>
<td>18.1 - 18.168MHz</td>
</tr>
<tr>
<td>28.3 - 28.69MHz</td>
<td>50.1 - 50.5MHz</td>
</tr>
</tbody>
</table>

This year, to qualify for the Marconi Award, it will be necessary to work any 10 of the 15 special stations. QSL cards can be exchanged via the bureau, or if preferred directly (with stamps or a donation towards the costs please).

All official award claims must be accompanied by either $5(US), £2(UK) or 10 IRCs. The official award is for full two-way working only, but in addition there is a separate award for short wave listeners where claimants will have to record at least 10 of the Marconi Day stations together with the times heard (UTC). The s.w.l. award will cost $3(US), £1 50(UK) or 6 IRCs.

CRAC (or IMD), PO Box 100, Truro, Cornwall TR1 1RX.

GB2SEM. On May 19 and 20, this station will be running from the Old Power Station, Bargates, Christchurch, Dorset. Running on h.f. and v.h.f. bands, colour QSL cards via the bureau or direct from G6DUN, QTHR on receipt of an s.a.e. The Old Power Station will be open to the public from 10am to 4pm both days with talk-in on 522. Also on show will be the Journeaux Vintage Wireless collection.

GB2RBC. A return visit, by Royal Permission, will put this station on the air over this weekend of June 9/10. Paddy GM3MTH, PO Box 59, Hamilton, Lanarkshire ML3 6QB.

GB2SSD, GB20BD, E17M & E12WW. These stations will be on the air for the Heritage of Whisky Four Distillery Event. The locations will be: Scotland’s smallest distillery, Pitlochry, Perthshire; the Old Bushmills Distillery, Bushmills, Co Antrim, Midleton Distillery, Midleton, Co. Cork & John Jameson’s Distillery, Dublin respectively. A certificate is available for overseas stations if they work any two of the stations or for the UK if they work any three. Annotation is available for working all four stations and the cost of a certificate is 50p, $1 or the equivalent. Robbie GM4UQQ, PO Box 59, Hamilton, Lanarkshire ML3 6QB.

GB2STB. This station will be on the air on the final day of Beth Civic Week from Beth, Ayrshire. That’s June 16. Paddy GM3MTH, PO Box 59, Hamilton, Lanarkshire ML3 6QB.

GB2NTS. This station will be on the air over the week July 15-22 for the Castle Country Four Castles Event. The castles will be Grampian Region Drum Castle, Castle Fraser, Craigievar Castle and Leith Hall. A certificate is available for overseas stations if they work any two of the stations or for the UK if they work any three. Annotation is available for working all four stations (the cost for the certificate is 50p, 1 dollar or equivalent). Robbie GM4UQQ, PO Box 59, Hamilton, Lanarkshire ML3 6QB.

GB70SIG. To celebrate the 70th Anniversary of the formation of the Royal Corps of Signals, the Scarborourgh Special Events Group, together with members from RSARS, RNARS and RAFARS, are proposing to run a special event station from the Royal Signals Training Centre, Burnston Barracks, Scarborough over the period June 10 to July 7.

Operation will be around 3.725 and 7.056MHz on the h.f. bands, plus 144MHz s.s.b and f.m., in addition to activity on the RSARS nets. Special QSL cards will be available and further details can be obtained from: Roy Clayton G4SSH, QTHR.
FOR SALE Sony ICF-201 receiver, 150-299.9kHz, a.m., s.s.b., plus 76-108.9kHz f.m. Digital readout, memories, direct or manual tuning, complete with power supply and instructions, v.g.c. £100. T. W. Hyder. Tel: Hythe, Southampton SG3347.

FOR SALE TM701E 2m/70cm 7/8, £325. AR-560, s.l., Narke, £100. Tel: 0751-3954 (Brighton). All items manuals boxed, v.g.c. J. Goodwood 3GXU, QTHR. Tel: Malls 596.

WANTED Sony 2001D receiver or Philips D2935 exchange for AR800E hand-held scanner. Ray, 41 Gwerlliwyn Terr, Tivorstown, Rhondda, Mid-Glam. Tel: Ferndale 753567.

FOR SALE Sony ICF-PRO-80 hand-held communications receiver, boxed, as new, £200 o.n.o. Peter. Tel: 01-789 1499 evenings.

FOR SALE Realistic PRO-32. 200 channel, v.h.f.u.f. hand-held scanner. Mint condition, unused or unwanted gift. Own interest lies in h.f. only, hence £100. J. Wilkes. Tel: Credinton 4577 evenings.

FOR SALE Commodore 64/PK323: CS cartridges Commodore 64/PK323. Panter, Lincoln, £150. Tel: 01-733 1234.

FOR SALE Plustron TVR5 u.h.f. TV with f.m./m.w./s.w. 16-49m, £25. Buyer collects. C. Blake. Tel: Swindon 266876.

WANTED Sony FRG-7 communications receiver about £100. For Sale Philips DJ935 digital world receiver, unused, £80. F. Steele. Tel: Edge Hill 760 (Warrington).

FOR SALE Sony ICF-201 receiver, 150kHz-30MHz + f.m. no power pack, £50. Panasonic KX-101 printer with BBC lead. £70. Buyer collects. J. Gaffield. Tel: 01-948 5443 (Greenford, Middx).

FOR SALE Standard AX100 panadiser scanning receiver. £40. Realistic PRO-2004 scanner, £20. Also Realistic PRO-32 hand-held scanner, £100. C. Palmer. Tel: 01-902 4914 (Greenford, Middx).

FOR SALE Icom IC-R71E communications receiver with f.m. and a.t.u. in makers carton with manual, £500. G. Smith. Tel: 01-556 5131 (Ealing, London).

FOR SALE Sony ICF-201 receiver, 150kHz-30MHz, f.m. no power pack, £50. Panasonic KX-101 printer with BBC lead. £70. Buyer collects. J. Gaffield. Tel: 01-948 5443 (Greenford, Middx).

FOR SALE Sony ICF-7601L 12 band s.w. RX, dual conversion (SWM/mediumwave Dec 89); £60. Signal S375 airband monitor, £55. Both with accessories. Tel: Livingston 115106.

FOR SALE Icom IC-R71E, 200 channel, sw.d.ppm, optional touche monitor, £250. J. L. E. Cameron. Tel: 01-303 4357 (Bexleyheath, Kent).

FOR SALE FRT-7700 v.h.f. hand-held 2m transceiver with charger, £79. David Cross. Tel: 01-429 0896.

WANTED Icom IC-R71E, 200 channel, full working order, £30. Vega Selena radio, f.m./s.w. 16-49m, £25. C. Blake. Tel: Swindon 613599 evenings and weekends only.

WANTED Icom R-9000, AOR-3000 or PRO-2005 receiver. J. House, 4 Elizabeth Avenue, Kenilworth, Warwickshire CV1 10P. Tel: Kenilworth 54556.

WANTED AOR-2002/1 interface and software for BBC-B or IBM clone, also weather map, facsimile interface and software for BBC-B or IBM clone. A. Prestidge. Tel: 0708-3558. Leeds LS2 1HN. Tel: Leeds 865/726.

FOR SALE Drake 2B receiver, matching speaker, crystal calibrator, crystals fitted for 80, 40, 20, 15, 10, 6, service/instruction manual, spare set valves, £150. J. Wilkes. Tel: Credinton 4577 evenings.

FOR SALE Grundig Satalit 2100 world band receiver, £1,700. A. Brown. Tel: 0261-287718 (UK).

FOR SALE Wanted Yaesu R-9000, AOR-3000 or PRO-2005 receiver, unused, £80. F. Steele. Tel: Edge Hill 760 (Warrington).

FOR SALE Sony ICF-7601L, s.w. receiver, £55. Bearcat 100XL receiver, wide band rubber duck and airband telescopic antennas, case, charger, £110. Both items still under guarantee and in excellent condition. A. Ryan. Tel: Radcliffe-On-Trent, Notts 333237.

FOR SALE Realistic PRO-34, 200 channel hand-held communications receiver, 66-88, 108-200V, 830-950MHz with carrying case, charger and four Ni-Cads, £115. A. Twin, 59 Welbeck Ave, Aylestone, Bucks HP2 9BJ. Tel: Aylesbury 88385.

FOR SALE Icom R-70 communications receiver, very good condition, £350 o.n.o. S. McDonald. Tel: Burnley 54918.


FOR SALE Sony ICF-80 receiver, 150kHz to 2499kHz, AN-1 active antenna and power adaptor AC-D4M for PRO-80, p.s.u., £50. J. Ryan. Tel: 051-513 2237, 505504. WANTED Sony FRG-8800 h.f. receiver with v.h.f. converter, mint condition with packaging and handbook, £275. Bath G3MNZ, 87 Stannore Cres, Luton LU3 2RJ. Tel: Luton 917497.

FOR SALE Yaesu TR-7700 with memory board, £200. For Sale Yaesu FRG-7700 v.h.f. hand-held receiver, excellent condition, boxed, £300. M. Emmott. Tel: Maidstone 36293.


WANTED AR-98D rubber foot, RA17E tuning knob, P940 audio and aerial Plessey connectors, SP946 X6 top and bottom dust covers, RA118E top dust covers, £120 each. 120/200V, 100mA, AS515 250-300V, 200mA stabilised p.s.u., £20 each. £5. 120/200V 100mA, £20 each. £5. £120/2100V 100mA, £20 each. £5. £120/2200V 100mA, £20 each. £5. £120/2300V 100mA, £20 each. £5. £120/2400V 100mA, £20 each. £5. £150/3000V 5mA, £20 each. £5. £150/3500V 5mA, £20 each. £5. £150/4000V 5mA, £20 each. £5. £150/4500V 5mA, £20 each. £5. £150/5000V 5mA, £20 each. £5. £150/5500V 5mA, £20 each. £5. £150/6000V 5mA, £20 each. £5.

FOR SALE GEC RTTY system for BBC computer, £50. Trio R640 150kHz-30MHz with f.m., £200. Grundig Satalit 1400SL with dry-fit battery, £150. Buyer collects. C. Earl, 1 Myfield Drive, Daventry, Northants. Tel: Daventry 702265.

Advertisements from traders, apparent traders or for equipment which it is illegal to possess, use or which cannot be used in the UK will not be accepted.
April 29: The Bury Radio Society will be holding its annual Hamfest at the Castle Leisure Centre, Bolton Street, Bury. Doors open at 11 am (disabled at 10.30 am). Talk-in on S22 and SUB. Catering facilities and a licensed bar are available as well as the giant Bring & Buy. C. Marcroft G4JAG, Mosses Community Centre, Cecil Street, Bury.

May 6: The 7th Anglo-Scottish Rally will be held in the Tait Hall, Kelso. Doors open 11 am. All the usual facilities will be available, hot and cold food, bar, bookstall, John’s ice cream, etc.

Bruce GM4JUB, QTHR.

*May 12: The VHF Convention will take place at Sandown Park Racecourse, Esher, Surrey.

*May 13: The Yevoli Amateur Radio Club will be holding its 6th ORP Convention in the Preston Centre, Monks Dale, Yevoli. D.J. Bailey G1MMM, 7 Thatcham Close, Yevoli, Somerset BA21 38S.

May 19: The Swindon Radio Rally will be held in the Oasis Centre, Swindon. J. Broadfoot. Tel: (0793) 611859

*May 20: The 33rd Northern Mobile Rally will be held at the Great Yorkshire Show Ground, Harrogate. Mike GM0MKX. Tel: (0423) 564353/507653.

May 20: The 7th National Amateur Radio Car Boot Sale will be held at the new venue of Stockwood Park, Luton. This is easier to get to (not far from junction 10 on the M1). Private sellers £7 in advance or £9 on the day, traders £20. The group would like to thank all those who have supported the Sales for the past six years when they were held at the Shuttleworth collection during September. Clive GA4ENB. Tel: Luton 27907.

May 20: The Parkanana Amateur Radio Rally will be held at the Silverwood Hotel, Lurgan, Co. Armagh. Doors open at 12 noon and the entrance fee is £1. There will be the usual trade stands, Bring & Buy, bookstall, OSL bureau, etc. Talk-in on S22. The proceeds of this rally go to the Stanley Eskins Memorial Fund at Parkanana near Dungannon. Jim Lappin GIYGS. Tel: (0762) 851179.

May 20: The Cambridge & District ARC are holding their 6th Annual Rally & Radio Car Boot Sale at Coleridge Community Centre, Radegund Road, Cambridge. Doors open at 10.30 pm. Brian G4TRO. Tel: (0223) 353664.

May 27: The 16th annual East Suffolk Wireless Rally will be held at the Civil Service Sportsground, Straight Road, Bucklesham, Ipswich. There will be a Bring & Buy, Car Boot Sale, a transceive/collection, S22 demo station, all the usual traders and lots more including a children’s play area. Paul Whiting G4YQC. Tel: (0473) 642595.

May 27: The Plymouth Radio Club are holding their annual Radio & Electronics Fair in Plymouth School, Church Street, Plymouth. The doors open at 10 am with all the usual stalls, traders, Bring & Buy, raffle and a licensed bar and refreshments. There will also be an RSGB zonal meeting and lecture along with Morse tests. Jan Fisher. Tel: (0752) 340946.

May 28: The 1990 Bircotes Radio Rally will be held near Bawtry, Doncaster. Doors open at 11 am (10.30 am for the disabled). Talk-in on S22. Details and booking forms from: Pat Smith, 23 Florence Avenue, Balby, Doncaster. Tel: (0302) 857526.

June 2: The first Belfast Amateur Radio Convention, held at the RAIBC (Northern Ireland Area), is being held in the Ormeau Park Recreation Centre, Ormeau Embankment, Belfast. All the usual convention attractions will be there plus demonstrations and talks on the hobby by local well-known amateurs. They are also trying to cater for the XYLs by having demonstrations on microwave cookery, crafts and first aid. The special event station operating on the day will be GB2BRC David Caldwell G1HOW. Tel: (0223) 471137.

June 3: The Southend & District Radio Rally and Boot Sale will be held at the Rocheway Centre, Rocheway, Rochford, Essex. There will be the usual trade stands plus a Bring & Buy, licensed bar and coffee bar. Doors open 10 am with talk-in on S22. John Stone GOOFE. Tel: (0702) 202216.

June 10: The Mid Lanark ARS Annual Open Day will be held at Newarthill CE Centre, High Street, Newarthill. Doors open at 11 am. There will be the usual traders, a Bring & Buy, demonstrations of packet radio, a talk by John Branegan GM4HJ on his experiences with Lotus, demonstrations of equipment and the annual award of their EIHI Trophy. Catering will be provided. David Williams. Tel: (0698) 732403.

*June 10: The Royal Naval Amateur Radio Society Annual Mobile Rally will be held in the Oasis Centre, Swindon, near Petersfield, Hants from 1000-1700.

June 17: The Newbury Radio Boot Sale is being organised by the Newbury & District ARC at a new site, the Brynglas Community Education Centre, Cold Ash, Newbury between 10 am and 3 pm. There will be refreshments available, with free entry and parking for visitors. Talk-in will be provided by GB4NBS. Mike G3VOW. Tel: (0635) 43048.

June 23: The Annual Longleat Mobile Rally will be held at Longleat near Warminster with Shaun O’Sullivan GBVPQ. Tel: (0225) 873098.

July 1: The Worcester & District Droitwich Strawberry Rally will be held at the High School, Droitwich. There will be the usual trade stands, Bring & Buy, family entertainment and strawberry fields (weather permitting). Gates open at 11 am with free car parking and entrance. Tony G4OPD. Tel: Worcester 626057 or Derek G4RB. Tel: Worcester 641733.

July 1: The York Radio Rally will be in the Tattersall Building, York Race Course, The Knavesmire, York. Doors open at 11 am with an entrance fee of 50p (children admitted free). There is ample free parking. On show will be amateur radio, electronics and computing, arts and crafts, there’s a grand Bring & Buy, Morse tests, lectures on various aspects of amateur radio, a raffle and talk-in on S22. A licensed bar and café will be available for refreshments. The Knavesmire is well signposted and there will be additional RAC signs round the main approaches to York. Frank Webb G3ZKS. Tel: (0904) 625799.

