ShortWave Magazine

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APRIL 1990

SWM SWM SWM SWM SWM SWM

REVIEWED THIS MONTH
COBRA SR925 Scanning Receiver

FREE PULL-OUT
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AND
Regular Features for Airband, Scanning and Broadcast Enthusiasts

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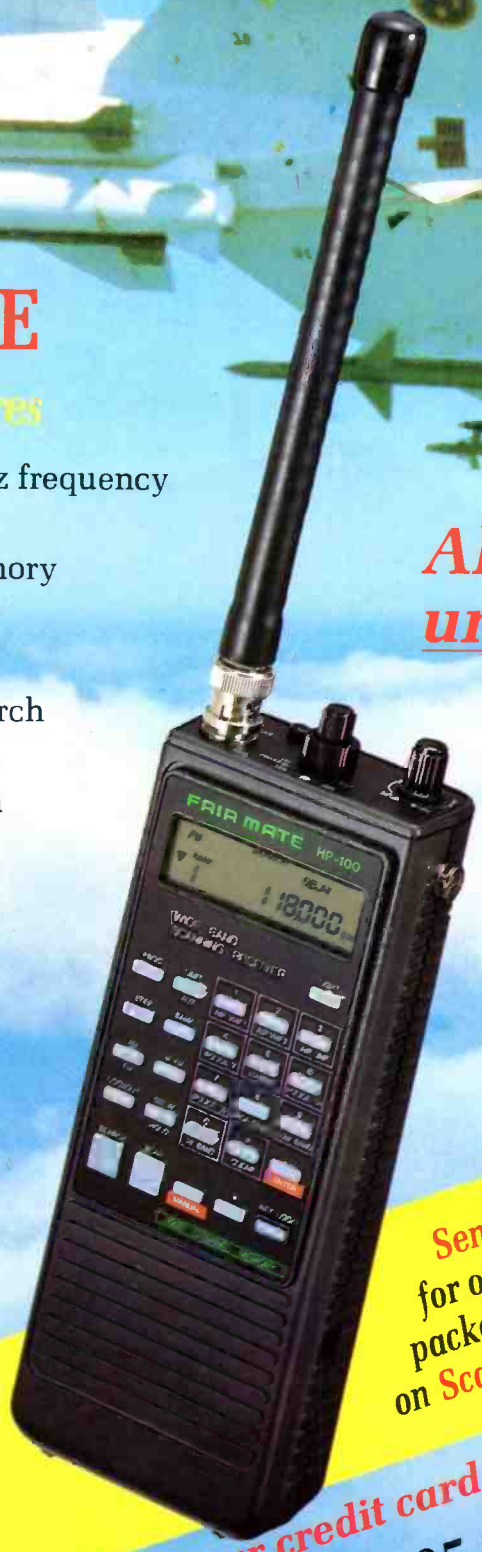

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VOL 48 ISSUE 4 APRIL 1990

ON SALE MARCH 22nd

MAY ISSUE ON SALE
APRIL 26th

|30| **Cobra SR925 Scanning Receiver.**

Cover The Cobra SR925 is a base station scanner and Jack Aldridge has been trying it out to see how it performs.

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Short Wave Magazine

PULL-OUT SECTION

REGULARS

SEEN & HEARD

GOOD LISTENING

FIRST WORD

This month we have something extra special for you. It is now three years since we re-launched *SWM* as a magazine for the listening enthusiast and in that time it has become established as the second highest selling radio magazine on the bookstalls.

To celebrate three years we are giving you a pull-out centre-section with world-wide TV Test Cards in full colour. This is the first in a series of pull-out DX-TV DataFiles which will give the DX-TV enthusiasts complete information on individual countries television systems and transmitters. The second in the series, which will appear later in the year, will cover Spain. It is hoped to publish these DX-TV DataFiles at roughly three-monthly intervals.

Also with this issue is the first of a

two-part Wordsearch competition with many prizes to be won. Don't, however, forget that you must wait until next month for the second half and that you must Sellotape the two halves together before sending them in.

Although the competitions in the centre of the issue have been extremely popular, there is no monthly competiton this month, or next - the one on the front will have to keep you occupied.

Our Radioline service - 0898 654 676 - is proving very popular. Updated each Saturday it enables us to bring you up-to-the-minute information as well as being interesting.

We are still hoping to be able to publish *Vintage Radio* in the Spring - it all depends on your response. Several readers thought that the letter published in last month's *SWM* referred to the Issue 1. It did not. *VR* will not appear on the bookstalls - direct subscription only is the order of the day.

A WORD IN EDGEWAYS

Dear Sir

I have been reading the articles by Steve Whitt 'Hot-Rodding the ICF-2001D' with great interest and not a little trepidation.

The less-than-perfect design faults appear to be:

1. Distinctly disappointing on f.m. and airband frequencies.
2. Memory wipeout due to loose batteries.
3. 10kHz and 4.4.kHz filters too wide.
4. Some frequencies possibly missing depending on where you buy the receiver.
5. Receiver overloads due to limited dynamic range.
6. Serious reciprocal mixing problems.
7. S-meter too sensitive.
8. Audio performance rather poor.

I also understand that some owners of the 2001D have experienced burnt-out h.f. transistors when using an outdoor antenna!

Whilst I have no doubt the author of these articles knows what he is doing, why should all these modifications be necessary? At £300 we are not talking about a cheap domestic portable.

The ICF-2001D may be described as the 'best selling s.w. radio of all time' but is it the best performing? I have my doubts.

CLIFF STAPLETON
TORQUAY
DEVON

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. The views expressed in letters published in this magazine are not necessarily those of Short Wave Magazine.