July 1: Newport ARS are holding their 3rd Grand Semi-Open Event and Amateurs Rally at the Brynglas Community Education Centre, Brynglas Road, Newport. The event is open from 10.30 am to 4 pm (10.30 am for the disabled). Kevin GW7BSC. Tel: (0633) 262488.

July 6, 7 & 8: The Popular Flying Association Rally is again being held at Cranfield Aerodrome, Bedfordshire. All activities related to flying, including airband radio will have a place there.

*July 14: The Cornish Radio Amateur Rally will be held in the Richard Lander School, Truro. There will be the usual trade stands, Bring & Buy, a computer display/demo and a weather satellite demo. There will be refreshments, free good parking and the doors open at 10 am (8.30 am for the disabled). Rolf Little G7FHR. Tel: (0872) 725654.

*July 15: The Sussex Amateur Radio and Computer Fair will be held at Brighton Racecourse. All the usual traders and other attractions will be there. Doors open from 10.30 am to 4.30 pm, with entrance at £1. Ron Bray GBVEH (QTHR). Tel: (0273) 415654 office house or (0903) 673978 other times.

July 22: The Burnham Beeches and the Maidenhead & District Amateur Radio Clubs are staging the 7th McMichael Rally at the Haymill Centre, Burnham, near Slough. Doors open to the public at 10.30 am (10.15 am for the disabled). Admission is £1, the car boot sale pitches cost £5. There will be the usual trade stands, packet radio demo, refreshments, tea and coffee on the RAIBC stand this year - honestly!, bar as well as the GB4NBS special event station. Contact Bob Hearn. Tel: (0494) 29689.

*July 29: The Scarborough ARS Rally will be held at the Spa, Scarborough. Doors open at 11 am. Many trade stands, large Bring & Buy, Morse exam and demonstration for the Morse examiners, refreshments and bar. Details from Ian G4AUP (QTHR). Tel: (0273) 378647.

July 29: The Rugby ATS will be holding their Car Boot Sale at Lodge Farm, Walcote, near Lutterworth, Leicestershire. Talk-in will be provided by GB8CBS on S22. Pitches are £5 for the whole day. Entrance for visitors is 50p per car. Gates open at 10 am. David G4DOW. Tel: (0455) 552599.

*August 12: Hamfest ’90 will be held at the Flight Refuelling Sports Grounds, Wimborne, Dorset. The event will feature Radio and Electronics Trade Stands, Craft and Gift Fair, Bring & Buy, a vintage wireless exhibition and full family entertainment at Talk-in on S22. The event opens at 10 am. Free parking and overnight camping on the Saturday night by prior arrangement. John G0API. Tel: (0202) 691849 or Rob G5DUN. Tel: (0202) 479038.
The NRD-525 from JRC

In America, they refer to the NRD-525 as JRC's superset, and it's not a bad description, because there is little doubt that the NRD-525 stands in a class of its own. Whatever you want a receiver to do, it's likely that the NRD-525 will do it; whatever you want to hear, the NRD-525 will allow you to listen to it. What will the NRD-525 do for you? In a space so limited as this page, I cannot possibly cover all the answers, so I will let a respected reviewer make some comments for you. Here's what Rainer Lichte, author of "Radio Receivers — chance or choice" said about it:

**Accuracy and stability**

"The tuning accuracy and the matching display are impressive indeed. Still the more impressive is the receiver's frequency stability. Drift is virtually non-existent, it was measured at less than 5Hz/hour."

**And about dynamic range:**

"ICP 3rd order (3rd order intercept point) was measured at +17dBm at 7MHz and +14dBm at 25MHz. These are excellent values, and they are not the result of decreased sensitivity. The NRD-525 is amongst the most sensitive receivers I've measured so far. ... Dynamic range was computed to 102dB, an equally outstanding value."

All very well you may say, but what does this technical jargon mean in real life? Let me quote Rainer Lichte again:

"The signal quality under adverse conditions is remarkable, e.g. the 40 metre band here in Europe is fairly cluttered with high-power stations and most receivers just quit when you try to extract some intelligence from a weak radio amateur signal. The NRD-525 is unimpressed and functions in a truly professional manner."

In other words, there is virtually nothing you cannot resolve. If it cannot be received by the NRD-525, it cannot be received by anything. As a final quote from the review, let me give some conclusions:

"The receiver is a joy to operate and a joy to listen to."

"The new NRD-525 very impressively manifests itself as the No. 1 receiver outside the commercial/military bracket."

"Performance-wise, the NRD-525 is way ahead of the competition because this receiver delivers outstanding results in all modes of operation."

When you try an NRD-525 for yourself, all that Rainer Lichte has said will be clearly true, but that's not the end of the story, because the NRD-525 has a range of options which will extend its use even further; to VHF/UHF with an internally fitted converter; to more demanding applications with a range of high performance IF filters; to almost anything you want it to do.

For more advice on this outstanding receiver, just send for details, or call in here at Matlock, or at any of our branches across the country. You will find us helpful, knowledgeable and competent, and when you buy from us you have the comforting thought that you have the backing of Europe's best service team should you require it. That's why JRC, Kenwood, AOR, Signal, Datwa, and all the other well known names have chosen us to be their sole UK distributors. Others may sell the radios, but we do so much more. Try us and see.

**Options**

- CMK-165 VHF/UHF converter: £391
- CMH-530 RTTY demodulator: £102
- CMH-532 RS232 Interface: £91.75

The NRD-525 is fitted with 12kHz, 6kHz and 2.4kHz filters as standard. Option filters are available for 300Hz, 500Hz, 1kHz and 1.8kHz bandwidths.

Send four first class stamps to cover the postage and we will send you, by return of post, you FREE copy of "THE LISTENERS GUIDE" (2nd edition), a commonsense look at radio listening on the LF, MF and HF bands. Its unique style will, I am sure, result in a "good read" but underneath the humour lies a wealth of experience and expertise. You will also receive detailed leaflets on our range of receivers and a copy of our current price list.

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When it comes to scanners
Look to Lowe

AR-1000 . . . £249 inc. VAT

We are delighted to give firm information about the new AR-1000 handheld scanner from AOR. Their design aim of producing a handheld version of the AR-2002 but improving on the spec. at the same time seems to have been fulfilled.

**BASIC SPECIFICATION.**

**Frequency ranges**
8 to 600MHz continuous, 805 to 1300MHz continuous.

**Frequency selection**
By direct keypad entry or by tuning knob on top panel.

**Memory channels**
1000 arranged conveniently in ten banks of 100, with direct keyboard access to any memory.

**Search bands**
Ten bands which come pre-loaded with the ten most important UK bands of interest as follows:
1. VHF air 118-138MHz
2. UHF air 225-400MHz
3. VHF PMR 1 71-87MHz
4. VHF PMR 2 165-174MHz
5. Band 3 118.5-225MHz
6. VHF marine 156-163MHz
7. VHF amateur 144-146MHz
8. UHF amateur 433-435MHz
9. Cell mobile 890-905MHz
10. Cell base 935-950MHz

Note that this is only the factory pre-loading, and any search band can be easily re-programmed by the user for any frequency range they wish. What is important is that the new owner can unpack the receiver and by pressing just 3 keys can begin using the unit straight away.

**Reception modes**
AM, FM (narrow), and FM (wide) which gives access for the first time to FM broadcast and TV sound in a handheld scanner.

**Frequency steps**
User programmable from 5 to 995kHz, in any multiple of 5kHz or 12.5kHz.

**Scan speed**
20 channels per second.

**Search speed**
40 channels per second.

**Power source**
4.8V rechargeable NiCd.

The battery pack is four separate 600mA/H AA size cells which are provided, but the user can easily remove them and replace them by four standard AA pencells. Also, and most importantly, the AR-1000 can be powered from any external dc supply of 13.8 V nominal, which not only powers the receiver but also charges the NiCd batteries — so satisfyingly simple.

**Other features include**
10dB switched RF attenuator; concentric easy to use volume and squelch controls; a brilliantly designed keypad layout which anyone can understand and use; and a simple interactive operating system in which the display clearly indicates what the user's next move should be.

All the performance and features which we wanted from AOR are here in a stylish handheld package, measuring only 70 x 35 x 170mm, and weighing a mere 300g. (excluding batteries).

The ARO-1000 comes complete with the following accessories:
- Set of 600mA/H NiCd batteries
- 240V mains charger
- DC power cord with cigar lighter plug
- Soft carrying case
- High performance DA900 flexible gain antenna
- Belt clip
- Carrying strap
- Earpiece
- Band clip
- High performance DA900 flexible gain antenna

For the past 26 years Lowe Electronics have specialised in seeking out the best in radio and bringing it to our customers. Those customers will also tell you that we have another speciality — looking after them. Whatever is best in radio, we sell. Whatever we sell, we back with really expert advice and service. We are pleased to represent the best companies in the receiver world, and in addition to the AOR range shown here, we also distribute receivers from Signal Communications and WIN, two of the top names in Airband radio. For full information and a copy of our Airband Guide, simply send us four first class stamps and mention that you saw our ad. in Short Wave Magazine®. Happy listening.

Short Wave Magazine May 1990

Shops in GLASGOW Telephone 041-945 2626. DARLINGTON Telephone 0325 486121. CAMBRIDGE Telephone 0223 311230 BARRY Telephone 0446 721304. LONDON Telephone 081-429 3256. BOURNEMOUTH Telephone 0202 577760.

All branches are closed all day Monday.
Before we start I must explain that radio has never been a hobby to me and my various activities in this field have always contributed toward my living which is why I was able to put so much time and effort into this solar project.

As time went by it became important for me to know more about the behaviour of radio waves and while gathering information about beacon signals in the 28MHz band, openings in the East-European broadcast band (66-73MHz) and keeping records of atmospheric pressure and disturbances to the domestic radio and television networks, I decided to build a simple radio telescope. Such an instrument would add another dimension to the subject of propagation and tell me when the sun was ‘active’ and likely to be ejecting streams of particles toward the earth causing auroral or ionospheric disturbances.

The First Step

Radio astronomy is a young science and in the 1960s information was limited so I began by referring to the book Solar Radio Astronomy by Kundu. I already knew that when sunspots are present, the sun is a powerful transmitter of radio waves and a chart in this book showed that noise from large solar bursts and storms can be received on earth in the 100-200MHz region, peaking around 150MHz. Fortunately, I had previously heard solar noise on a communications receiver and knew that descriptions of it sounding like ‘hissing’, ‘the sea rolling across the shore’ and ‘who000oshing’ over a wide bandwidth were correct.

Where to ‘Listen’ and Where to Build

Before starting to create such a tool I had to find an observational frequency that was clear of terrestrial and satellite signals plus a south-facing site on which to build the antenna. After prolonged tests with a converter and dipole I found that 135.95MHz met the first requirement and by watching the sun’s path I decided that the southern end of my garden would be ideal for the second. The site, with the completed antenna, 21 years ago, can be seen in the photograph.

The Antenna

The main frame, supporting the four Yagis is 3 x 2m, made from 50mm rough sawn batten, held together with about 120 No.10 wood screws and covered with 12mm wire mesh to act as the reflector. The mesh was secured to the frame with a large number of wire staples to keep it as tight and flat as possible. Next came the business part of the antenna. Following a chat with the late Vic Hartopp, then a director of Jaybeam, his firm promptly supplied all the parts I needed to make the four Yagis and the coaxial matching harness.

The selected site had a clear view of the midday sun for about three hours and was well away from sources of local ignition or electrical interference. This was ideal, because the rotation of the earth would move the antenna across the sun in the horizontal plane, known as earth-drift, leaving me to adjust its angle about five times per year to keep the sun within its vertical beamwidth. This was achieved by hinging the reflector on its bottom rail and supporting the back with a couple of 4m long television masts and a simple arrangement of universal clamps. This weighty assembly rested on three, 2m lengths of 230 x 75mm timber, evenly spaced with approximately 610mm of each protruding above the ground. The short-ends of three long reflector hinges, with their moving parts well greased, were bolted to a plank which in turn was secured to the three ground-posts with coach screws.

The Receiver

Briefly, the receiver used in this radio telescope was a ‘spreadout’ superheterodyne with an added means of recording the incoming signal on a paper chart, Fig. 1.1. Basically, a superheterodyne receiver can be divided into three sections, first the r.f. amplifier, local oscillator and mixer; then the intermediate frequency amplifier and detector and finally the audio output stage. Section 1, a crystal-controlled converter, was installed in a waterproof container near the antenna thus allowing for a short, coaxial feeder at the observational frequency, Fig. 1.1 'A' and 'B'. The first converter inside container 'B' was home-brewed using an r.f. stage to amplify the incoming signal at 136MHz, a crystal oscillator chain giving an output of 110MHz and a mixer which produced an intermediate frequency of 26MHz (136 - 110 = 26MHz). This conversion enabled any solar noise, at 136MHz, to reach the rest of the receiver, in the
USING A SOLAR RADIO TELESCOPE

Solar radio waves reach earth about 8.3 minutes after their generation on the sun.

A Multi-element antenna
B Converter and housing
C Underground feed cables
D Communications receiver
E d.c. amplifier
F Pen recorder
G Loudspeaker
H Paper chart

Fig. 1.1: The 'spreadout' superhet radio telescope.

This system was tested by tuning between 136 and 137MHz (now converted to 26-27 MHz on the dial of 'D') to find a signal from an orbiting satellite and then re-tuned to its operational frequency when the check was complete.

The set first used in position 'D' was an ex-military AR88 which was just right because, apart from its good performance, it was fitted with a 'diversity' terminal fed from its detector and a convenient place to connect the movement of a sensitive pen recorder 'F'. Although the energy at this point was insufficient to move the pen, the addition of a d.c. amplifier 'E', using a 741 operational amplifier i.c., made this possible.

The DC Amplifier

There are many published circuits using a 741 to drive such a movement, but some experimentation is required to get the right component values, especially the feedback, to make the pen move to full scale with a low input voltage. It is essential to fit a zero control to the 741 which can be adjusted in conjunction with the receiver's r.f. gain control. In my case, I zeroed the movement and then increased the r.f. gain until the receiver's noise line was drawn about 10mm in from the edge of the paper chart 'H'.

Pen Recorder

I was lucky to find an Evershed & Vignoles pen recorder, with a 1mA movement and a 240V chart motor, on the surplus market. The mains driven motor meant that observation times could be commanded by a time-switch. Gear wheels were obtained from the makers to give a chart speed of approximately 12mm per minute which is optional, but reasonable on a three hour run. I set the time-clock to switch on at 1130, as the sun entered the antenna's horizontal beamwidth and off at 1430 when the sun was outside. These times are not too critical but must be adjusted to suit the location and antenna direction. Each daily observation produced about 2m of chart which enabled increases of noise and/or individual bursts to be timed and clearly seen.

In 1978, I replaced units 'B' and 'D' with a Microwave Modules 144MHz converter and a Yaesu FRG7 communications receiver which were suitable for the work and performed very well. I fed the d.c. amplifier from the FRG7's RECORD socket and adjusted a couple of resistance values in the d.c. amplifier to suit the output of the FRG7. This was trial and error.

Results

The completed instrument began its daily work in May 1968 and early recordings proved that solar radio noise could be logged under two headings; individual

Fig. 1.2: (Left) Individual solar bursts.

Fig. 1.3: (Above) A continuous noise storm.
So far in this series the radio receivers have been very much home-made items. The first radios were limited in the number of stations and the selectivity to isolate individual stations was poor. Even the ‘one-i.c.’ radio, which receives local a.m. broadcast stations well on its own ferrite rod antenna, only worked personal headphones. Typical radios receive plenty of stations and drive a loudspeaker. Such a radio requires adequate audio amplification to power the loudspeaker and usually includes a volume control to adjust the output to the required listening level.

The ‘one-i.c.’ radio is a surprisingly good receiver for the number of components used and could make the basis of a useful domestic radio set. Alone, it is incapable of driving a loudspeaker and therefore needs further audio amplification. It would be possible to build several extra transistor stages to give this further amplification, each stage would require the associated components around each transistor to achieve the correct operating conditions and each stage could give only a limited amount of extra amplification. The best solution is to use an audio amplifier integrated circuit: another i.c.