Dear Sir

The New Year is upon us and this presents endless opportunities to try and fail yet again to get the c.w. sorted. Ah well.....

Was that a J or X or M,
Perhaps it was a P?
dah-di-dah-di-dah-di-dah,
this code's all Greek to me.
The Alpha Kilo Papa stuff
was difficult enough.
But trust that fellow Morse
to think up something really tough.
A dot's an E, a dash a T,
That much I've learned and know.
But it gets tricky after that,
With 24 to go.
And then there's all the numbers,
And the International Code.
And all I want to do is
talk to Fred in the next road!
I keep on putting off the test,
I'm a coward to the bone.
But there's thousands of us out here,
so at least I'm not alone.

PETER ROBINSON
LEEDS
WEST YORKSHIRE

Dear Sir

With reference to Mr C. Stapleton's letter in the February issue, I do not see what he is trying to prove. He has not told us anything we do not already know.

But I would like to point out to Mr Stapleton that not every s.w.l. wants to listen to amateurs and therefore does not require expensive equipment, though my Grundig Satellit (domestic) is quite capable of picking up amateurs and it is also quite capable of winkling out weak stations. I use a properly installed random wire, as well as the telescopic antenna on the set. I do not use a length of wire slung anywhere, very untidy!

Mr Stapleton also states that Grundig radios are now fitted with s.s.b. I bought my Satellit in 1982 fitted with s.s.b. for the princely sum of £164.

As I said in my first letter, we buy what we can afford and I am very happy with my two Grundigs, one Philips, one Toshiba and one Sangean (domestic)

Also I have been a reader of PW since 1955 or thereabouts and I became a regular reader of SWM from the first copy.

I hope this letter will put an end to the bickering my first letter seems to have started.

Much ado about nothing.

E. S. WALDEN-VINCENT
GREAT YARMOUTH
NORFOLK

WHAT'S NEW

Straight Key Evening

The Edgware & District Radio Society will be running their Straight Key Evening on Friday May 18. The frequency is 3.55MHz and it is from 1900BST onwards. You should call "CQ SKE". The Edgware Club will once again be running their special event callsign GB2SKE.

Wordsearch Winner

The winner of the February Wordsearch Competition is **Graham Cochrane** from Ayrshire in Scotland. He will now be able to enter all the remaining competions for the next year as a result of his win.

Border Awards

In the light of recent changes to band allocations and modes of operating, Oswestry & DARC have revised their popular Border Awards. They are re-introduced their award to take account of new trends for contacts made after 1 January 1990.

HF Award - Counties on Welsh/English Border

Bands: 1.8 to 30MHz

Open to both operators and s.w.l.s.

Work, or hear, either a club member or club callsign G4TTO or any special event station organised by the club **plus** UK/Eire: 3 stations in each Border County

Overseas: 2 Stations in each Border County

Counties: Cheshire, Clwyd, Gloucestershire, Gwent, Powys, Hereford/Worcester, Shropshire Total Required: U or Eire 22 stations

Overseas: 15 Stations

VHF/UHF Award - Shropshire and Bordering Counties

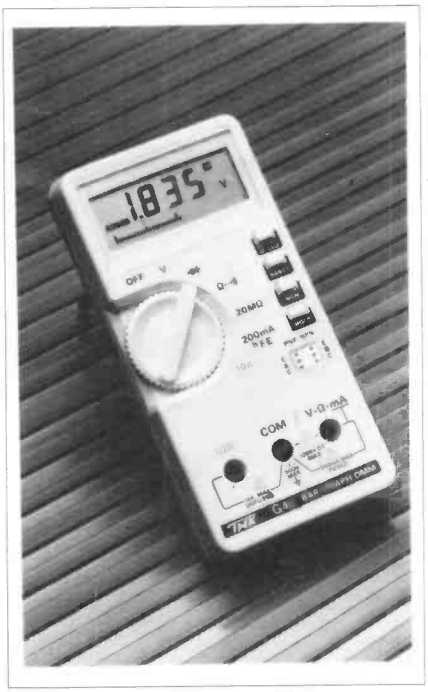
Bands: 50MHz and above

Open to both operators and s.w.l.s.

Work, or hear, either a club member or club callsign G1ORA or any special event station organised by the club **plus** 10 stations in Shropshire and 5 stations in each bordering county Counties: Cheshire, Clwyd, Hereford/Worcester, Staffordshire, Powys and Shropshire. Total: 36 stations, all on a single band and mode.

Log extracts, for either Award, must include the date (from 1-1-90), time, frequency, mode and be certified correct by two other operators or s.w.l.s and be sent, together with £1.75 or 10 IRCs to: **Awards Manager, PO Box 73, Oswestry, Shropshire SY11 1ZZ.**

Combined Display



The latest instrument from TMK is a digital multimeter for all general purpose applications. Housed in a rugged, safety-yellow case, model G40 has a three-and-a-half digit, liquid crystal display with full annunciation and an analogue bar graph to indicate the movement of unstable readings. Auto ranging is supplemented by manual range selection for readings of a similar value. A reading 'hold' control and memory mode for carrying out relative measurements.

With basic d.c. accuracy of 0.5%, the G40 can handle d.c. voltages up to 1000V, a.c. voltage up to 750V, both alternating and direct current up to 10A and resistance up to 20MΩ. Other test modes include continuity with an audible tone, diode and h_{FE} tests for both *npn* and *pnp* transistors. Fully guaranteed, this d.m.m. comes ready for use with a case and costs £65.00 excluding VAT.