### Integrated Circuits

There are several audio amplifier i.c.s (integrated circuits) which could do the job. Indeed some of these are capable of very high levels of audio output. The one chosen for this project is an inexpensive and readily available type; the LM386. It has been chosen because it is cheap, easy to obtain and also because it requires very few external or extra components to get it working. It also has a low standing current, that is, it does not draw much current from the battery when signals are not being amplified. I like the LM386 and have used it in many radio projects over a number of years.

The circuit of the ‘two-i.c.’ radio is shown in Fig. 8.1. The LM386 is a package called the 8-pin d.i.l. (dual-in-line) which gives a very compact arrangement. There are two rows of 4 pins, spaced 0.1 in apart, either side of the flat package. A notch marks the positions of pins 1 and 8 (opposite sides of the package) and some makers add a marker, or dot, to denote pin 1. Looking from the top of the i.c., the pins are numbered in an anti-clockwise direction from pin 1. The pins must be wired correctly or the i.c. will not work and could even be damaged.

### The Circuit

The circuit is far more complex than any other circuit diagram we have used so far in this series. Do not be put off by the number of components and stages. Circuits diagrams can usually be split up into units or stages according to function. This circuit can easily be divided into two units to the left and right of the volume control, R4. The left-hand side is the ‘one-i.c.’ Radio and the right-hand side is the audio amplifier built around the LM386.

The left-hand section looks much like the original circuit of the ‘one-i.c.’ Radio in Fig. 7.2. The LT700 audio matching transformer has been replaced by a resistor, R2, which is connected to another resistor, R3. R2 provides the audio signal load, in the same way as T1 of Fig. 7.2. R3 simply serves to drop the voltage from the battery supply to a suitable level for the ZN414. In this circuit a 9V battery will be used as the power source.

The audio output from the ZN414, at pin 1, is fed to a volume control, R4. Resistor R4 is a potentiometer (variable resistance) which can be adjusted to allow only the required amount of audio signal to pass to the amplifier to produce the required amount of sound output. The whole of the audio signal appears across the carbon track of R4. The wiper arm, controlled by the rotating shaft allows a portion of the total signal to pass via C4 to the amplifier. The nearer the wiper is to the top of R4 the more signal is allowed to pass. Turning the wiper down towards the bottom of R4, the ground (or earth) end gives less signal.

### Potentiometer

The potentiometer has a value of 10kΩ and follows a logarithmic law, usually sold simply as ‘10kΩ Log Pot’. Logarithmic and linear laws of change are too complex to be explained here - if you really must know, look it up in a maths book!

The choice of the log potentiometer, rather than one with a linear track, is because of the human ear. The ear follows a logarithmic law in its response to sound. To put it very simply: the louder a sound level, the greater in proportion must the sound be increased to register an increase in human hearing. A sobering thought for live pop music fans and Walkman users!

The signal from the volume control is coupled, via C4, to the input of the LM386 at pin 3. Capacitor C5 helps to roll off some of the high-pitched notes and makes the operation of the amplifier more stable. The output of the LM386 appears at pin 5 and can directly drive an 8Ω loudspeaker. Capacitor C9 couples the output to the loudspeaker and R6 and C8 provide a simple filter to stabilise the operation of the LM386.

### Supply Voltage

The supply voltage for the LM386 comes from a 9V battery via R5, with C10. These components ‘decouple’ the supply, this is, they prevent any of the audio signal getting onto the power supply line. Should this occur, the signal will appear across R5 but then be led to ground by C10. The capacitor, C7, is used to set the overall gain of the amplifier (the amount it amplifies) which in this case is 200 times. Capacitor C6 is a decoupling capacitor required for the internal working of the LM386.

In Part 9 we will get down to building the ‘two - i.c. Radio’.

Turn to page 15 for resistor values.

### Abbreviations

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<td>a.m.</td>
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channels to store your favourite stations and has features
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search step increments, clock timer, power-save, S-
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RIGHT THE FIRST TIME

RESISTOR VALUES

The colour coding for resistors may include a fourth band to indicate the tolerance of the resistor, that is, how accurate we might expect the stated value to be in practice. Most modern resistors are ±5% but ±10% or even ±20% resistors are common. For example a YELLOW-VIOLET-YELLOW resistor would have the stated value of 470kΩ (470kΩ). If it has a silver fourth band (±10%) the value can be between 470000 - 470kΩ and 470000 + 470kΩ, that is 423kΩ to 517kΩ. This may seem a ‘rough’ value but it is accurate enough for most radio applications.

Obviously resistors cannot be made for every value of resistance, so manufacturers use a system of preferred values. The chart shows what these values are for the three common tolerances. The relationship may seem odd but it does reflect the tolerance extremes and complete coverage of values without duplication.

The preferred values are used for the whole range from 1Ω upwards, so the values available for 10% resistors would read: 1, 1.2, 1.5, 1.8, 2.2, 2.7, 3.3, 3.9, 4.7, 5.6, 6.8, 8.2, 10 and so on up the range of resistance.

Capacitors also use the same system of preferred values.

<table>
<thead>
<tr>
<th>Tolerance</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>1.0, 1.1, 1.2, 1.5, 1.6, 1.8, 2.0, 2.2, 2.4, 2.7, 3.0, 3.3, 3.6, 3.9, 4.3, 4.7, 5.1, 5.6, 6.2, 6.8, 7.5, 8.2, 9.1</td>
</tr>
<tr>
<td>10%</td>
<td>1.0, 1.2, 1.5, 1.8, 2.2, 2.7, 3.3, 3.9, 4.7, 5.6, 6.8</td>
</tr>
<tr>
<td>20%</td>
<td>1.0, 1.5, 2.2, 3.3, 4.7, 6.8</td>
</tr>
</tbody>
</table>

USING A SOLAR RADIO TELESCOPE

bursts, (Fig. 1.2) and the continuous noise storm, (Fig. 1.3). The former can last up to 10 minutes and the latter may continue for several days depending on the size and life-span of the area on the sun where the radio-waves are being generated. The 93mm length of chart in Fig. 1.2 represents 7 minutes of recording time and clearly shows the two burst lengths of 1 and 2.25 minutes respectively.

A typical noise storm can be seen in Fig. 1.3. The system switched on automatically as the sun entered the antenna beam and Fig. 1.4 shows this start, plus about eight minutes of recording.

Take a close look at the bottom left of the chart and you will see the level of the receiver background noise when I checked the system against 'cold' sky some three hours earlier. Now compare this with the increase in noise level when the sun, with a mild noise storm in progress, entered the antenna beam.

Although solar activity is generally random and complex there are many similarities between events. For example, the appearance of an active sunspot usually produces a few small bursts which increase and decrease in numbers as the spot crosses the central meridian before disappearing off the opposite limb. This takes about 13 days because the apparent movement of the spot across the sun’s disc is due to the approximate 27-day rotation of the sun on its axis.

Noise storms are often recorded while spots are in mid-travel and one never knows what activity is round the corner and yet to appear, Fig. 1.5.

In Part 2 Ron tells us how he put his creation to work listening to the sun.
DECODING THE DATA

Part 2
Mike Richards G4WNC

Last month Mike covered the translation of a keypress on the computer into a binary number for transmission as data from the computer’s serial port. Now he explains how this digital signal is processed so that it can be sent over a simple radio link.

The mark and space states of our serial data. The convention being that the mark is represented by the higher of the two frequencies. There are some stations that use the opposite sense and these are said to be using reverse, or inverted, shift.

So why are there a variety of different shifts in use as it would seem that the 170Hz shift is the best because it uses less of the valuable frequency spectrum? Well the wider shifts reduce the number of errors and also allow data to be sent at a higher speed, which is of particular value to commercial operators. The wider shift also places less demands on the design of the terminal unit, but more of that later.

Practical Example

Let’s now move on to describe a practical example using a typical commercial press station with a shift of 425Hz and a speed, or baud rate, of 50 bauds. You may remember that in the first part of this series I described the generation of serial data representing the letter A, well I’ll continue from there and describe how that letter is transmitted. The waveform of the serial data complete with start and stop bits is shown in Fig. 2.1. In order to show how this is transmitted all we have to do is change the mark and space legends to the two transmitter frequencies.

So if for the sake of this example our theoretical transmitter is operating on 12.1MHz for the mark condition, a space will result in the carrier changing to 12.099575MHz i.e. 425Hz lower in frequency. This change is shown in Fig. 2.2, as is the rate of change which is shown by the timings in milliseconds along the bottom of the graph.

That’s all there is very broad terms to generating an f.s.k. RTTY transmission. So now we will move on to how the signal is resolved at the distant end. First of all let’s define just what we require of the reception system. It must take an r.f. signal with a shift of 425Hz and convert it back into a serial digital signal which can be handled by a computer. Rather than try and describe a sophisticated commercial decoding system, I’ll deal with a common system that is used by a large number of short wave listeners.

By far the simplest way to convert the f.s.k. signal into something more manageable is to use a conventional s.s.b. receiver. When an f.s.k. signal is demodulated by an s.s.b. receiver the result is two audio tones with the difference between the frequencies being the same as the shift of the original signal. The actual frequency of the audio tones will vary as you tune through the signal but the difference between them will always be the same as the shift, i.e. 425Hz in our example. If you’ve a receiver to hand you can try this simple experiment to illustrate this point. You will need to tune very slowly between 14.080MHz and 14.095MHz - the RTTY section of the 14MHz amateur band. I chose this band as there is almost always some RTTY activity, whereas many commercial stations operate to timed schedules. Once tuned to this band you should hear a few RTTY signals, which have a warbling sound as the signal switches between the two carrier frequencies.

You may also notice that the signal often stops on one frequency then starts again - this is due to the amateur operator typing slowly and pausing between letters, but nevertheless serves to illustrate the process quite well. Now that you appreciate how the RTTY signal can be converted into audio tones we need to consider the next step. What is needed is a device that can accept this two-tone audio signal and convert it back into a digital form that can be handled by...
a computer. There are in fact many ways of doing this, but for the sake of this example I will briefly explain a common type of terminal unit. The name terminal unit is used to describe an electronic device that converts audio RTTY tones into a d.c. signal which varies according to whether a mark or space tone is received.

One of the most common types of terminal unit is known as the filter type and uses two audio filters and a detector to achieve the conversion. A greatly simplified block diagram is shown in Fig. 2.3. Before we go any further I ought to talk about the actual receive tones used. If you tried the test I described earlier where you tune across a RTTY signal you will have noted that the actual frequency of the RTTY tones varies widely as you tune. This leads us to the next problem - the filters in the terminal unit will only respond to two fixed tones. There is no real reason why terminal units shouldn't use whatever frequencies they like, but for some sort of commonality, standards have been adopted. Unfortunately there are two standards, known as 'high tones' and 'low tones'. The 'high tones' being used primarily in the USA and the 'low tones' in Europe. The frequencies used for the high and low tones are shown in the table below.

<table>
<thead>
<tr>
<th>Shift (Hz)</th>
<th>Low Tones</th>
<th>High Tones</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mark (Hz)</td>
<td>Space (Hz)</td>
</tr>
<tr>
<td>170</td>
<td>1445</td>
<td>1275</td>
</tr>
<tr>
<td>425</td>
<td>1700</td>
<td>1275</td>
</tr>
<tr>
<td>850</td>
<td>2125</td>
<td>1275</td>
</tr>
</tbody>
</table>

One significant point you may have noticed from this is that with low tones the mark tone is always the higher of the pair whereas with high tones the space is always higher. As a result of this the received data is inverted when using high tones unless a correction is made within the terminal unit.

So to get back to our example, you can see from this table that to receive a signal with 425Hz shift using European low tones, our two terminal unit filters need to be set to 1275Hz and 1700Hz for the mark and space signals respectively.

Let's use our original graph again, but this time I'll show the audio tones from the receiver that are applied to the terminal unit - Fig. 2.4. In a perfect terminal unit the d.c. output signal from the unit to the computer will mimic this waveform exactly. To complete the process all we now need to cover is the display of our letter A on the computer terminal. By employing the principles that I described in the first part of 'Decoding the Data', but in reverse. The serial signal is converted back into a parallel data number, which the computer then looks up against the ITA No.2 (International Telegraph Alphabet) to see what letter needs to be displayed on the screen. The actual display of the letter on the screen is an internal function of the computer so we don't need to go into too much detail. In order to summarise the whole process from end to end, I have constructed the flow chart shown in Fig. 2.5.
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Godfrey Manning G4GLM

Flying Experiences

Continuing the story of his involvement with BEA, Geoff Halligey (Bridgeton, Mid-Glamorgan) recounts his days as radio operator (!) on Vikings, Elizabethans (Ambassadors to us) and Viscount; 700s between 1951 and 1962. Here’s his description of an early form of ground controlled approach: "In front of you is a thick blanket of fog. The bloke on the ground keeps saying 'Commence your descent, you are passing the middle marker, left 2°; the runway is straight ahead,' all you see is white-out. At 200ft (if you’re lucky) you spot a lead-in light, and eventually up comes the runway". Thanks, Geoff; do tell us about the days at Croydon on c.w. and how the Americans used radio ranges.

Your Questions Answered

VOLMET and a.t.i.s. broadcasts interest

Neil Oakley (Whitstable, Kent). London

VOLMET South is still on 128.6MHz and

Heathrow a.t.i.s. for both arrival and

departure is on 133.075MHz. Both

transmissions originate from ground

stations separated by just 3kHz.

Dave Hulme (Manchester) wants the u.h.f.

frequency of London Mil North.

Both my Aerad and RAF Supplements

give this as 342.8MHz but if anyone

knows better, please write in.

I’m often asked about receipt of oceanic clearances. The best description I’ve seen is in From the Flightdeck 1: Heathrow-Chicago by Stan Stewart (Ian Allan). During the later stages of climb north-west England the aircraft is controlled by London Airways; however, the co-pilot obtains the oceanic clearance by contacting Shanwick on the second v.h.f. set. Later, Scottish Airways hands the flight over to Shanwick by giving the appropriate primary and secondary h.f. frequencies; this should satisfy J.D.

Toseland (Woodford, Northants).

Donald Jackson (Stanford-le-Hope, Essex) - forgive me if I haven’t read the signature correctly - will find a complete description of n.d.b.s, v.o.r.s and other navigational aids in part 2 of my ‘Aeronautical Radio’ series in the June 1987 SWM. Why is this subject important? There are four reasons. Firstly: knowing the usage of nav. aids is the only way to understand the conversations between controllers and i.f.r. flights. Even v.f.r. aircraft make use of beacons. Secondly: the current pattern of i.f.r. traffic can vary to take into account unserviceability of nav. aids. Thirdly: some v.o.r.s also carry useful a.t.i.s. transmissions, helping aircraft which might be out of range of the airport’s own transmitter. Fourthly, beacons are a reasonably constant signal source which are of interest for propagation tests.

Dave Wright (Sheffield) is troubled by adjacent-channel interference on h.f. stations separated by just 3kHz. Remedies include buying a receiver with better selectivity (an old-fashioned v.f.o. is often better than a synthesiser in such cases of adjacent channel breakthrough). However, this is expensive advice so first try simpler remedies to reduce the unwanted signal before it reaches the first mixer in your receiver. I suggest adding an attenuator and/or a preselector between the antenna and the receiver. The problem you are experiencing is becoming increasingly important with modern receiver designs and ever more crowded bands.

Roger Ryton (Newbury, Berkshire) notes that his local TACAN at Greenham Common is on a published frequency of 108.0MHz. Actually, it’s on channel 17 which is really 978MHz. What happens in the aircraft is that the v.h.f. nav. set tunes in a.v.o.r. and the appropriate d.m.e. is automatically selected on u.h.f. at the same time. There isn’t a v.o.r. on 108MHz but you still select this frequency on the cockpit controller in order to gain automatic access to the d.m.e. part of the TACAN. There is no separate d.m.e. receiver tuning control. Now, still on the subject of navigation, can someone tell us where the GIBSO reporting point is?

Company operations reports don’t follow the rigid procedure laid down for communications with controllers. Typically consistent, though, is reporting of times off blocks/airborne, saying ‘diagonal’ where I’ve printed a ‘/’ (slash). Roger will no longer be puzzled by this. But, he does want to know about secondary surveillance radar. The aircraft replies on 1090MHz and no, you couldn’t turn to this and generate a plan on your computer. Both direction and distance are only determined once the ground antenna direction and timing of the interrogation pulse are known. The reply signal means nothing on its own.