Further information from: **TMK Instruments, Building 3, GEC Estate, East Lane, Wembley, Middlesex HA9 7PJ. Tel: 01-908 3355**

Celsiclock

Celsiclock is the latest addition to the range of temperature recording equipment on offer from Cobonic Ltd. The Celsiclock is an irreversible, temperature recording, clock label which measures and permanently records the maximum temperatures on any surface. It is a simple, reliable and economic method of permanently recording temperature maximum levels on surfaces which are inaccessible by standard methods, due to rotation, vibration, high voltage or for any other reason. Celsiclocks cover the range from +40 to 260°C in eight separate labels and each label is divided into five temperature sequences. The temperature sensitive circular spots on the Celsiclock change colour permanently from white to black when their individual specified temperature rating is exceeded for less than one second. A free sample kit is available on request from: **Cobonic Ltd., 32 Ludlow Road, Guildford, Surrey GU2 5NW. Tel: (0483) 300160.**

Sponsored Amateur Station GB4SMC

GB4SMC is trying to raise funds for two causes - Powys REMAP (Poyal Association for Disablement & Rehabilitation) and the Restoration of the Shropshire & Montgomery Canal. The sponsored amateur radio station will be on the air between 1500 April 14 and 1500 April 15. A special trailer-mounted tower has been loaned by Strumech Engineering Ltd., and the other equipment has been loaned by Powys ARC. The operating room and the electricity supplies, etc., are being loaned by Frank Jones in the Abermule Lock Cottage.

If you would like to sponsor the group, please write to: **Paul Essery GW3KFE, 287 Heol-y-Coleg, Vaynor, Newtown, Powys, Tel: (0686) 628958.**

DXpedition

Spen Valley ARS will be running their annual DXpedition on May 19 to Pen-y-Ghent. Pen-Y-Ghent is situated in North Yorkshire in beautiful limestone country, surrounded by natural caves and potholes and is 694m a.s.l., quite a climb when carrying lots of radio gear. It is well known as one of the Three Peaks and is very popular with walkers.

The special event callsign **GB2PYG** will again be used and it is hoped that operation will be on all bands from 1.8 to 28MHz mainly s.s.b. with some c.w., 28 and 50MHz f.m. and 144MHz s.s.b. and f.m. As usual, WABers who require SD87 square are invited to call in. Operation will be 1100 - 1700 clock time approximately.

GRASSROOTS

Lorna Mower

Norfolk ARC meet Wednesdays, 7.30pm in the Norfolk Dumpling, The Livestock Market, Harford. March 28 is Digital Electronics G3YLA, April 4 is their AGM, the 11th is Contest Techniques/NFD Analysis G3IOR, the 18th is an informal/committee meeting, the 22nd is a Club Outing to RSGB Exhibition at the NEC Birmingham and the 25th is Real Radio evening/ Construction Contest. Steve Sewell G4VCE on (0508) 78258.

Hornsea ARC have natter nights on March 28/April 25, PC Unlocked G3PWN on April 4, Operating From Exotic DX G4HYD on the 11th and a Visit to YTV Facility, Hull on the 18th. Wednesdays, 8pm at The Mill, Atwick Rd. Jeff G4IGY on (0964) 533331.

Cheshunt & District ARC have natter nights on March 28/April 11/25th and a Construction Contest on April 4. Wednesdays, 8pm in the Church Room, Church Lane, Wormley. Roger Frisby G4OAA on Hoddesdon 464795.

Felixstowe & District ARS have an Open evening on April 2. All meetings in the Back Room of the Ferry Boat Inn, Felixstowe Ferry, 8pm. Paul Whiting G4YQC on (0473) 642595 (daytime).

South Manchester RC meet Fridays, 8pm at Sale Moor Community Centre, Norris Rd, Sale. March 23 is a Surplus Equipment Sale and April 20 is Club Activities Review. Ian Butterworth on 061-231 5870.

Bromley & District ARC have Bargain Basement on April 17. 3rd Tuesdays, 7.30pm at the Victory Social Club, Kechill Gdns, Hayes. Geoffrey Milne G3UMI on 01-462 2689.

Mid-Warwickshire ARS meets 2nd & 4th Tuesdays, 8pm at 61 Emscote Rd, Warwick (St. Johns Ambulance HQ). March 27 is Sound-Explored by G0AJA, April 10 is a Radio Sale and Auction conducted by Chairman and the 24th is Cellular Radio G3MXH. Mike Newell G1HGD on Kenilworth 513073.

Grafton RS have Equipment Clinic G8JGE on March 23 and their Annual Dinner at the Waggon & Horses, Southgate on the 30th. 2nd & 4th Fridays, 8pm at Holy Trinity Church Hall, Stapleton Hall Rd, London N4. Rodney Harrigan G0JUZ on 01-368 8154.

Chesham & District ARS meet Wednesdays, 8pm at The Stable Loft, Bury Farm, Pednor Rd. March 28 is a Visit to Bracknell Weather Station. Lis G0ETU on 092783911.

Stamford & District ARS meet 1st & 3rd Wednesdays, 7.30pm at The Flat, Marshalls Garage, St. Pauls Street, Stamford, Lincs. Peter Fancourt G3HEE on (0780) 55001.

Stevenage & District ARS meet in Ground Floor Lecture Room, "D" Block, Ridgemond Training Enterprise, Ridgemond Park. March 27/April 24 are committee meetings 8pm, April 3 is Meons 50MHz And All That G1ZZH 7.30pm and the 17th is Converting Commercials G1ZOO 7.30pm. Pete G0GTE on (0438) 724991.

South Dorset RS meet 1st Tuesdays, 7.30pm in the Wessex Lounge, Weymouth Football Club, Radipole Lane, Weymouth. April 3 is their AGM & Constructors competition. G. Gwilliam G4FJO on (0305) 781164.