Finally, a good idea from Roger is to couple a receiver’s squelch output (the RS35 has one) to a tape recorder (a dictating machine is best, it starts and stops more sharply) so that no recording time is wasted on a silent channel. Sorry, I can’t comment on any particular combination of antenna/receiver that you might set up at your location; there are too many variables.

Follow-ups

In the March issue Stephen Patrick (Wishbech, Cambridgeshire) asked for the location of Eastern Radar’s transmitters. Jim Wright gives them as Trimmingham, North, Rothwell, Lincolnshire; Wissby and Grantham; Steve Foster (Burton-on-Trent) adds Chedburgh. The first three are shared with Anglia Radar. Can anyone pinpoint the Grantham site with more precision, for Steve’s information? Midland Radar has moved from North Luffenham to amalgamate with Eastern Radar, both being controlled from West Drayton. Border Radar is now controlled from North Luffenham. There must be a good reason for all these changes!

Now for the remaining callsigns requested by P.J. Saliss (Highgate, London), also in March. BALAIR is a Swiss charter operator; CHALLENGER could be a Canadair Challenger business jet, the “flight number” actually being its registration; MARTIN could be Martinair, the Dutch cargo airline; ROOK is probably military, e.g. Alconbury TR-1As. Thanks to Steve Foster, David Hulme and Dave Wright.

Frequency News

Geoff Halligey reports on Novair’s new long-distance operations control using 6.556, 10.021 and 11.363MHz.

Barry Craner (Leicester) is well informed about East Midlands Airport. Barry recommends a day out at the Aeropark which is an aircraft museum on the airport; the advertising leaflet has enticing pictures of an Argosy, a Whirlwind, a Varsity and of course the Vulcan. You can get quite close to the runway for photography. Apparently Tower (124.0MHz) relays on

20

Short Wave Magazine May 1990

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- VHFAHFA Airband Guide ............................... £5.95
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Short Wave Magazine May 1990
The new station of High Adventure Ministries, KHBN on Guam, is still a long way from being on the air on its own. Problems with the lease for the land on which the station is to be built have created a considerable delay, but a fellow religious broadcaster on the island is enabling High Adventure to get on the air anyway. The short wave station of Adventist World Radio, KSDA, has sold a daily four-hour time block to KHBN for its own programming beamed to China. So, KHBN can currently be heard via KSDA’s facilities from 0400 to 0800 on 15.225MHz. Once it begins operations on its own KHBN will probably show up on 9.830 and 9.840MHz.

Herald Broadcasting KHBI
Herald Broadcasting’s KHBI on Saipan (the former KYOI) has returned to the air, having added a second 100kW transmitter and new antenna systems. The station, which carries the same programming as WCSN and WSHB, is currently scheduled as follows: 1800-2000 on 11.980MHz, 1900-2200 on 17.770MHz, 2000-2200 on 9.455MHz, 2200-0000 on 15.275 and 15.405MHz, 0000-0200 on 15.445MHz, 0400-0800 on 17.780MHz, 0600-0800 on 17.855MHz, 0800-1000 on 9.530 and 17.855MHz, 1000-1200 on 9.530 and 15.115MHz, 1200-1400 on 9.465 and 15.285MHz and 1400-1800 on 9.530 and 15.365MHz.

Radio Clarin
Radio Clarin in the Dominican Republic has made the predicted change in frequency from 11.700 to 9.950MHz. Shortly after making the move the station began carrying a programme called ‘La Voz de Fundacion’, an anti-Castro broadcast produced by the Cuban American National Foundation. The programme’s purpose is to serve as a link between the Cuban exile community in the United States and the people of Cuba. The programme airs at 0100-0200, in Spanish. Reception reports can be sent to Mr Delsin Pernas, Cuban American National Foundation, 7300 NW 35th Terrace, Suite 104, Miami, Florida 33122, USA.

Voice
According to a report in the newsletter of the Association of North American Radio Clubs, funding for the Voice of America’s Voice magazine was to be discontinued at the end of 1989. The magazine featured the VOA programme schedule, along with feature articles and stories about upcoming Voice of America programmes.

More news of short wave broadcasting activity from the Americas.

According to the news item there was some hope the magazine might be taken over and turned into a commercial venture by a private company but nothing definite had developed when the newsletter story was written. Listeners in the US are barred by law from receiving the magazine.

American SW Listener’s Club
The American Short Wave Listener’s Club has ceased operations. The club had been in existence since the early 1960s and, for most of its existence, had been run by Stewart MacKenzie of Huntington Beach, California. Lack of support was cited as the reason for ending club operations. The club has been suffering from declining membership for the past several years.

Nicaragua
The Voice of Nicaragua has left 6.100 and is now being heard on 5.998-5.999MHz with Spanish and English language programming around 0000 and through to 0500 or 0600.

Radio Reloj
Long time Costa Rican broadcaster Radio Reloj has resumed use of its 6.006 frequency. Silent at present is 4.832MHz which operated in parallel for many years. Earlier, the situation was just the reverse, with 4.832 active and 6.006 inactive, so it may be that the station has only one serviceable transmitter. With 4.832 gone, reception of the Venezuelan Radio Tachira in San Cristobal is excellent.

Radio Nacional
Radio Nacional de Ecuador continues to be heard on short wave through the facilities of HCJB. Radio Nacional airs a half-hour in Spanish daily at 1730-1800 on 15.270. HCJB even handles QSLs for this programme.

It’s reported that, eventually, Radio Nacional plans to have its own transmitters on short wave, as it did many years ago. We’ve seen no timetable for this, however.

La Voz de Nahuala
The Guatemalan station, La Voz de Nahuala, on 3.360MHz opened up a second frequency, 5.040MHz, which is being heard very well after 0000 with religious and cultural programming in Spanish and Indian languages.

Radio La Hora in Cusco, Peru, once active on 4.977, is now heard on 4.860, although usually with poor signals. The best time for listeners in Great Britain would seem to be between 0200-0400.

Radio Iris
Long standing Ecuadorian broadcaster, Radio Iris, is reported to have moved from Esmeraldas to Quito. The new address is Edif Benalcazar 100, Av. 10 de Agosto y Riofrío, Quito. The station operates on 3.381MHz variable between 1000-1400 and 2200-0100. Years ago the schedule ran to 0400 or 0500 so Radio Iris has suffered some cutbacks.

RAE in Argentina
RAE in Argentina has regained the use of its second transmitter for its international service so two of the standard three frequencies (9.690, 11.710 and 15.345MHz) are in use during each transmission. English is currently scheduled at 1630, 2100, 0100 and 0300.

The short wave outlet from Belize has been silent since June of last year, although it is supposed to return. Belize normally operates with 1kW on 3.285.

C-SPAN
C-SPAN, the cable TV service which provides coverage of the US and House of Representatives has added a pair of audio channels carrying international short wave. One channel provides the BBC World Service 24 hours a day, the other is carrying programmes from Radio Canada International and Radio Beijing. C-SPAN hopes to add to this list later.

Major Events
Several major events for s.w.l.s are already on the 1990 calendar. The Third Annual Winter SWL-Fest was scheduled for the weekend of February 23-25 at Kulpsville, Pennsylvania. This event was an instant hit when it made its debut in 1987 and was expected to draw well over 100 participants.

Although details have not been made available yet, it seems the annual Association of North American Radio Clubs convention (ANARCON) will be held in September as a part of an annual Ham-SWL-Computer Fest held in Virginia Beach, Virginia.

That covers the highlights from North America for now. We’ll be back with another ‘DX Letter From America’ in August. Until then, good listening!
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P.O.A.
Although PC-HF-FAX is distributed by Comar Electronics, it is actually an American program written by John Hoot of Software Systems Consulting. The manual was remarkably comprehensive and comprised a card-bound, 88-page, A5 book. The first few chapters dealt with the general installation details and hardware requirements. These were straightforward, needing a basic IBM compatible with at least 384K of RAM.

On the video side the program supports CGA, EGA, HGA and VGA graphics systems, though VGA gives the best results. Connection to the outside world was achieved via the serial port, so obviously one of these is required as is MS-DOS 2.1 or higher. PC-HF-FAX provided adequate printer support with drivers for IBM, Epson 9 and 24-pin, OKI and Laserjet. As these are all industry standard printers, you will find that most other printers can emulate at least one of these modes. Although a printer is useful, the program was fully operational without one, so it's not a necessity.

The manual continued with a brief outline of the main modes followed by a very interesting section giving some background to weather FAX transmissions. Although this was based very much around the activities in the States, it did cover universal aspects such as the common symbols used on weather charts which was useful. The next chapter gave a variety of useful hints to overcome some of the problems that the new user may encounter. The function of each of the commands was then described in detail. Although there was little use of diagrams the explanations were very clear. The final sections of the manual comprised a number of appendices which included a FAX frequency list and schedules for a number of American FAX stations. Overall a remarkably comprehensive manual for a software package of this type.

**Setting-up**

The PC-HF-FAX was simplicity itself to get going, needing a minimum of connections. The only connection between the receiver and the computer was a single lead terminated with a 3.5mm jack plug. This plug was simply inserted in the external speaker socket of the receiver. The other end of this lead comprised a standard 25-way D connector which contained some basic signal processing electronics. I checked out the sensitivity of the interface and found that it could handle a wide range of signal levels. This meant that, in addition to using the external speaker socket, the PC-HF-FAX could be fed from the fixed level auxiliary output available on many receivers.

With the external connections complete and the program installed, the next stage was to select 'Hardware Configuration' from the main menu. As the name suggests, this allowed the adjustment of various pre-set parameters. One notable point about all forms of FAX decoding is that the timing is critical to obtain a correctly proportioned image. The PC-HF-FAX program uses the internal PC clock as its main timing reference. The only problem that may be encountered here is the variation of clock frequency from machine to machine. This however had been catered for by the provision of two software timing adjustments. The first is called 'clocks per Pixel' and allows the user to adjust the number of clock cycles at 2.3MHz for each of the 640 pixels in the display line. The second adjustment defines how many clock cycles are added at the end of each line in order to hold synchronisation. Although all this sounds a bit complicated, the software comes set-up with default values and these were spot on for my Amstrad PC-2086.

Most users should find that only minor adjustments are necessary. One advantage of software decoding is that it becomes easy to alter parameters that would be difficult with hardware systems. An example of this in the PC-HF-FAX, is the facility to alter the black and white frequencies. These are the frequencies that represent the black and white extremes of the picture. The default settings of 1460Hz and 2087Hz are just about right for normal 800Hz shift f.h.f. signals, but these could easily be altered, for example to receive FAX which uses a 300Hz shift. As I mentioned earlier the printer type could be set to a number of industry standards, this was supplemented by the ability to choose between LPT1 and LPT2 printer ports. The selection of the appropriate graphics card and monitor type was also achieved using the hardware menu.

With a lot of PCs these days being fitted with more than one serial port it was useful to be able to set the PC-HF-FAX to use either port 1 or 2. For the radio enthusiast this means that you could for example connect your RTTY terminal unit to port 1 and the PC-HF-FAX to port 2, this saves having to keep swapping plugs around. It was in this section of the program that you could set the appropriate graphics card and monitor type according to your own hardware. Adjustment of the Index of Co-operation (IOC) could be achieved by altering the number of scans per displayed line. The range here was 2 to 16 with VGA graphics which gave a usefully wide range of adjustment. One final area of hardware adjustment dealt with the colour palette where all sixteen colours could be adjusted at will. This was a very powerful feature as it allowed the user to completely alter the red, green and blue content of each colour. Once finished with the hardware configuration menu, you are given the choice of either making the changes permanent or just using them for the current session. So you only needed to set up the default options once leaving you free to make temporary adjustments without upsetting your default settings.
**PC-HF-FAX PROGRAM**

**Image Reception**

With all the options set up it was time to get on the air and start receiving some FAX images. For all the on air tests I used the PC-HF-FAX with my Amstrad PC-2086 computer, Icom IC-720A receiver and Epson RX-80 printer. The antenna was my own faithful nest of dipoles. The first operation was to find a FAX station - its best to start with a strong local one such as Bracknell on 4.792MHz.

I was particularly impressed with the tuning system used with the PC-HF-FAX. This was selected from the main menu and comprised a full-screen, oscilloscope type display. There were two horizontal lines - one representing the white level and the other for black. To set the optimum tuning point all you had to do was adjust the receiver until the FAX signal evenly overlapped these two lines.

The system was extremely simple to use and very effective - probably one of the best tuning systems I have encountered. It was at this point that I discovered that rather than just a FAX tuning aid, this display was also very effective for identifying other utility signals. The waveforms of RTTY and many other data signals showed up remarkably clearly and for the experienced, the format could be identified. This point has not been overlooked by the author, as he states in the manual that he hopes to further enhance the software to provide RTTY, ARQ and SSTV decoding. With the tuning point set it was time to return to the main menu and select the 'Monochrome Image Capture' option. At this point the screen cleared and the image started building up on the screen.

One common problem when receiving FAX images manually is setting the synchronisation point. If this is not done the edge of the image rarely aligns with the edge of the screen. In PC-HF-FAX pressing 'S' while receiving an image caused the program to search for the sync pulse and re-start accumulating the image. This feature worked best during the initial stages of a transmission and could understandably be confused when a lot of image detail was being sent. The only other option available whilst capturing the image was to use a key which returned the scan to the top of the screen and was useful for getting rid of rubbish at the beginning of a transmission. Capture of the image could be suppressed at any time by pressing a key, whereupon the program returned to the main menu.

With the image captured in memory there were then a host of features available for manipulating and refining the result.

One of the most important and useful features was the ability to store the captured image on disk. The standard format used 120K of disk space for each picture, so allowing six pictures to be stored on a standard 720K 3.5in disk. Although the image may have been collected using the monochrome capture, you could use the Display option cycle through all the capture modes to see which best suited the received image. The modes available were monochrome which, with VGA graphics, gave a resolution of 640 x 480 with 16 grey levels. The second mode was Black and White which was primarily designed for chart reception and designated the image elements as either black or white.

The next mode was rather novel and extremely effective. It was titled Blue/Gray and used a grey scale but with black represented by blue. This had the effect of showing the sea as blue on re-broadcast satellite images. The next two modes were full colour, the first being a 16 pseudo colour display, whilst the second option used the colour palette set-up by the user and could provide some very interesting effects. It is very useful to be able to move the received image around the screen and the PC-HF-FAX provided some very impressive features in this area. First the image could be moved from left to right or vice versa in one or eight pixel steps. This was very useful for those occasions when an image has been received out of synchronisation, as the resultant page slip could quickly be corrected. Vertical movement of the image was also possible, but only in single pixel steps.

One of the most infuriating reception problems is when the image is received as a mirror image. However with PC-HF-FAX this is no longer the case as the image could be flipped left to right and top to bottom - it could even be inverted into a negative image if required. The final adjustment enabled the image to be lightened or darkened for best effect. This very powerful range of adjustments meant that you really could get the very best of any image received.

**Utilities**

As if the facilities described so far were not impressive enough, there were a couple of utilities supplied with the program which opened up a whole new range of options. The first of these was called FAXTOPCX and converted the images stored using PC-HF-FAX into standard PCX image files. This might at first seem a little pointless, but there are a number of software packages on the market which can import PCX files for further manipulation. An example of this would be in desk top publishing, where a FAX image could be imported and all manner of useful text added to enhance the overall image.

There are also a number of programs that allow very sophisticated modifications to be made to imported images and you could tidy up your received images by eliminating streaks or dots that were caused by interference. The second utility enabled animation of received images and was appropriately called FAXSHOW. This utility used its own command language and enabled the user to sequence a number of images to make up an animated show. The options within the command language were very powerful and allowed mode changing, variable delays and screen clearing to name but a few. With a little patience some entertaining results could be obtained with this feature.