Wimbledon & District ARS have a general activity evening on March 30. 2nd & last Fridays, 7.30pm in St. Andrews Church Hall, Herbert Rd. Nick Lawlor G6AJY on 01-330 2703.

Chelmsford ARS have Aerials For Restricted Sites G3XAP on April 3. Meetings in The Marconi College, Arbour Lane, 7.30pm. Roy Martyr G3PMX (0245) 353221 Ext. 3815.

South Bristol ARC have a Computer Activity Evening G4RZY on March 28, Hand-held Rig meeting G4RZY on April 4, 70cms activity evening on the 11th and 10m activity evening on the 25th. Wednesdays at the Whitchurch Folkhouse, Bridge Farm House, East Dundry Rd, Bristol. Len Baker G4RZY on Whitchurch 832222.

Yeovil ARC have Lambda Diode Fundamentals G3MYM on April 12, their AGM on the 19th and a natter night on the 26th. Thursdays, 7.30pm at The Recreation Centre, Chilton Grove. David Bailey G1MNM at 7 Thatchem Close, Yeovil BA21 3BS.

Galway Radio Experimenters Club meet 1st Mondays, 8.30pm at Richardson's Bar, Eyre Square. Ciaran McCarthy on 091 53592 Ireland.

Southgate ARC have a Grand Surplus Equipment Sale on April 5 and Youths' Construction Evening on the 26th. Brian Shelton on 01-360 2453.

York RS meet Fridays, 7.30pm at York City Supporters Club, Bootham Crescent. Keith Cass G3WVO at 4 Heworth Village, York YO3 0AF.

Wirral ARS have Decca Navigation Stn G3XJZ on April 4. Ivy Farml, Arrowe Park Rd, Birkenhead. Alec Seed G3FOO on 051-644 6094.

South East Kent (YMCA) ARC meet Wednesdays, 7.30pm at the YMCA in Leyburne Rd, Dover. March 25 is South East Kent QRP Convention/Radio Table Fair, the 28th is a construction contest, April 4 is their AGM and Presentation of Club Awards, the 11th is a natter night/committee meeting, the 18th is a natter night and the 25th is Special Events Planning for 1990. G8ZYZ on (0304) 852533.

Derby & District ARS have a Junk Sale on April 4. Wednesdays, 7.30pm at 119 Green Lane. Kevin Jones G4FPY on (0332) 669157.

Verulam ARC meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association HQ, New Kent Rd, off Malborough Rd, St. Albans. March 27 is their 1990 G3PAO Memorial Lecture. Andy Ince G0BZS at Cottage No. 1, Rounton, 28 Nascot Wood Rd, Watford WD1 3SD.

Coventry ARS have a Video Evening - Secret Listeners and Aerial Circus on March 23, Nights on the Air/Morse tuition on March 30/April 13 and Clandestine Radio G3BA on April 20. Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford. Neil Blair G7ASZ on (0203) 523629 (Home) or (0203) 523523 Ext. 2541 (Work).

Biggin Hill ARC meet 3rd Tuesdays, 7.30pm at The Victory Social Club, Kechill Gdns, Hayes. Their next meeting is April 17. Geoffrey Milne G3UMI on 01-462 2689.

Keighley ARS have a Visit to Leeds Weather Centre on March 27, natter nights on April 3/17th, a Night on the Air G0KRS on April 10 and a Junk Sale on the 24th. Clubroom, rear of Victoria Hall, 8pm. Kathy on Bradford 496222.

Thornbury & District RC have their AGM on April 4 and an HF activity/natter night on the 18th. United Services Reform Church, Chapel Street, 7.30pm. Tom Cromack G0FGI on (0454) 411096.

Lothians RS meet 2nd & 4th Wednesdays, 7.30pm at the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. March 28 is a Junk Sale, April 11 is National Awards by GM2AOL and the 25th is a Construction Competition/DF Tune-up. Peter Dick GM4DTH at 21 West Maitland Street, Edinburgh EH12 5EA.

Horndean & District ARC meet 1st Thursdays, 7.30pm at Merchistoun Hall, London Rd. April 5 is EMC by G4RLE. Stuart Swain G0FYX on Havant 472846.

Loughton & District ARS have Who Has L&DARS Worked - a review of their QSLs by G6BPA, their AGM on April 6 and Facts on Fax G0LWM on the 20th. Room 14 of Loughton Hall, Rectory Lane, 7.45pm. John Ray G8DZH on 01-508 3434 (after 7pm).

Farnborough & District RS have a Bring & Buy Sale on April 11 and an Inter-Club Quiz evening on the 25th. 2nd & 4th Wednesdays, 7.30pm at the Railway Enthusiasts Club, off Hawley Lane (by M3 bridge). Tim FitzGerald G4UQE on Camberley 29231 or Adrian Hammon on Farnborough 519773.

TRADING POST

WANTED Teleprinter, preferably transistorised, for use with Racal equipment, also Racal pre-selector MA197. Will collect. **For Sale** B/W French Thomson TV, 10in screen, GWO, £25. David Till. Tel: (0983) 864227. Isle of Wight.

FOR SALE Trio R1000 receiver, 200kHz-30MHz with instruction manual, excellent condition, offers around £200. Buyer collects. Chas Farrington, 25 Lynbrook Close, Hollywood, Birmingham B47 5PU. Tel: 021-430 7356.

FOR SALE Datong FL2 filter and power pack, pristine condition, instructions, original box (receipt supplied), £50, share postage. B. Blanchard, 1 Kent Gardens, Hetton-Le-Hole, Tyne & Wear DH5 9LA. Tel: 091-526 7902.