**Conclusion**

So how did the program fare? I must admit I was very impressed with its performance using VGA graphics. The detail available in the monochrome mode with its 16-level grey scale was very impressive. The other modes also had their uses but I always seemed to return to monochrome for the best results. One important point to note about this program is that it has been designed primarily to produce screen images. Because of this, the results when driving an external printer were not quite as good as some routines that have been designed with printer output as the prime mode. However the printer results were quite acceptable for the intended purpose. I must admit though that for general monitoring, I prefer to use a screen orientated package.

To finalise then, PC-HF-FAX is a very impressive package which I can thoroughly recommend - in fact I shall be purchasing the review copy for my own use! The package is available from Comar Electronics, 1A Birmingham Road, Cowes, Isle of Wight PO31 7BH. The current price is £99.00 inclusive of VAT but post and packing is £2.57 extra. My thanks to Comar for making the review copy available.
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Short Wave Magazine May 1990
LUNAR ECLIPSE PHENOMENON

F. C. Judd G2BCX

Most of the country was covered in cloud during the recent lunar eclipse. Fred Judd was lucky. No one else, except possibly the Rutherford Appleton Laboratory, would have been able to see and record this phenomenon. He ran his ionospheric sounding equipment during the event and made the observations recorded here.

Increasing

After the start of the eclipse, the c.r.t. display showed the number of echoes due to multiple reflection, to be increasing, although the primary echo (1F) still showed the region’s virtual height to be 250km.

At about halfway through the eclipse the number of echoes reached a maximum of 16 as shown in the photograph. In fact the timebase had to be run at half normal speed to accommodate the vast distance covered by all the echoes, up to the sixteenth, the smallest detectable. This meant that the transmitted pulses had travelled a total distance, between the F region and earth, of 500 x 16 or 8000km!

In the Polaroid photograph, Fig. 1, echo 16F is marked with an arrow. It can be seen more clearly near the end of the upper trace which shows the rectified signals. The lower trace shows the r.f. signals. The transmitted pulse is marked Tp with the first F region echo - showing virtual height as 250km - being marked ‘1F’.

Totality

As the eclipse continued towards totality, the number of echoes decreased and continued to do so even as the other half of the Moon became bright again. At the end of the event they had disappeared, leaving only the primary (1F) still indicating the region’s virtual height to be 250km, plus a variable amplitude 2F more or less as before.

No Explanation

I can offer no explanation for this phenomenon. Had this been an eclipse of the Sun, the reflection of radio signals from any ionospheric region would have disappeared completely during the major period, just as Prof. E.V. Appleton found when he made similar tests with pulse transmission during the eclipse of the Sun in 1927. This prevented radiation from the Sun reaching the ionosphere thus reducing ionisation of any of the regions to nil.

Fig. 1: (Upper trace) Rectified pulse signals. (Lower trace) Tp - transmitted pulse 0.5ms duration; p.r.f. = 35p.p.s.; 1F - primary signal from F region; 16F - sixteenth multiple echo.

ANTENNAS

F. C. Judd G2BCX

Unfortunately the Power Loss Table referred to in Antennas Part 14 as Table 15.1 was omitted. It is reproduced here.

Providing the v.s.w.r. is not greater than about 2:1, r.f. power loss is not excessive as can be seen from Table 15.1 - although this assumes no loss in the transmission line or antenna itself.

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<th>VSWR</th>
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<th>25W</th>
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Abbreviations

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<th>c.r.t.</th>
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<th>ms</th>
<th>Abbreviations</th>
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<th>p.r.f.</th>
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<td>cathode ray tube</td>
<td>kilometres</td>
<td>milliseconds</td>
<td>pulse repetition frequency</td>
<td>pulses per second</td>
<td>pulse frequency</td>
</tr>
</tbody>
</table>

Short Wave Magazine May 1990 29
THE LINDENBLAD ANTENNA

Peter Rouse - GU1DKD

This practical antenna design is suitable for listening to both amateur and weather satellites as well as the aircraft band.

Materials and Assembly

Eight metres of white conduit, 2m of pvc overflow piping and 10m of 300Ω ribbon cable will enable any version shown to be built. The conduit and fittings are usually available from the bigger d.i.y. stores or electrical suppliers or contractors. Do not attempt to substitute the conduit with pvc overflow piping as it is not strong enough and unless you follow the step-by-step procedure shown you will probably end up with problems in the latter stages of assembly.

(1) Take the conduit and give it a coating of impact adhesive and then insert it into the overflow pipe used for mounting the antenna. You may need to sand the dowelling slightly to get it to go into the pipe as sizes tend to vary a fraction between suppliers.

(2) Make-up the four dipole elements. First cut the ribbon cable to the lengths shown plus 25mm overlap. Trim back the plastic coating from each wire at each end in order that the wires can be bent towards each other and soldered.

Find the centre of the dipole and cut one side and trim for soldering to the feeder. Cut and trim the ends of the feeder sections but at this stage do not solder them to the dipole elements.

(3) Cut the required sections of conduit making allowance for the dimensions of the tee connectors and junction box. On each of the dipole arms allow about

A Linden-what? A Lindenblad, my friend, is a strange-looking assembly that consists of four folded dipoles spaced round a ring and slanted at a slight angle to the horizontal plane. Go on...check the front cover and make sure this isn't the April issue.

I came across the Lindenblad whilst browsing through The Satellite Experimenters Handbook by Martin Davidoff - K2UBC. It is published by the ARRL and available from the SWM Book Service.

Having discussed the more common types of non-steerable antennas, Mr Davidoff makes brief mention of this antenna on pages 6-18 and gives some dimensions but seems to avoid further details in a manner that suggests he is wary of going too near the beast in case it should bite. It looks very odd and no mention is made of gain nor general impressions of its behaviour.

I assume its inventor was a Mr Lindenblad although first mention of it was apparently back in 1947 in a technical paper from RCA in America.

It could well be the solution to the problem that some weather watchers are now experiencing with Mercury and Racal paging transmitters on 138.075 and 138.175MHz because in extreme cases it will at least provide fairly good coverage without a pre-amplifier (often where the overload problem starts).

However, the two versions that I have constructed both exhibit slightly unusual behaviour. When the satellite is directly overhead there is a brief drop in the signal level. I have yet to find a cure for this, but have not worried unduly about it because it has not caused me any real problems.

Otherwise, I have been delighted with the results and suspect that the only reason this antenna has not gained wider acceptance is because initially it looks difficult to construct.

Extensive use of easily obtained pvc electrical conduit and fittings, together with elements constructed from cheap 300Ω ribbon cable have enabled me to design and build an antenna that not only looks quite professional but is also robust.

The dimensions given in The Satellite Experimenters Handbook are only for the 144MHz version but these have now been re-calculated for 137.5MHz (dimension for three bands are shown).

I have no way of measuring the gain of this antenna but suffice to say it far outperforms the usual crossed dipole arrangement as long as it is mounted well above ground level.

Airband enthusiasts may care to note that a version with the elements cut for 127MHz has provided me with excellent performance over the 118 - 136MHz aeronautical band.
The telephone is designed to ‘connect you’ to all sorts of interesting and useful people. So is every portable radio. Yet many radios in the home stay tuned to one station all the time! Getting more variety of listening is not a matter of chance or magic or even special training. It is largely a question of having the right details to hand - you need a directory. That's why George Wilcox wrote the first edition of Dial Search way back in 1981.

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There are two maps included in the book, the first inside the front cover is a Map of European Broadcasting Stations. The second, inside the back cover, is of the Broadcasting Stations in the British Isles. Other chapters include: Abbreviations, Spot the Tune, Broadcasts in English, Frequency Bands, Long wave, Medium wave, v.h.f. (f.m.) and Short wave.

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Available from Evergreen, PO Box 52, Cheltenham, Glos GL50 1YQ.
154 x 212mm (hard covered), 168 pages. Price £7.95 including p&p (allow 28 days)
ISBN 0 906324 12 2

Being asked to review a new book on radio can sometimes provoke mixed emotions; whilst pleased to find literature concerning a favorite subject, one is at the same time likely to be a little apprehensive that the work will fall short on facts or literary style. Thus it is a special pleasure to discover a book that can hardly be faulted on either count, and David Lazell’s warm-hearted evocation of the Golden Age of Wireless is most certainly in this category. Readers of the magazine Evergreen will be familiar with David’s regular articles on this subject, and in What’s on the Wireless? he presents a splendid collection of nostalgic knowledge covering from the 1920s through to the 1950s. He commences with a short biography of P.P. Eckersley, the engineering genius behind the British Broadcasting Company, then goes on to recall some of the artistes and programmes that captivated audiences in the early days of broadcasting and on into the 1930s. There are chapters devoted to regional broadcasting from Birmingham and Bristol. We meet some of the comedians who were famous 'on the wireless' and are reminded of some of the radio serial stories and 'soap operas' from both the BBC and the Continental commercial stations.

One chapter is devoted to religious broadcasts by such well-known and well-loved churchmen as the Rev Dick Sheppard and Father Martindale. I particularly like David’s remark that “...Of course, there was no shortage of people who thought radio quite inappropriate for worship - forgetting, it seems, that the Creator built in the possibilities of all-electronic communication on the Day of Creation.” In a further chapter we learn how Christmas was celebrated in radio programmes.

On a more secular side there are memories of famous radio comedy shows such as Band Wagon and ITMA, of the cinema organists who provided music from ‘The Mighty Wurlitzer’, of In Town Tonight, The Daily Dozen and many, many others. Altogether this cheerful little book will most certainly brighten a few hours for the reader who, like me, cannot really believe that it is over 50 years since the ‘30s!

Is there, then, anything to complain of in the book? Well, to prove that I did indeed read every word, I found three small errors; a date that was ten years out due, obviously, due to a simple mis-print; a misquoted film title; and the wrong location for a funeral, but that there were so few in the enormous amount of information given in the book is more in the nature of a tribute than a rebuke.

One would like to see a list of chapters at the front of the book and it does seem a great pity that there is no index. Don’t let this dissuade you from seeking out this otherwise excellent little book which is decorated with many photographs and drawings, and, thanks to a well-chosen type face, has an appealing ‘vintage’ appearance, all at a very modest price.

C.E.M.
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SHORT WAVE MAGAZINE
(4) Use the correct type of pvc adhesive/cement (it sets very quickly) to join the dipole arms to the tee-junction. Once set, insert the dipole element with the bared wires facing inwards and then solder these to the feeder cable. Ribbon feeder usually has each wire identified by one silver and one copper coloured wire and you should ensure that each of the four dipoles is wired to the same colour coding to avoid confusion later.

(5) Drill two holes in the base of the 4-way junction box; a small central one for the mounting screw and a larger, offset one, big enough to take the feed cable.

(6) Thread the dipole boom arm over the feeder and attach it to the T-junction with adhesive. Once it has set you must glue the boom arms into the junction box at an angle of 30°.

All the diagrams and photographs show the booms tilted for right-hand, circular polarisation which is suitable for weather satellites and airband. For 144MHz amateur band use you need left-hand, circular polarisation and the elements must be tilted the other way.

(7) The dipole feed cables should now be doubled back on themselves slightly in the form of a collapsed ‘Z’ so that surplus cable can be fed back down the booms. All feeds to the upper section are now soldered together and to the centre conductor of the coaxial downlead. All lower element feeds join together and go to the braid.

(8) Use corks, rubber bungs, car body filler paste or even silicone rubber sealant to seal the open ends of the dipole housings.

(9) The completed assembly will now need to be attached to the mounting pole. Note that once this is done you will not be able to get the antenna through a normal household door. A single 30mm woodscrew holds the assembly to the pole but the joint needs to be further strengthened with a strong glue such as Araldite which must be liberally applied between the top of the pole and base of the 4-way junction box.

Mounting

The antenna should be mounted as high as possible above ground level but not on a chimney. The emission from the average chimney is at a surprisingly high temperature and will almost certainly melt the conduit.

Although the antenna looks complicated it is surprisingly easy to build if you follow the steps shown and total assembly time should not take more than a couple of hours.

Is it worth the effort? I can only compare it with the usual crossed dipole which is tricky to set-up, does not have a true circular pattern and often displays near nulls in some areas unless phasing is perfect.

The Lindenblad on the other hand performs extremely well without critical phasing elements or matching and I am constantly amazed by the gain at low elevation angles.

Even though I live right at the end of a small valley, in a poor location for reception, I am now able to receive some of the NOAA-11 passes which many people only seem to be able to get with elaborate, steerable, crossed Yagis.

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Overflow piping, pvc (2m); White pvc electrical conduit, 20mm (8m); Inspection tees with rubber gaskets (4); Circular, 4-way, junction box with rubber gasket and M4 screws (1); Solvent adhesive for pvc; Ribbon cable, 300Ω, (10m); Wooden dowelling, 17mm dia. (2m).

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VISA AND ACCESS WELCOME
Many scanner users are quite happy just to use the telescopic antenna supplied with the receiver - this is fine if you only want to listen to relatively local signals, but it does seem a bit of a waste after you have spent all that money on the scanner not to go to a little bit of trouble in providing a better antenna system. By siting the antenna away from the scanner it is often possible to reduce the level of spurious signals and hash that are received (many of these are being generated by the control circuits inside the receiver). By moving the antenna just a few metres away from the back of the scanner you may notice an improvement.

Location
The ideal location for any antenna is as high and as well away from any nearby objects as possible. Try and avoid siting your antenna next to domestic TV and radio antennas if you can. This may seem unnecessary but it serves two purposes. The first is to limit the possibility of any hash or oscillator radiation from the TV and hi-fi interfering with reception on the scanner, and the second is to prevent interference to the TV and hi-fi from the scanner.

All scanning receivers generate a low level local oscillator signal in order to operate. A small amount of this signal tends to leak out of the scanner either through the plastics case or via the antenna socket. Modern designs of scanner use local oscillator frequencies which lie within the TV and radio broadcast bands. As a result you can sometimes detect patterning on the TV screen or distortion on the radio if you have an unfortunate combination of frequencies selected. For example you may notice the patterning on a TV screen change as the scanner searches through a particular frequency band. Spacing the antennas by just a few metres from each other can usually solve this problem.

Of course not all of us can put our antennas outside and with the recent high winds still firmly implanted in our minds many people may now be doubting the wisdom of putting up quite such a large array. The amateur radio saying 'If you don’t worry about it then it isn’t up high enough' may not seem quite so valid after your pride and joy has just impaled the neighbour’s cat!

Loft Mounting
Loft mounting an antenna is usually the most popular alternative and good results can be achieved up to the low mid-wave frequencies. Roof tiles and slates do not seem to have too much effect at the lower frequencies unless it is raining, but a gradual increase in the attenuation of signals starts to become noticeable beyond a few hundred megahertz.

One other problem associated with loft mounted antennas is interference. This seems to be transmitted to the antenna either by the mains wiring or by direct radiation from the equipment itself. I partially solved this problem in my old house by putting a layer of galvanised chicken wire on top of the loft insulation. This provided some screening against interfering signals which were being radiated from within the house and had the additional benefit of providing a very large ground plane.

The great advantage of loft mounting an antenna is of course that you can experiment with designs without risking life and limb 10 metres up a ladder. If you do decide on this option please put some boards to stand on between the joists as this can save a lot of heartache - and plaster.

What Type?
The type of antenna you choose depends on what you want to listen to. If you are just interested in one group of frequencies, for example the v.h.f. airband, then a simple half wave dipole will give reasonable results.

Many different types of antenna are available for the amateur bands but a popular choice is usually some form of dual-band collinear which gives a degree of gain at both v.h.f. and u.h.f.

It is always worthwhile experimenting with existing antennas. For example, when I was working away from home I found that the f.m. broadcast antenna mounted on the roof of the temporary accommodation worked very well on the u.h.f. airband.

Another range worth trying are the many and varied CB antennas that are available. Try and avoid the types that are helically wound or have loading coils at the base as these tend to dramatically reduce the frequency coverage.

One word of warning, however, please DO NOT try transmitting on any antenna not specifically designed for the frequency in use. You can get away with it on receive but it usually results in expensive transmitter repairs as the impedance presented by the antenna may be a less than perfect match.

Multi-Frequency Operation
If you are only interested in one or two bands of frequencies then one of the multi-element or ‘loaded’ types of antenna may prove suitable. The multi-element types usually have two or more elements of differing sizes fed from the same feed point. Each element has a different resonant frequency which corresponds to one of the bands of interest. A typical example of this type is the Revco Radac antenna which has six pairs of elements giving coverage of six separate frequency bands. In addition good results can often be obtained outside the specified ranges, but only on receive.