FOR SALE EXCHANGE Yaesu FRG-7000 with the instruction book, £180. Also a Realistic scanner PRO-2021 with instruction book, £150. Or will **swap** both for a Kenwood R2000 with some cash. Mr W. Illingworth. Tel: Rochdale 352335 anytime.

FOR SALE Plessey PR115 receiver, frequency counter, £30. Lafayette HE80 G/C receiver, £30. Trio R599 speaker (mint), £30. Yaesu FR101 spares w.h.y. Vintage components w.h.y. Two 1930 receivers w.h.y. ICL computer w.h.y. Mr J. P. Wright, 54 Queen Mary Avenue, Basingstoke, Hants RG21 2PG. Tel: Basingstoke 468649.

FOR SALE Sony ICF-2001D portable receiver, excellent condition. Also Sony AN-1 active antenna, £225. Buyer collects. Colin Shaddick. Tel: Barnstaple 42999.

FOR SALE Sony PRO-80 complete with NiCad pack and Sony charger, boxed as new, £200 or close offer. Signal R537S airband scanner, mint, £50 or **swap** both for Jupiter 2. David Coe. Tel: Droitwich 779184.

FOR SALE Yaesu FRG-8800 communications receiver, VFRV-8800 v.h.f. converter fitted 150kHz-30MHz/118-174MHz, plus ARA 30 & 900 active antennas. All mint condition, £630 o.n.o. Or **Part Exchange** for Icom R7000, 25-2000MHz. V. Hanning. Tel: Luton 472347.

WANTED Kenwood HC10 world clock. Ray. Tel: 051-526 4832.

FOR SALE or **SWAP** KORG Trident studio synthesiser keyboard, c/w Roland Cube 60W amp, stand, etc., £475. Would **swap** for all-mode 2m mobile rig or Trio R2000/Yaesu FRG-8800. John Evans, 377 Newchurch Rd, Stacksteads, Bacup, Lancs OL13 0NB. Tel: Bacup 874055.

WANTED SX232 Data Interface to fit SX400 scanner. E. Davis. Tel: 091-548 5586 day or 091-514 3449 night.

FOR SALE AOR-900 hand-held scanner & case, 108-174, 220-280, 300-380, 400-470 and 830-950MHz. Cost £240 July '89, as new, boxed with receipt, £160. G. E. Richardson, 10 Orme Rd, Peterborough PE3 6DY. Tel: Peterborough 53657.

FOR SALE AOR-2002 communications receiver, Nevada AB15 low-noise pre-amp, Nevada WB-1300 discone antenna (25-1300MHz), £400. Carriage extra. G. Spencer. Tel: Shenstone 481202 Staffs.

FOR SALE AOR-2001 communications receiver, mint condition, £210 o.v.n.o. Mr O'Keefe. Tel: 01-850 7656 after 6pm.

FOR SALE Matsui MR-4099 world band scanner/receiver, as new, receipt and handbook available, £65. Patrick Lord. Tel: Bradford 592415 anytime.

WANTED Drake MS7 speaker and noise blanker (NB7A) for Drake R7 receiver, good price paid. Keith. Tel: 01-570 5603 evenings.

FOR SALE PK232 digital data controller and TNC. Equipped for Morse, Baudot, Amtor, FAX, packet radio, ASCII RTTY. Boxed as new. Complete with comprehensive manual, power supply, all connecting leads and plenty of software for IBM or PC or compatibles, £200 o.n.o. Mr Harvey. Tel: 01-506 2360.

FOR SALE Drake R4B, T4XB, MN4, MS4, £600. TR44, rotator/direction unit, £75. Omni 'D' Tentec 252 power unit tuning unit 160/10 voltage protection relay, £800. KW104 10/160, £70 all o.n.o. D. V. Richey, 43 Cavendish Ave, Eastbourne, E. Sussex. Tel: Eastbourne 639782.

FOR SALE *The Modern Amateur Electronics Manual*, Volumes 1 and 2, £45 including p&p UK. J. Jackson. Tel: Midsomer Norton 413669.

FOR SALE Signal R528 airband Xtal scanner with six crystals included, £60. Black Jaguar MkIII scanner, boxed with mobile charger, excellent condition, £150. R. Hubbard. Tel: Byfleet 40468 evenings.

FOR SALE Realistic PRO-2004 scanner, 300 channel, telescopic antenna, d.c. power cable, £250. FDK ATC-720SP professional airband monitor, 720 channel thumbwheel operation, very sensitive, metal case, p.s.u./charger + rubber duck antenna, £120 o.n.o. R. G. Braithwaite, 1a Farm Rd, Hove, East Sussex BN3 1FB. Tel: Brighton 729582.

FOR SALE AOR-2002 scanner receiver, £325. D. Kenyon. Tel: Carterton 841037.

FOR SALE send s.a.e. for clearance list of radio, aeronautical, computer items, including 2 scanners and modern military radio. **Wanted** MuTek 50MHz transverter, 28MHz i.f.. Bob Sayers, 120 Birmingham Rd, Redditch, Worcs B97 6EP.

FOR SALE Realistic PRO-2004 base scanner, 300 channels, boxed with manual, £200. Plus SEM h.f. converter, £40, brand new. M. Mayer. Tel: Nuneaton 327611 after 7pm.

FOR SALE Sony Air7 plus 12V supply, £130. J. S. Trutwein, Flat 5, Elmslie Court, East Rd, Maidenhead, Berks SL6 1PN. Tel: Maidenhead 27505.

FOR SALE Eddystone 840 as from works, no soldering or screw driving, £85. Telequipment lab scope and work shop manual. £40. JVC stereo keyboard KB, 300B, £70. **Swap** for w.h.y. of interest to s.w.l. L. Conway. Tel: 01-594 7840.

Write out your advertisement in BLOCK CAPITALS - up to a maximum of 30 words plus 12 words for your address - and send it, together with your payment of £2.30, to Trading Post, Short Wave Magazine, Enefco House, The Quay, Poole, Dorset BH15 1PP. Advertisements will be published in the earliest available issue and *SWM* reserves the right to exclude any advertisement not complying with the rules. You must send the flash from this page, or your subscription number as proof of purchase of the magazine.

FOR SALE Sony Air-7 hand-held scanning receiver complete with case and all accessories, £160 o.n.o. AOR-2002 comms receiver, little used, offers. Both receivers in mint condition with manuals. G. D. Atkins. Tel: 021-360 3972 Birmingham.

WANTED Lowe HF-225 receiver, must be in perfect condition with manual, good price paid. Mr Robson. Tel: Scunthorpe 762094 after 6pm.

FOR SALE Yaesu FRG-8800 communications receiver, 150kHz-30MHz, only two months old (10 months guarantee left), hardly been used, £500. N. Whittaker. Tel: Norwich 501563.

FOR SALE Jupiter 2 hand-held scanner with NiCads, £185. Also Realistic PRO-32 scanner with NiCads, £85. Gregory Hurwitz. Tel: Maidstone 861253.

EXCHANGE my Philips stereo a.m.-f.m. receiver model 794 **for** Grundig Yacht Boy 700 radio in good condition. M. Dubenski. Tel: 01-346 3920 NorthLondon.

FOR SALE AOR-2002 comms RX, freq range 25-550-800-1300MHz includes a discone antenna, £350 o.n.o. Sony ICF PRO-80 hand-held, 150kHz-108MHz + 115.15-223MHz, includes AN1 antenna, £230 o.n.o. R. Keary. Tel: 061-436 7224.

FOR SALE Eddystone 880, excellent RX in good order complete with circuit info, £125. R. Birchall. Tel: 0270 73667.

FOR SALE Sony Air-7 hand-held, six months old, excellent condition, £140. T. Buckman. Tel: 01-391 2879 Chessington.

FOR SALE FT22IR 20W base multimode 2m rig, excellent condition, £160. Also FT212RH 45W mobile 2m rig, 18 months old, perfect condition, £185. FT757GX or similar **wanted**. A. Mikol G4ZRE on Mansfield 34863.

EXCHANGE Scanner AR900, less than three months old, for communication Rx FRG-7 or similar. F. Worthington. Tel: Warrington 822276.

FOR SALE Realistic PRO-2003 v.h.f./u.h.f. base scanner, 50 memories, also covers f.m. broadcast band. Boxed with manual, £110. M. Woodcock. Tel: Abingdon, Oxon 31918.

WANTED Sony ICF-2001D a.m., f.m. and air bands. Must be complete and in perfect condition, your best price. H. Haley. Tel: Huddersfield 844739 anytime.

FOR SALE Kenwood R2000 all mode receiver 150kHz-30MHz fitted with VC10 v.h.f. convertor 118-174MHz, little used, £480. Phillips short wave receiver, model D2935, unused, 13 short bands plus b.f.o. etc, £80. F. Steele. Tel: Edge Hill 0295 87780.

WANTED R216 (Ex. MOD) receiver and p.s.u. any condition but g.w.o. preffered, cash or **swap** Yaesu FR50B. Postage payed or collect. Mr D. Todd. Tel: Pencader 055 934 697.

Advertisements from traders, apparent traders or for equipment which it is illegal to possess, use or which cannot be licensed in the UK will not be accepted.

SWM APRIL 90 TP

RALLIES

March 25: South East Kent (YMCA) ARC are holding their first South East QRP Convention and Table Fair at the YMCA, Dover. Doors open from 10.30am to 4.30pm. There will be a lecture programme on h.f. and v.h.f. QRP, plus traders and a Bring & Buy. Talk-in on S22. **Dick Pascoe G0BPS. Tel: (0303) 276171**.

March 25: The Cunninghame & District Amateur Radio Club will be holding their rally at the Magnum Centre, Irvine.

March 25: The Pontefract & DARS 11th Components Fair will take place in the Carleton Comunity Centre, Pontefract from 11am to 4.30pm. There will the usual stands, a bookstall, Bring & Buy and a licensed bar. Talk-in on S22. Admission free. **B. Atkinson. Tel: (0977) 704067**.

April 1: Bournemouth Radio Society will be holding its annual Amateur Electronics (Radio, Electronic & Computer) Bring & Buy Sale at Kinson Community Centre, Pelhams, Millhams Road, Kinson, Bournemouth. Doors open at 2pm. Admission is 50p including a prize draw ticket. Refreshments will be available. Talk-in on S22. **Vic G4PTC. Tel: (0202) 516593 after 1800**.

April 8: The 4th Launceston Radio Rally will be held in Launceston College. There will be the usual traders, Bring & Buy, hot snacks and a bar available. Doors open 10am with Talk-in on S22. **Maggie. Tel: (040921) 219**.

April 8: The Cambridgeshire Repeater Group Amateur Radio Rally will be held at the Philips Radio Communications - Catering Centre, St Andrews Road, Chesterton, Cambridge. Doors open 10.30am, auction items accepted from 9.30am. **G.M. Gardner G0HEM. Tel: (0799) 23689**.

April 8: The Swansea ARS are holding their 9th Amateur Radio Trade Rally in the Swansea Leisure Centre. This is situated on the A4067 Swansea-Mumbles coast road. There will be trand stands, catering facilities, a licensed bar, bookstand, Bring & Buy, etc. **Roger Williams GW4HSH. Tel: 0792 404422**.