Most cheap ‘plastics tube’ scanner antennas use a combination of these techniques to achieve the required frequency coverage. Some work better than others so try one before buying - if you can.

Active Antennas
If you want a compact antenna which offers a wide frequency range then the solution may be an ‘active’ antenna. The term active means that they require an additional power source in order to operate.

This is because they incorporate an amplifier in order to perform two key functions. The first is to convert the feed impedance of the actual antenna element to 50Ω, and the second is to boost the level of received signals before they reach the receiver. This of course means that the antenna can only be used for receive purposes but it does have the advantage of permitting a much smaller design. As
discone

External antennas are not permitted.

Amongst flat dwellers or on estates where obtrusive it tends to be very popular as having wideband characteristics, the antennas which can really be described close to a TV or radio transmitter site. Active designs if you live in a major city or without overloading. In practical designs time being able to handle strong signals as possible whilst at the same
time. Make sure all external joints are well waterproofed as the outer braid tends to act as a wick drawing the moisture along the cable. This corrodes the braiding and dramatically increases the loss.

Testing

Antenna construction is perhaps one of the most popular activities associated with scanning - next to actual listening of course! For just a few pounds you can obtain some very good results and learn something in the process. Once you have built or installed an antenna, how do you go about testing it?

Well you really need a receiver with a signal strength meter but you can do it by ear if you are careful. I keep a list of stations which I know I can hear at my location. I have chosen ones which I know are always present and which are being transmitted from a fixed location and at a fixed power level. Aircraft navigation and marker beacons, amateur repeaters and broadcast stations, are good sources.

Before I make any measurements on a new antenna I make a note of each station's signal strength and background noise level using a test antenna. This is usually either a simple dipole or discone. Once I have done this I replace the test antenna with the new antenna and measure the signal strengths again. It is important to mount both antennas at the same height and position as a difference of only a few centimetres can cause dramatic changes in level. Once the measurements are complete I put the test antenna back and measure the signal levels again. In this way I can compare the results before and after fitting the new antenna as a double check in order to ensure that the signal levels have not changed since the start of the test. By doing this it is possible to obtain an objective set of results for a whole range of antennas. It can often be rather disappointing to find that a short length of wire works just as well as your latest design - but at least you know!

I hope you have enjoyed this brief look at antennas and that it has given you some food for thought. If you would like me to feature any other scanning topics in more detail drop me a line at PO Box 1000, Eastleigh, Hants SO5 5BH. Until next month - Good Listening.
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<td>66-512MHz</td>
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The demodulated signal may be just a single audio tone, but more often it will consist of speech or music and a number of frequencies of different amplitude and some harmonics will then be present in the complex waveform presented to the input of the audio amplifier. If the waveform is changed in some way by the amplification process, then the output is said to be distorted.

Distortion

Various types of distortion may be introduced by the audio pre-amplifier and power amplifier stages already outlined in this series - see SWM/March, April '90. One of the most common forms, known as attenuation distortion, arises if the gain of the amplifier is not constant at all frequencies. The relative phases of the frequencies contained in the complex input waveform may also be changed by the amplifier and phase distortion will result. In practice attenuation distortion and phase distortion always occur together so, if a complex waveform is involved, e.g. speech, the phase relationship between the various harmonic components of the signal may be altered and their amplitude may be changed. Note however, that a phase reversal of all frequencies does not constitute phase distortion.

The nature of the coupling employed between the stages is, to a large extent, responsible for these effects. When resistance-capacity (R-C) coupling is used, the reactance of the coupling capacitor becomes important at low frequencies. At the lowest frequency in the amplifier passband the inductive reactance must be much greater than the effective input impedance of the next stage, otherwise the low frequency response will fall off and phase distortion will be introduced. At high frequencies the stray capacitance associated with the windings is in shunt with the inductance, consequently the response falls off and a phase shift is introduced. Although most of the flux produced by the primary winding of a well designed transformer will link with the secondary, some will only link with the primary turns. The primary can therefore be considered as two inductors in series, the additional one being referred to as the leakage inductance. The stray capacitance and leakage inductance are effectively in series at high frequencies and form a series resonant circuit which may result in a hump in the high frequency response, as indicated by the dotted line on Fig. 1.

In another form of distortion, frequency components appear at the output from the amplifier which are not present in the input signal. By plotting a graph of collector current (Ic) against base-emitter voltage (Vbe) for a particular transistor it will be seen that the relationship is non-linear - see Fig. 2. Unless the forward bias applied to the base of the transistor is set so that operation is centred on the most linear portion of the characteristic, non-linear distortion will arise, whereby a sinusoidal signal applied to the base will result in a periodic output waveform that is non-sinusoidal - see Fig. 3a. An analysis of this type of waveform reveals that spurious harmonics are present. The effect of adding the second harmonic to the fundamental is depicted in Fig. 3b.

Negative Feedback

It is possible to modify the characteristics of an amplifier by returning a portion of the output to the input. If the fraction fed back is in-phase with the input signal it will add to it, so the feedback is said to be positive. Usually positive feedback causes an uncontrolled rise in gain which results in self oscillation. If the fraction fed back is in antiphase, i.e. 180° out-of-phase with the input signal, it will subtract from it, so the feedback is said to be negative.

Attenuation and phase distortion can be markedly reduced by the application of negative feedback and since the new frequencies produced by non-linear distortion will be returned to the input in antiphase they will be largely self-cancelling.

Negative feedback can be applied to one or any number of stages within the amplifier. All of the transistors (or valves) and components in the circuit between the point where the feedback signal is obtained and where it is inserted are said to be within the feedback loop. The application of negative feedback will stabilise the signal gain of the amplifier so that it is largely independent of the manufacturing tolerances encountered in individual transistors and components and also of variations in supply voltages. Noise and hum produced within the feedback loop will also be reduced.

The input and output impedances of an amplifier can be modified by the application of feedback. The price that has to be paid for all these advantages is a reduction in the overall gain of the amplifier, so additional stages of amplification may be required. All of these factors are of great importance to the manufacturers of mass produced equipment.

Negative feedback is classified in two ways - by the method of derivation and according to the method of application. The basic circuit of a non-bipolar transistor amplifier with voltage derived, parallel feedback is shown in Fig. 4. In this arrangement the forward bias is applied to the base of the bipolar transistor (TR1) via a resistor (R1), which is connected to the collector end of the load resistor (R2). During positive going half cycles of the input waveform the signal voltage at the collector will be negative going, consequently the bias...
on the base will be reduced. The reverse
will apply during negative half cycles.
The characteristics of the transistor may
result in a distorted output waveform
similar to that shown in Fig. 3a, but the
effect of the feedback will be to reduce
the distortion, since more feedback (less
base bias) will be applied during the
peaked half cycles and less feedback
(more base bias) will be applied during the
rounded half cycles of the output.

Current derived, series applied,
feedback can be introduced into the
amplifier in Fig. 4, by removing the by-
pass capacitor (C1) across the emitter
resistor (R3). The flow of emitter current
through R3 results in a voltage drop,
thereby self-biasing the emitter.

The role of C1, usually a 10 to 100µF
electrolytic, is to prevent the emitter
voltage from varying with small changes
in emitter current. If C1 is omitted, then
the voltage drop across R3 will vary in
step with the signal applied to the base.
During a positive going half cycle of the
input waveform the emitter current will
increase and the voltage drop across R3
will rise, thus reducing the signal voltage
between the base and the emitter.

The effect of feedback on the input
impedance (Zin) and output impedance
(Zout) of an amplifier can be summarised
as follows:

- Zout is reduced by voltage derived
  feedback, but increased by current
derived feedback.
- Zin will be increased if the feedback
  voltage is applied in series with the input,
  but it will be reduced if it is applied in
  parallel.

Appendix

A simple block diagram can be used to
illustrate the effect of negative feedback
on the voltage gain of a transistor
amplifier. Consider first the voltage gain
(M) without feedback applied. Refer to
Fig. 5a. The output voltage (Vout) will
be equal to the base emitter voltage
(Vbe) multiplied by the gain of the
amplifier (M), thus:

\[ V_{out} = M \times V_{be} \]

M = \frac{V_{out}}{V_{be}}

The block diagram can then be
modified to include negative feedback -
see Fig. 5b. Let \( M' \) denote the voltage
gain of the same amplifier with feedback
applied and the fraction of the output
returned to the input. In this example
the feedback voltage (Vfb) is derived
from a potential divider formed by two
resistors (R1, R2), so

\[ V_{fb} = \frac{R2}{R1 + R2} \times V_{out} \]

The overall gain of the amplifier
depends upon the feedback circuit - not
on the gain of the amplifier. Variations in
components or voltages which would
alter the gain are unimportant so long as
M' is greater than 1.

Now consider what will happen if
the gain without feedback is halved by
a transistor fault. What will be the new
gain with negative feedback applied?
Answer: New gain without feedback
(M) = 200/2 = 100. Therefore the
new gain with feedback applied
(M') = \frac{M}{1 + \frac{M}{M'}}

= \frac{100}{1 + (100/50)} = 33.

The degree of negative feedback
applied to an amplifier is usually quoted
in decibels (dB). The voltage gain of an
amplifier without feedback is 20 \log M
and with feedback, 20 \log M'.

\[ \text{Feedback applied is } 20 \log M - 20 \log M' = 20 \log \left( \frac{M}{M'} \right) = 20 \log \left( 1 + \frac{M}{M'} \right) \text{ dB.} \]
AMATEUR BANDS ROUND-UP

Paul Essery GW3KFE
PO Box 4, Newtown, Powys SY16 1ZZ

Before I make a start on the piece, please let anyone concerned about the time-scales involved. The deadline for your input to this month’s column is March 20th, so please make sure that your letters are penned in February. What I write today will appear in the May issue, appearing on April 26. That, therefore, is the query to be answered in the column is obviously going to take the same time, and the letters which I assume that I can intervene with a little flash a few days before publication. Alas, I ain’t one! Once the offering leaves me, it goes into the sausage-machine and that’s that. Nothing can be stopped without the issue coming out late - and it NEVER leaves Pw Publishing late!

This time I have two main items to consider; first the SLP and second my request for your views on the way this column of mine is put together.

The SLP

Andy Brown (Barney) reappears in the SLP lists having missed a couple. Sadly, Andy parted with his Trio 859SD during November, in favour of a rig that is a lot more of a SLP to him, a Tecsun S502STFM. That was bad enough, but then the trusty old JR5005 went silent, a blow Andy won’t forget. For several days in error, and now all it does is blow fuses. What’s wrong, Andy wonders? I could hardly expect to have diagnostic tests as a diagnostic, but I would just comment that if the fuse is on the mains side that it is a G5RV and a random length of wire. On the output side the recovered audio goes through a grid-leak filter, an arrangement which doesn’t look too handsome but does clear some of the noise off the output. Andy is really an elegant filter! Andy found forty-three bursts of which the longest was apparent after 1000, and that the m.u.f. appeared to be 9MHz at 0615. Neither John Heath nor Phillip Davies wrote on other subjects, of which more anon.

Comments

First, G. Smith (London E10) who reckons that since the cover says ‘For the Listener’ he is puzzled to see such items as Decode, Info in Orbit and Television. Further, he doesn’t consider Airband and Band II are part of the short waves either. Please, he says. tell GPBVH! (Not on your life! he’ll tell me!) Mr Smith does so on the other hand reckon on this column and that of Brian Oddy, because we are in your view teachers and not just anything. Something, he finds so many of the articles are full of unexplained technical terms. This is a point of view one must to take it as well as dish it out, find an elegant filter! Andy found forty-three bursts of which the longest was apparent after 1000, and that the m.u.f. appeared to be 9MHz at 0615. Neither John Heath nor Phillip Davies wrote on other subjects, of which more anon.

Next John Heath (Kirkby Mallory) relies on the ‘old’ SWM, good preparation, and attitude; all it requires to place such a small event is to plan a little, some concentrated listening, and a little luck. John says he ‘had to throw in lots of modern technology plus v.h.f.u.f.h. for the multipath to keep near Philip Davies’, and adds the comment that listening systematically, logging the DX one hears and the times when one hears it, must result in a better ‘feel’ for propagation. I agree; even if one has such a program as W6EL’s Minioprop available, it is still an adjunct to one’s own instincts. Perhaps the most useful simple guide was the artisans truly and the late G2DC did in the ‘old’ SWM, which tabulated what parts of the world were likely to pop up at what time of day on what frequencies. To that end it is possible to plan what technical assistance to take, for Winter, Spring, Summer and Autumn. (October 1979, pages 409-411.) It was duly discovered that H2D was not normally an amateur bands space, and indeed Simon indicates that even though he now operates two metre sideband, he would still like to compete with other s.w.l.s on the HPX Ladder. Anyone else feel similarly?

Next we come to Mr R. C. Cole (Cwmbran) who wants to know how to reach OLY and 47TA. The OLY ‘green stamp’ is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable in the US ‘green stamp’, is acceptable

What’s On

By the time you get this, we shall have seen another Western Sahara, SO operation; the call we understand will be SO1LYNX, with ten operators and QSLs to EA2JQ. There may be extra stations with SO2, SO3 prefixes as well.

Keep an ear out for operation from Bhutan A5; Jim Smith is going there, and may well be operational as A56AU. If you hear him ‘had to throw in lots of modern technology plus v.h.f.u.f.h. for the multipath to keep near Philip Davies’, and adds the comment that listening systematically, logging the DX one hears and the times when one hears it, must result in a better ‘feel’ for propagation. I agree; even if one has such a program as W6EL’s Minioprop available, it is still an adjunct to one’s own instincts. Perhaps the most useful simple guide was the artisans truly and the late G2DC did in the ‘old’ SWM, which tabulated what parts of the world were likely to pop up at what time of day on what frequencies. To that end it is possible to plan what technical assistance to take, for Winter, Spring, Summer and Autumn. (October 1979, pages 409-411.) It was duly discovered that H2D was not normally an amateur bands space, and indeed Simon indicates that even though he now operates two metre sideband, he would still like to compete with other s.w.l.s on the HPX Ladder. Anyone else feel similarly?

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More Mail

E. H. Trowell (Minister) next; he sticks to the dots and dashes mainly, and this mode produced among the small fry such catches as ZL3GQ, J34LTA W2BA and VE3BCH on 3.5 MHz, while 7 MHz gave with the JAs have dropped out, and that without fire.... the latest news is that Spratly 1S, operation is just smoke a separate DXCC country.

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handle ARQ and FEC in addition to RTTY at a variety of speeds. It is also worth trying the Public Domain Software Library if you believe that they only have straightforward RTTY programs available.

The development of the ASCII code. You may be aware, computers are American Standard Code for Information Interchange and is simply an acronym for ASCII. It was designed to provide a standard method of representing letters of the alphabet. As it's a subject that the C-64 has the correct type of plug but wrong gender you can buy a very useful device called a Gender changer which as the name indicates changes the gender. These gender changers generally cost in the region of £5.00 each. If anyone out there has experience of this particular problem perhaps they would like to let me know.

In a PS to his letter Graham asks what is TDM and ASCII? Well, a full explanation would warrant quite a bit of space but here's a brief summary. ASCII is an acronym for American Standard Code for Information Interchange and is simply a code used to represent letters of the alphabet. As you may be aware, computers are really only simple devices and can only deal with numbers consequently if we want them to handle letters we have to first convert the letters into numbers. In order to promote some standardization it is obviously desirable for all computers to use the same table for the conversion hence the development of the ASCII code.

So, a transmission that is said to be using ASCII is simply sending information that has been converted using the ASCII code. The second question regarding TDM covers a slightly different aspect of the problem. TDM is an acronym for Time Division Multiplex and is a system where more than one communication channel can be passed over a single radio link, hence increasing its capacity. There are many techniques used, but the simplest do simply interleave the two separate channels with the terminal equipment providing the separation. Using this technique each channel has its own time slot hence the term Time Division multiplex.

Don't fret if you don't quite understand TDM or ASC from this description as it's a subject that is usually covered in detail in most textbooks. All the change does is separate the high tones of 2125 and 2295Hz from each other.

USB - LSB - RTTY

A confusing title for a confusing subject! Several readers have written with queries regarding what mode should be used to receive RTTY. The general answer is upper sideband, but the choice between upper and lower side band is of little consequence. All the changes do is invert the tones and hence you will find you have to reverse the shift on your terminal unit. In fact if you find that you have to reverse the shift on your terminal unit it is a sure sign that something is wrong.

In this case you will usually find a mark for u.s.b. reception or at least some advice in the manual of the required setting. If this information is available the normal position is at least on most sets that I've tried, is about 10 - 15 degrees right of centre. Readers often ask about the use of filters and here the best advice is to start off at the normal setting for reception and then select narrower filters if you are troubled by interference. Starting with a narrow filter just tends to make tuning difficult. Finally on this subject is the use of the RTTY mode which is provided on some receivers. Readers often write to say that this mode doesn't seem to work although reception using s.s.b. is fine. The reason for this is almost invariably due to standards. There are in fact two standards for RTTY tones and these are known as high tones and low s.o.s. The high tones of 2128Hz and 1445Hz for 170Hz shift signals are primarily used in Europe whereas the low tones of 2125Hz from RTTY are used in the USA. Because the USA hold such a large stake in the commercial market the Japanese manufacturers tend to build for that market.

The result of this is the list of codes for the Japanese receivers and transceivers imported into the UK are set-up for high tones. If you know what you are doing it is usually possible to change this by adjusting the carrier insertion oscillator, but don't attempt it unless you really are competent!

Frequency List

Don't forget if you would like a copy of my frequency list just send me a few pounds to the address at the head of this column and I will do my best to return a list as quickly as possible. It's also appreciated if you find you have to reverse the shift on your terminal unit and I will do my best to return a frequency list. The list is than available for picture adjustment. Acareful study of the various advertisements in SWM will reveal the software facilities offered by each manufacturer but there is nothing like actually seeing the systems in operation.

Hash

One other factor to consider is whether the computer generates much hash at the frequencies being used. I have one computer which can be used without problems while a second computer is being driven mad by the hash generated by the actual computer that I bought to digitise the satellite data seems to act as a communications channel. In our modern experimenting with earth terminals it is possible to cut the interference to a tolerable level.

Colin noticed the wide variation in prices for equipment for decoding satellite data, ranging from £99.99 for some £1695 but of course the systems are all different with widely differing facilities and capabilities.

Doug Ellershaw G1KLZ of High Bentham has a Dragon 32 computer and has recently come across a WEPAF program. He sent me a tape to provide some METEOSAT recordings to test out his program and load some recording from 2234UTC, on 19.2745MHz, RTTY, 50, -6, CNM85, 8093UTC, MAP Rabat. He notes that the software suggested by Maplin is obviously in great demand. TDM is often write to say that this mode doesn't seem to work although reception using s.s.b. is fine. The reason for this is almost invariably down to standards. There are in fact two standards for RTTY tones and these are known as high tones and low s.o.s. The high tones of 2128Hz and 1445Hz for 170Hz shift signals are primarily used in Europe whereas the low tones of 2125Hz from RTTY are used in the USA. Because the USA hold such a large stake in the commercial market the Japanese manufacturers tend to build for that market.

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to use to help align the decoder phase-locked loop. The tape was returned within a few days after I re-assembled the dish. Every time we have gales forecast I have been diamanting it just in case the winds were stronger than expected.

By chance I left either Chris’s or Doug’s tape in the cassette player when I was waiting to see if Okean-2 (see later paragraph) would transmit. One morning it did transmit and so one of them will find an early transmission from that particular satellite on their tape. It was travelling south while passing over the Gulf of Bothnia.

Offers

As mentioned in previous months I will be happy to send any reader a recording of METEOSAT/NOAA satellite signals if a suitable cassette tape is enclosed with pre-paid postage. Several readers have requested such data and I hope that it has been used successfully to prove that decoding systems work even if you don’t yet have a suitable antenna system.

Also available for an s.a.e. is a print-out of my list of Kepler elements for the polar orbiting satellites. I try to keep these as up-to-date as possible but occasionally an error might creep in.

OKEAN-2

Some months ago I mentioned that Geoffrey Falworth of Penwortham produces a list of expected satellite launches based on his studies of satellite lifetimes and rocket availability. Last November he wrote to me that a new Russian oceanographic satellite was expected to be launched towards the end of 1988.

The OKEAN-1 satellite has not been transmitting for some time as far I am aware and I understand that it does have problems so I was very pleased to receive a call telling me of the launch of OKEAN-2. In early March I received orbital elements for this newly launched oceanographic satellite. It was launched on February 28 and after a wait of only a few days I picked up a transmission on March 8. In fact being a weekday I had to use my recording equipment so I set the timer to allow the cassette recorder to switch on for a few minutes either side of each possible pass. When I returned, the recorder had collected several minutes of data so I replayed it immediately.

The recording consisted of several sections, rather similar to the type of pictures sent by its predecessor OKEAN-1. The first section was completely black, the second section was a radar image and the remaining half of the picture was a visible light frame of eastern Europe. Numbers were displayed with the pictures as is standard with many transmissions from the OKEAN series and these numbers can be decoded using information published in copies of the Remote Imaging Magazine.

Running the program and using the figure given in the telemetry produced the time 1122UTC which was the exact time predicted by the elements that I had received. This validated both the elements and the satellite signal.

Keplers for OKEAN-2

Here are the latest elements available for OKEAN-2 courtesy of Goddard Space Flight Center.

Satellite: OKEAN-2 (1990-18A)
Epoch: 90067.11324253
Decay: 0.00002854
Inclination: 82.5281
RAAN: 190.7521
Eccentricity: 0.0018974
ArgP: 240.5761
Mean anomaly: 119.3567
Mean motion: 14.72673418
Orbit number: 119
Transmission frequency 137.40 MHz.

Russian METEORS

There has been a significant change in the operation of the Russian METEOR satellites during March. I last logged a transmission from 2/17 on February 11 and since that time I haven’t heard or recorded any signals from it. Similarly 2/16 which also operated on 137.4MHz has been quiet. In an attempt to see whether I had simply missed the passes I have been recording the system set up on the frequency in my absence but any unidentified signals have been recorded.

I do believe that there is another satellite transmitting on this frequency but it requires a lot of time to monitor every transmission and then to work out a possible orbit.

So for the present we have just OKEAN-2 using this frequency. No doubt the other satellites will be reactivated in due course.

METEOR 2/18 continues normal transmissions on 137.30MHz and some very good pictures can be seen.

If you examine the pictures at full resolution there is plenty to be seen, particularly around Greenland where the icebergs change with the change in the seasons. If ever there was a geography project for schools it is to actively monitor the advance and retreat of the ice in Greenland.

Another interesting meteorological phenomenon that I saw from 2/18 in late February was a cloud bank hanging over a part of the Mediterranean sea which was avoiding encroaching the land. Both North Africa and Spain were cloud free and so the effect was quite marked.

METEORS 3/2 and 3/3

For the last few weeks only METEOR 3/2 has been transmitting pictures. It remains on 137.85MHz and has been transmitting both visible and infra-red pictures of very high quality. The absence of 3/3 is probably temporary but we will have to see what happens. Only a month or so ago I commented that I didn’t expect to see 3/2 back on again!

NOAAs

All three of the NOAA polar weather satellites continue regular good quality picture transmissions on 137.50 or 137.62MHz.

METEOSAT

Transmissions from METEOSAT 3 remain good though do check that you are pointing correctly at the satellite. The gales played havoc with my dish as I mentioned and whilst looking for the signal I came across another strong signal several degrees to the west which is evidently METEOSAT 4.

In an effort to see whether METEOSAT 4 was transmitting any wefax pictures I set up my computer and left it set up to trigger on any wefax tones and so store any picture that might be transmitted. After several days of monitoring I haven’t recorded anything at all. I would be surprised if there were no wefax pictures at all so keep watching that signal!

GOES is still transmitting pictures though my equipment is seeing a low signal strength.

Other Satellites

The longer periods of sunlight now blessing the northern hemisphere have brought more satellites back into operation over the UK. At least that is the impression that I get listening to my scanner! Just this evening I have again logged the transmissions on 136.11MHz, 136.23MHz and some other possibilities.

Geoffrey Falworth, mentioned previously, has kindly sent me some more elements to try to identify these transmissions. Try listening out in the 136 to 136MHz band and see how many signals you can spot. My computer broadcasts on 137.02MHz so do allow for any unexpected frequencies that may only appear when you switch your home computer on!

New Equipment

I am always interested to know of new products for the satellite enthusiast and a recent letter from Richard Wilmot GW3RRI told me of the APT-1 weather satellite decoding module from Technical Software. This module converts the APT format used by weather satellites into the FAX format that many s.w.1.s have and so allows them to enter the field without major expenditure.

I haven’t seen any results from this innovation but Richard describes several features that look appealing, particularly the provision for grey-scale enhancement.

Pictures

To celebrate the launch of OKEAN-2 I have included here two pictures from my collection of OKEAN-1 prints.

The first one, Fig. 1, is of Lake Vanern in Sweden taken in December 1988. I added artificial colour to the original print.

The second, Fig. 2, is of Scotland and shows the way that OKEAN can transmit more than one picture type within a frame. This picture includes part of the UK in the left section which is a microwave image, and a radar image of Scotland. At the time of scanning Scotland was under cloud cover.

I have run out of space now so until next month keep listening to the band and send in your reports.

Fig. 1

Fig. 2
Reg Ward & Co. Ltd.

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Short Wave Magazine May 1990
During the month prior to March 13, I have recorded variations in atmospheric pressure ranging from 29.8 (998mb) on February 26 and 28 to a super high of 30.9 (1046mb) on March 3, all on Fig. 1. Mild and sunny days on February 16 and March 2, temperatures on some days starting with a light frost (the lowest being 28°F) to daytime highs of between 50° and 62°F, a total rainfall of 5.65in for the month of February with thunder during a gale on the 25th and a beacon at early dawn which lasted throughout the late evening of the 7th. The chart in Fig. 1 came from the barograph, installed in my upstairs office, indicating the pressure for the week including days 3 and 4. The ex-RAF allimeter in my car, at ground level, indicated 1065mb (30.95in) and a BBC weather programme reported a record high for March so far this century. My home is situated 322m a.s.l. so I assume that the sea level pressure could have hit the 31.0 inch mark.

Such variations have caused a number of short-life tropospheric disturbances which could easily have been missed had it not been for those familiar warning signs which suggest that, at least for a while, we check and tune through Band II more frequently. For instance, shortly before the high pressure of 30.7 (1039mb) began to decline at noon on February 22, Joan and I noticed those “wispy” clouds building up in a clear sky and, as the fall continued, some very strong signals from French and German stations, popping up between 87.6 to 102MHz, were pounding from the loudspeaker of my 36 year old, ex-military, R216 v.h.f. communications receiver, Fig. 2.

**The R216**

Several readers have asked me about the availability and workings of this elderly receiver and firstly I think it highly unlikely that any will be found on the surplus market today, however, should one turn up, it is important that you get the correct power supply unit and multi-way interconnecting lead that goes with it. The reason I emphasise this point is because the set uses a mixture of 14 directly and indirectly heated valves and a diode mixer. Therefore the power unit must correctly provide two separate and widely differing high tension and low tension supplies, plus a small voltage for the bias line and readers, please remember that this power pack must be taken when handling the high voltages therein and even more so with such aged equipment. If you are in any doubt, ask a good radio engineer to check it. The R216, the v.h.f. companion to the R209, has a turret type wave-change switch (bottom right) to select one of the five bands, 19-30MHz, 30-48MHz, 48-68MHz, 68-101MHz and 101-157MHz and below the antenna socket (top right) is a crystal oscillator which provides 1 and 5MHz markers for dial calibration and is used in conjunction with the adjustable cursor (below dial right) on the dial glass. A roll-up-type tuning scale is employed to spread the bandwidth of each range over a long length of film and the six ‘pointer’ knobs to the left of the scale-window are (top to bottom) for scale lamp brilliance, 30/120kHz bandwidth selection, b.f.o., c.w/a.m./f.m. selector and r.f. and a.f. gain controls.

Although this set is very well made and among the best in its day the general performance and sensitivity cannot compare with the hi-tech receivers manufactured today. However, with a wideband antenna preamplifier and an outside beam on dipole, the R216, with its 4.86MHz i.f., is a most useful receiver for DXing in Bands I and II.

**Tropospheric**

During the evening of February 22 and the afternoon of March 4, PK Editor Rob Manion (Dorset) heard French and Spanish stations in Band II and on the 4th he added the Canary Islands.

From his home in New Radnor, Simon Hamer received a multitude of stations between 87.5 and 106MHz during the good tropospheric conditions on February 18, 22 and 23 and March 7. On the 18th he logged signals from the Benelux countries, BBC Radios Scotland and Ulster, France, Ireland RTE-FM1 and the Irish Independent stations Capital Radio (Dublin, 104.4MHz), Century Radio (100.3 and 101.4MHz), Clare FM (96.4MHz), Classics 98FM (Dublin, 104.4MHz), County Sound (Cork, 103.7MHz), Horizon Radio (Belfast, 94.9MHz) and South-East Radio (Wexford, 99.2MHz) and Manx Radio.

Simon recently added Classics FM to his QSL collection and tells me that they use a 4kW transmitter at Three Rocks, Dublin. On days 22 and 23 he found Band II open towards Germany and Scandinavia and identified the American Forces Network (AFN on 98.7 and 102MHz), The British Forces Broadcasting Service (BFBS on 96.5 and 103MHz), Deutschlandfunk (100.3, 101.8 and 103.3MHz), Radio Hamburg (103.6MHz), Hessisches Rundfunk-1, (91 and 99MHz), HR-2 (95.8 and 98.6MHz) and HR-3 (99.7MHz), Norddeutscher Rundfunk-1, (91.1 and 98MHz), NDR-2 (98.6, 98.15 and 99.8MHz) and NDR-3 (94.4MHz), Suddeutscher Rundfunk-1 (97.8 and 98.8MHz) and SDR-3 (99.9MHz) and Westdeutscher Rundfunk-2 (99.2MHz) and WDR-3 (97MHz) from West-Germany and Danmark Radio-1 (88.1MHz), DR-2 (98.1 and 99MHz) and DR-3 (99.8MHz) from Denmark, Norsk Riksradiokasting-1 (97.6MHz) and NRK-2 (100MHz) and the Third Programme (99.4MHz) plus Radios Gothen (101.1MHz), Gotland (100.2MHz) and Kristianstad (101.4MHz) on the forth FM network for local radio from Sweden. The more limited event on March 7, added BBC Radio Cumbria, Guernsey, Jersey, Newcastle, Ulster and Scotland, Manx Radio and ILR Clyde, Downtown, Forth and one of the recent additions, Jazz FM (102.2MHz).

Around 0000 on March 3, George Garden was parked in a lay-by on the coast just north of St. Cyrus and with his car radio heard a weak and fading signal on 102.8MHz which turned out to be Radio Clyde and he also logged, "at full strength", BBC Radio Newcastle and from the IBA, Radios Borders and Tay. “I received BBC Radio Newcastle with the strongest signal from 1100 on to midnight and nearer transmitter at Chatton mixed 5.6kW and the weakest just above 100MHz. "At 0910 on the 8th revealed several strong French and German voices on several spots in the band, plus BBC Radios Bristol and Wales to the west and BBC Radio WM (Birmingham) and ILR Fox FM (Oxford) to my north.

---

**Fig. 2**

Ron Ham
Faraday, Greyfriars, Storrington, West Sussex RH20 4HE

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**Fig. 1**

*Short Wave Magazine May 1990*
Although the month prior to March was generally quiet on the DXTV bands George Garden (Edinburgh), Simon Hamer (New Radnor), David Glenday (Arbroath) and John Woodcock (Basingstoke) found some forms of activity due mainly to disturbances in the ‘F2’ region of the ionosphere, when those smearable unlookable pictures appear at a few hours, yet limited life, tropospheric openings. The longest and best of the latter occurred on February 22 and 23.