April 8: The Lough Erne ARC will be holding their annual rally in the Killyhevlin Hotel, Enniskillen.

April 15: The Centre of England Amateur Radio Rally will be held at the Motorcycle Museum, Bickenhill, near the NEC Birmingham. It's being held in three large exhibition halls with ample free parking. **Frank Martin G4UMF. Tel: (0952) 598173**.

***April 21-22**: The RSGB are holding their Convention and Exhibition at the NEC, Birmingham.

April 22: The Marske rally will be held in the Marske Leisure Centre, Marske by the sea. Doors open 10am. **Mr Phoenix G7CBR, 1 Conway Road, Redcar, Cleveland. Tel: (0642) 48005**.

April 29: The Bury Radio Society will be holding its annual Hamfeast at the Castle Leisure Centre, Bolton Street, Bury. Doors open at 11am (disabled at 10.30am). Talk-in on S22 and SU8. 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 11am. All the usual facilities will be avaiable, hot and cold food, bar, Farmer John's ice cream, etc. **Bruce GM4UIB, QTHR**.

***May 13**: The VHF Convention will take place at Sandown Park Racecourse, Esher, Surrey.

May 13: The Yeovil Amateur Radio Club will be holding its 6th QRP Convention in the Preston Centre, Monks Dale, Yeovil. **D.J. Bailey G1MNM, 7 Thatcham Close, Yeovil, Somerset BA21 3BS**.

***May 20**: The 33rd Northern Mobile Rally will be held at the Great Yorkshire Show Ground, Harrogate. **Mike G0MKK. Tel: (0423) 564353/507653**.

* SWM and PW attending

May 20: The 7th National Amateur Radio Car Boot Sale will be held at the new venue of Stockwood Park, Luton, Beds. This is easy to get to as it's not far from Junction 10 on the M1. Private sellers £7 in advance or £9 on the day, traders £20. **Clive G4ENB. Tel: (0582) 27907**.

May 20: The Parkanaur 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, bookstand, QSL bureau, etc., Talk-in on S22. The proceeds of this rally go to the Stanley Eakins Memorial Fund at Parkanaur near Dungannon. **Jim Lappin GI1YGS. Tel :(0762) 851179**.

May 20: The Cambridge & District ARC are holding their 5th Annual Rally & Radio Car Boot Sale at Coleridge Community Centre, Radegund Road, Cambridge. Doors open at 10.30pm. **Brian G4TRO. Tel: (0223) 353664**.

May 27: The 14th annual East Suffolk Wireless Revival will be held at the Civil Service Sportsground, Straight Road, Bucklesham, Ipswich. There will be a Bring & Buy, Car Boot Sale, a transceiver clinic, 50MHz demo station, all the usual traders and lots more including a children's play area. **Paul Whiting G4YQC. Tel: (0473) 642595**.

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

June 2: The first Belfast Amateur Radio Convention, organised by 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 GI0HOW. Tel: (0232) 471370**.

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 10am with talk-in on S22. **John Stone G0OFE. Tel: (0702) 202216**.

***June 10**: The Royal Naval Amateur Radio Society Annual Mobile Rally will be held in the Sports Field, HMS Mercury, near Petersfield, Hants from 1000-1700.

***June 24**: The Annual Longleat Mobile Rally will be, as usual, held at Longleat near Warminster, Wilts. **Shaun O'Sullivan G8VPG. 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 11am with free car parking and entrance. **Tony G4OPD. Tel Worcester 620507 or Derek G4RBD. Tel: Worcester 641733**.

July 1: The York Radio Rally will be in the Tattersall Building, York Race Course, The Knavesmire, York. Doors open at 11am 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 cafe will be available for refreshments. The Knavesmire is well signposted and there will additional RAC signs round the main approaches to York. **Frank Webb G3ZKS. Tel: (0904) 625798**.

July 1: Newport ARS are holding their 3rd Grand Surplus Equipment and Junk Sale at the Brynglas Community Education Centre, Brynglas Road, Newport. The Sale is open from 10.30am to 4pm (10am 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 Club Rally will be held in the Richard Lander Scholl, Truro. There will be the usual trade stands, Bring & Buy, a computer display/demo and a weather satellite demo. There will be refreshments, good free parking and the doors open at 10am (9.30am for the disabled). **Rolf Little G7FKR. Tel: (0872) 72554**.

***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 10.30am to 4.30pm, with entrance at £1. **Ron Bray G8VEH (QTHR). Tel: (0273) 415654 office hourse or (0903) 763978 other times**.

July 22: The Burnham Beeches and the Maidenhead & District Amateur Radio Clubs are staging the 7th McMicheal Rally at the Haymill Centre, Burnham, near Slough. Doors open to the public at 10.30am (10.15am 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 GB4MR special event station.

***July 29**: The Scarborough ARS Rally will be held at the Spa, Scarborough. Doors open at 11am. Many trade stands, large Bring & Buy, Morse exam and demonstration for the Morse examiners, refreshments and bar. Details from **Ian G4UQP (QTHR). Tel: (0723) 376847**.

***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. Talk-in on S22. The event opens at 10am. Free parking and overnight camping on the Saturday night by prior arrangement. **John G0API. Tel: (0202) 691649 or Rob G6DUN. Tel: (0202) 479038**.

August 12: The 1990 Derby Mobile Rally will take place once again at Lower Bemrose School, St Albans Road, Derby, just off the A511 Derby Ring Road. Gates open at 10.30am with all the usual attractions including the Giant Junk Sale. **Kevin Jones G4FPY, 20 Pinecroft Court, Oakwood, Derby DE2 2LL. Tel: (0332) 669157**.