Band I

“The log really is pathetic, just a little ‘F2’ on Saturday 24th February,” wrote David Glenday having seen pictures he could not identify on Ch. E2 (48.25MHz) from 0955 to 1020. Something unusual happened around 1030 on the 27th when John Woodcock heard a violin concerto in Band I but was unable to resolve the associated video, however, Simon Hamer had better luck because he was able to recognise the ‘F2’ reflected picture from Dubai at 1300 on the 11th but, at 0800 on the 12th, he found signals unidentifiable on Ch. E2 and those on Chs. R1 or C1 (both 48.75MHz), were probably of Russian or Chinese origin. Simon had mysterious signals again on Ch. E2 around 1300 on the 15th and 19th similar on Chs. R1 and E3 (55.25MHz) at 0800 and 1300 respectively on the 17th. Undetectable test-patterns came up, maybe from Iran, on Ch. E2 and once more, possibly from Russia or China, on Chs. R1/C1 at 0800 on the 27th. Simon also received pictures from Czechoslovakia (CST) and Poland (ITV) via a random Sporadic-E opening on the 9th.

Picture Archives

While Band I conditions are in the doldrums it’s encouraging to look back at some of the signals which were received in India and the UK via Sporadic-E during 1989. Lt. Col. Rana Roy (Meerut) received pictures, on Ch. E2, from south-east Asia at 1940 on February 4, Fig. 1, Dubai at 1805 on May 29, Fig. 2, and Malaysia at 1800 on June 10, Fig. 3, and David (Brighton) saw an Italian weather forecast, Fig. 4 and a subtitled film from Sweden, Fig. 5, somewhat between June and August. Signals from Italy can be found in Band I on Chs. (53.75MHz) and (63.25MHz) and with suitable equipment on 1C (82.25MHz). Readers with v.h.f. communications receivers like the ex-military S36 or R216, (see photo in Band II DX) or one of the variety of scanners, can look for the associated sound channels on 59.25, 67.75 and 97.75MHz respectively.

Although, for early warning of sporadic-E, I use an R216, fed by a rooftop dipole, to check for the vision pulses on Chs. E2 and R1, the sound on the Italian channels can often indicate the first signs of an opening by rapidly perking up above the receiver noise level. David Glenday caught a Russian caption on Ch. R2 (59MHz) at 1557 on August 9, Fig. 6, a test-card from Poland on Chs. R9 and R2, Fig. 7, and the TSS ‘2049’ on Chs. E9 and 11, Fig. 8, at 1100 on November 1. The latter was late in the year because the annual Sporadic-E season is expected between April and September with the maximum number of events manifesting the June and July. Whatever the time of year it is always worth taking a quick look on Chs. E2/R1 during the morning for, in and out of “season” Sporadic-E openings.. Tropospheric-openings produced a programme from Lahore in Band III for Rana Roy on February 1, Fig. 9, a weather report from France for David Hunt in mid-season, Fig. 10, and a teletext transmission from West Germany on May 20, Fig. 11, for David Glenday.

Transmitter Gen

David Glenday wrote to Danmark Radio about the test-card marked ‘DR Danmarks Radio’ which he received last summer on the u.h.f. channel 4E1 and, in addition to their reply confirming that this signal came from Tommerup, they told him that the following UHF channels had been allocated to DR, E25 Sveborg, E29 Nibe, E31 København Vest and Thisted, E34 Næskov, E37 Abenbroa, E41 Tommerup, E42 Vordingborg, E44 Hadsten, E46 Vibekebaek, E51 Jyderup, E53 Varde, E54 Hedensted, E57 Tolne and E59 Ro and Viborg. Many readers find the Teletext service is a good source for the latest transmitter information so, on March 1 I checked CEEFAX page 699 and learnt from the BBC’s engineering information that new stations are due in service in early April from Haverfordwest (Dyfed) carrying BBC 1 and 2 on Chs. 52 and 66 and ITV and CH4 on Chs. 56 and 68 respectively, Long Compton (Warwickshire) with BBC 1 and 2 and ITV and CH4 on Chs. 22, 28, 25 and 26 and Pennine/cher (mid-Glamorgan) with BBC 1 and 2 on Chs. 57 and 63 and ITV and CH4 on Chs. 53 and 60. The antennas for the latter two are vertically polarised. Engineering Information in the IBA can also be found on ORACLE, ITV page 297 and CH4 page 697 and it’s worth taking a look at their weather and shipping forecast pages.

Tropospheric

John Woodcock received pictures from France (CANAL+) in Band III at 1530 on February 16, 19 and 24 and I saw programmes and adverts from this station, on system ‘L’. Ch. 5 with my YOKO TVC8M, when the high pressure was falling from 30.7in (1039mb) to 30.6in (1036mb) between 1800 and 1904 on the 22nd. Around this time I foundweak signals on Belgium and German transmitters on Chs. E6 and 9 and for a time around 2100, Rob Mannion (Dorset), the Editor of our sister magazine Practical Wireless, lost the u.h.f. signal from Rowridge (IOW) completely and commented on the high level of co-channel interference on other ‘local’ stations.

While parked on high ground at a coastal site south of Montrose at 1200 on March 3, George Garden received “strong grain free colour pictures" from the ITV transmitters for Border and Tyne Tees TV at Eymouth and Chatton on Chs. 23 and 49 respectively and next day, David Glenday found nothing more exotic than Emley Moor causing line-pairing on Tay Bridge and Blidsdale surging in over Eymouth occasionally. The already high pressure reached a record peak of 30.9in (1046mb) at midday on the 3rd, Fig. 12, (see Band II DX for full week’s chart) and during the afternoon of the 4th there was a short opening and Rob again found co-channel interference on the u.h.f. band. Simon Hamer logged pictures from Belgium (RTBF1, Ch. E8) and France (CANAL+, Ch. LS) in Band III and Belgium (BR1 and 2), France (TDF), Holland (NEDS1, 2 and 3) and Ireland (RT1, 2, 3 and 4) on their respective spots in Bands IV (ARD/HESSEN, NDR3, RTL PLUS, "now operating from Cologne" [WRTVH] both on Ch. E7, NDR1 on Ch. E10 and WDR1 on Chs. 6 and 11), Norway (NRK, Ch. E11), Poland (TVP on Ch. R8) and Sweden (SVT1, Chs. E6 and 9) in Band III and Czechoslovakia (CST2), Germany (ARD/HESSEN and NDR3, RTL PLUS, SAT1, WDR1, SVSS, WEST3 and ZDF) on their respective spots in Bands IV and V during a super opening on the 22nd, Austria (ORF1, Chs. E5 and 8), Germany (SWF1, Ch. E8) and Switzerland (‘PTT/SRG1, Chs. E8 and 7) in Band III and Austria (ORF2), Germany (SWF3/BADN and ZDF) and

Fig. 1: S.E. Asia
Fig. 2: Dubai
Fig. 3: Malaysia
Fig. 4: Italy
Fig. 5: Sweden
Fig. 6: Russia

WEATHER FORECASTS

Fig. 7: UK
Fig. 8: Iceland
Fig. 9: France
Fig. 10: West Germany
Fig. 11: Netherlands
Fig. 12: Sweden
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Some quite small s.s.b. receivers are now becoming available, for example the Panasonic RF 9550, which tunes from 1.615 to 29.999MHz, and can store 36 frequencies in its memory bank.

**Long Wave DX**

Note: I.w. & m.w. frequencies in kHz; s.w. in MHz; Time in UTC.

During a visit to Lecce, S.Italy Carlo Rizzo (Y0k) was surprised to receive after dark BBC Radio 4 on 501kHz, which is shared by Burghead (50kW), Droitwich (150kW) and Westerglen (50kW). In Bridgewater, Darren Beasley decided to check the band after dark and he added five stations to his growing list of DX - see chart. Among them is CFYN in Saskatchewan, Canada, noted as 32222. He also heard WTOP in Washington DC 1500, CKLM in Lavel, Quebec 1570 and the Caribbean Beacon, Anguilla 1610, all rated as SIO 222 at 0050. At 0100 he heard CJYQ in St.John's, Newfoundland 930 at SIO 333 peaking to 433.

The broadcasts from WTOP have also been reaching Dick Moon in George, S.Africa, he rated their transmission as 32222. He also heard WLAC in Nashville, TN 1510, which rated as 22222 and two of the broadcasts from S.America: R.Sutatenza in Bogota, Colombia 810, rated as 32332 and R.Muhler in Sao Paulo, Brazil 1260, noted as 22222.

In Bristol, Tim Shirley found the sky wave signals from several of the low power stations in Spain and Portugal have been reaching our shores after dark. Among those noted was a 1kW transmission from RRE Evora, Portugal 547 and two 2kW transmissions from Spain: Alicante 1395 and Pamplona 1584, see chart.

Some of the high power transmissions from N.Africa also reached the UK via sky wave paths after dark. They stemmed from Djerda, Tunisia 630 (600kW) and from four stations in Algeria: Ain Beida 531 (600kW), Les Trelbres 549 (600kW), Algiers 891 (600/300kW) and Alger 981 (600/300kW).

**MW Local Radio DX**

George Millmore has informed me that a new ILR station is due to commence operation on the Isle of Wight, it may be radiating on 1222kHz, during the time of this issue of SWM arrives on the bookstalls. The studios of 'Isle of Wight Radio' are located in Newport and the transmitter site is at Biddlesford Farm, Wootton. No doubt reception reports on their 5kW transmissions will be welcome from listeners on the IOW and from further afield too, see station addresses later.

**Short Wave DX**

During some days exceptionally high levels of solar activity have resulted in ionospheric disturbances and long distance communications have been rendered inaudible. From time to time prolonged fade-outs have occurred and reception of the broadcasts from many areas has then been seriously disrupted. During most days however, excellent conditions have prevailed in the h.f. bands.

When listening to the 25MHz
Local Radio DX Chart

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Note: Entries marked * were logged during darkness. All other entries were logged during daylight.
LongWave DX Chart

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Note: Entries marked * were logged during darkness. All other entries were logged during daylight.

SEEN & HEARD

Many of the broadcasts to target areas outside Europe were also logged. Some of the broadcasts noted in the reports. They stemmed from Radio Australia via Shepparton 9.110 (Eng 0400-0830), noted as 34333 at 0835 by David Edwardson; Voice of the UAE in Abu Dhabi 9.135 (Eng 0800-0830), noted as 44333 at 0835 by Mark Selby in Aldershot. Note: Entries marked * were logged during darkness. All other entries were logged during daylight.

LongWave DX Chart

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Note: Entries marked * were logged during darkness. All other entries were logged during daylight.

Chris Shorten at his listening post in Norwich.
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<td>CUSHCRAFT</td>
<td>A3 3 Element Tribander Beam</td>
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<td>A4 4 Element Tribander Beam</td>
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<td>HF 2V 80/40 metre Vertical</td>
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<td>Full range of antennas staggered microphones - SWR meter, DC Leads, Antennas etc.</td>
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<td>MJF-1701 6 way Antenna switch</td>
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<td>T2 Heavy duty rotator</td>
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<td>EMOTATOR 105/5Y</td>
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<td>POWER SUPPLIES</td>
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<td>PS20M heavy duty 30A, 22A cont</td>
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<tr>
<td>PS210M 3-15V variable 12A max</td>
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<td>£79.50</td>
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### Medium Wave DX Chart

<table>
<thead>
<tr>
<th>Freq (kHz)</th>
<th>Station</th>
<th>Country</th>
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<td>100000</td>
<td>M**</td>
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### DXers

- A: Ted Agerman, Norwich
- B: Daniel Bass, Bridgewater
- C: Carl Colby, Woburn, MA
- D: Mark Darr, Amherst, MA
- E: Phil Dutton, Cambridge, MA
- F: John Edgington, Princeton, NJ
- G: Michael Findlay, Portland, OR
- H: Robert Hansen, Boston, MA
- I: John Nash, Radio Beijing, China
- J: Richard Quay, Seattle, WA
- K: Thomas B. Rasmussen, Hawaii
- L: William Shorten, Norwich
- M: Mark Prudden, Portland, OR
- N: George Miller, Woburn, MA
- O: Dan Grafton, Manchester, NH
- P: Michael Findlay, Portland, OR
- Q: Bill Shorten, Norwich
- R: Mark Prudden, Portland, OR
- S: Charles Rogers, New York
- T: Ted Agerman, Norwich
- U: Mike Shorten, Norwich
- V: Bill Shorten, Norwich
- W: John Nash, Radio Beijing, China
- X: Robert Hansen, Boston, MA
- Y: Ted Agerman, Norwich
- Z: Richard Quay, Seattle, WA

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Short Wave Magazine March 1990
Equipment Used


Note: Entries marked \* were logged during darkness. All other entries were logged during daylight.

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<tr>
<th>Station Name</th>
<th>Location</th>
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<td>Channel Is</td>
<td>*^H</td>
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<tr>
<td>Corrin Head</td>
<td></td>
<td>*^H</td>
</tr>
<tr>
<td>Douglas Pier</td>
<td>IM</td>
<td>*^H</td>
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<td>Howth Head</td>
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<td>*^H</td>
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<td>Point Lonsdale</td>
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<td>*^H</td>
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<td>Point Dewart</td>
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<td>*^H</td>
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<td>Pointe du Caire</td>
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<td>*^H</td>
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<td>*^H</td>
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<td>Yarmouth Lighthouse</td>
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Abbreviations


The long wave maritime radio beacons around the coast of the UK and many other countries have attracted the attention of many listeners for the first time. Writing from Eastbourne, Philip Clements says: "I sat down just to see how many of the more local beacons I could receive on my modest equipment and I was surprised to hear more than just the odd one or two, that I sat for hours, cross referencing the Morse idents with those new to this aspect of our hobby.

Also in Eastbourne, Ian Harling says: "I was interested to find that the first time after studying the chart in the Feb '90 SWM using a Panasonic DR26 portable with built-in ferrite rod antenna, I was receiving the beacon signals from two light paths away from the point observed by me, and those new to this aspect of our hobby.

Attica, Greece. VOIRI, External Service, P.O.Box 1920, 1774, Tehran, Islamic Rep. of Iran.

Radio Zambia, External Service, Broadcasting House, P.O.Box 50015, Lusaka, Zambia.

Radio WMKL, Assemblies of Yahweh, Bethel, PA 19507, USA.
SEEN & HEARD

the main lighthouse, which is on land. He says "I was able to stand next to it and obviously the signal was extremely strong!" He also took the opportunity to buy land for other beacons while there, but they were all very weak, so perhaps the high level of radiation from CS caused the automatic gain control (a.g.c.) in his receiver to render it temporarily insensitive.

Further along the coast in Folkestone, Andy Cadier logged several beacons during daylight. He says "(lucky enough) to see a few more, but seem to experience difficulty in decoding weak Morse signals. Do you say something I can hear quite a few more, but the automatic gain control (a.g.c.) in high level of radiation from CS caused other beacons while there, but they had no opportunity to search the band for extremely strong!" He also took the main lighthouse, which is on land. He says "I was able to stand next to it and obviously the signal was extremely strong!" He also took the opportunity to buy land for other beacons while there, but they were all very weak, so perhaps the high level of radiation from CS caused the automatic gain control (a.g.c.) in his receiver to render it temporarily insensitive.

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The new Brookman's Park to Pole Hill (Daventry) sector, i.e. UB4, frequency is 121.025MHz (sometimes 133.7MHz at weekends), with backup on 135.425MHz. These replace 134.75MHz which suffered from unidentified interference. That should clear up this matter which I mentioned in previous issues. Thanks for the information to Steve Foster, J.D. Toseland, Dave Wright and Jim Wright.

More from Jim Wright: East Scottish Airband (Doncaster): "Would readers tell of books, lists and publications and also clubs that they have found useful." I will happily print details of other publications and also of clubs here. Let's start with UK Air Traffic Control (A Layman's Guide) by David Graves (Airlife), recommended by Roger Pyton. I can't, unfortunately, list all frequencies but only mention those that are new or changed or of other topical interest. My recommendation for a comprehensive list is one of the Supplements from Aerad, the RAF 1 AIDU or Jeppesen and in the last issue I gave the addresses for obtaining all these. The frequencies are, I repeat, not confidential; also, other lists tend to be culled from these main sources.

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