August 19: The West Manchester Radio Clubs Red Rose Summer Rally will be held at the Bolton Sports and Exhibition Centre, Silverwell Street, Bolton.

September 9: The Vange ARS will be moving the rally this year to The Laindon Community Centre, Aston Road, Laindon, Basildon, Essex. Doors open from 10am to 4.30pm.

September 16: The British Amateur Teledata Group Annual Rally will be held at Sandown Park Exhibition Centre, this time in the larger Surrey Hall. **Peter Nicol G8VXY. Tel: 021-453 2676**.

September 16: The Bristol Radio Rally will be held in Brunel's Great Train Shed, Temple Meads Station, Bristol. All the usual traders will be there, a large Bring & Buy, food and refreshments as well as displays and demonstrations. **D.S. Farr. Tel: (0272) 839855**.

ANTENNAS

F. C. Judd G2BCX Part 14

In this, the last part of his series, Fred Judd looks at further aspects of v.s.w.r.

Bandwidth versus VSWR

Antennas that have to operate over a particular bandwidth must first be tuned to resonance at the centre frequency of that band. The impedance of the transmission line must match the nominal impedance of the antenna at resonance. If not, an impedance matching device must be used to transform the line impedance to equal that of the antenna. Otherwise the v.s.w.r. should be 1:1, or very close to it, at the centre frequency of the band.

As mentioned earlier, an increase or decrease in frequency introduces reactance at the antenna feed point resulting in a change in the input impedance of the antenna and a mismatch with the transmission line; consequently the v.s.w.r. increases as the frequency is changed. This is illustrated in Fig. 14.1, which covers a total bandwidth of 4MHz (2MHz each side of centre frequency) - more than average for antennas other than those specially designed to have a very wide bandwidth.

Curve (A) therefore indicates an antenna with a fairly wide bandwidth and, since reactance would be increasing slowly with a change of frequency, the v.s.w.r. rises gradually to reach a maximum of 1.5:1 at the band ends. Curve (B) is about average for a not-too-sharply resonant antenna, the bandwidth being just over 2MHz and the band end v.s.w.r. not exceeding 1.5:1. Curve (C) is typical for a sharply resonant antenna: bandwidth is just over 1MHz, so reactance would increase rapidly as would the v.s.w.r - which at the band ends is, again, not greater than 1.5:1. Although the operational bandwidth could be extended for a v.s.w.r. not exceeding 2:1, more of the power supplied by the transmitter would be reflected.

Power Loss

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 due to the transmission line or in the antenna itself. In fact, far more power can be lost by attenuation due to poor quality coaxial cable, deterioration of insulation, screening braid and the inner conductor of old cable - or because of very long cable runs, particularly at v.h.f. and u.h.f.

For example, 3dB attenuation due to a coaxial cable can mean a loss of half the power supplied by the transmitter; add to this any loss due to high v.s.w.r., and 10 watts supplied by the transmitter can result in less than 5W fed to the antenna.

Open 600 or 300Ω transmission line offers very little attenuation but is not always convenient or even possible to use. Since coaxial cable is most used these days it should be of the low loss type, whether for h.f. or v.h.f./u.h.f. application, with the total run as short as possible and renewed every 5 or 6 years if most of it is continuously exposed to the weather. It is vital to prevent water getting into a cable, for instance at its connection point with the antenna, as this can render a cable completely useless in a very short time.

Transmission Line/Antenna Matching Systems

When the input impedance to an antenna is different, either higher or lower, than the impedance of the transmission line - as is usually the case - then the use of some form of impedance transformation or matching system becomes necessary. With end or voltage fed long linears an antenna tuner does in effect become a tunable matching system.

A half-wave dipole has a nominal feed point impedance of 72Ω and will directly match with a balanced open twin line of that impedance, but not with 50Ω coaxial cable which is also an unbalanced transmission line. A balanced and correct match could be obtained by using a 'balun' (balanced-to-unbalanced transformer) with a step-up ratio equivalent to 50:72. One alternative is a 'gamma match' which can also be used with dipoles employed as driven elements in parasitic beams, as in this case the impedance (of the dipole) is increased.

Since the most commonly used transmission line is the 50Ω coaxial cable, virtually all antennas designed for sale and/or featured as constructional projects in periodicals devoted to amateur radio will have an integrated matching system of one kind or another to function with coaxial cable of this impedance. There is little point, therefore, in dealing with all the different matching systems, each of which can be used with various types of antenna.

The subject is in any case a complex one, but for those readers who may be tempted to design an antenna for themselves - and why not! - all the technical information and other details concerned with matching systems and baluns will be found in books such as the *ARRL Antenna Book* and others mentioned in this series.

Performance Specifications

This series of articles has attempted to explain the nature and function of numerous types of antenna and most of the parameters concerned with performance. It would seem fitting, therefore, to include a list of specifications which one would expect to be supplied with a manufactured antenna; see Table 14.1.

While giving all due credit to manufacturers who do supply full performance specifications for their antennas, it must be emphasised that measured or calculated performance can be reduced by, firstly, failure of the owner to properly carry out adjustments provided for by the maker, e.g. for optimum v.s.w.r., element tuning etc., and, secondly, bad siting - placing the antenna too close to ground, other antennas, trees, brick/metal structures, or set up in a loft.

It is also futile to compare one antenna with another, however similar they may be, with the idea of deciding which one has the best performance. Remember that h.f. propagation via the ionosphere can - and does - change from day to day, and even from hour to hour. So don't blame a new antenna if you can't immediately work to the ends of the earth with it: you might well do so the next day, or the day after. Variations in v.h.f./u.h.f. propagation conditions can also create a mistaken impression about the performance of a new antenna. □

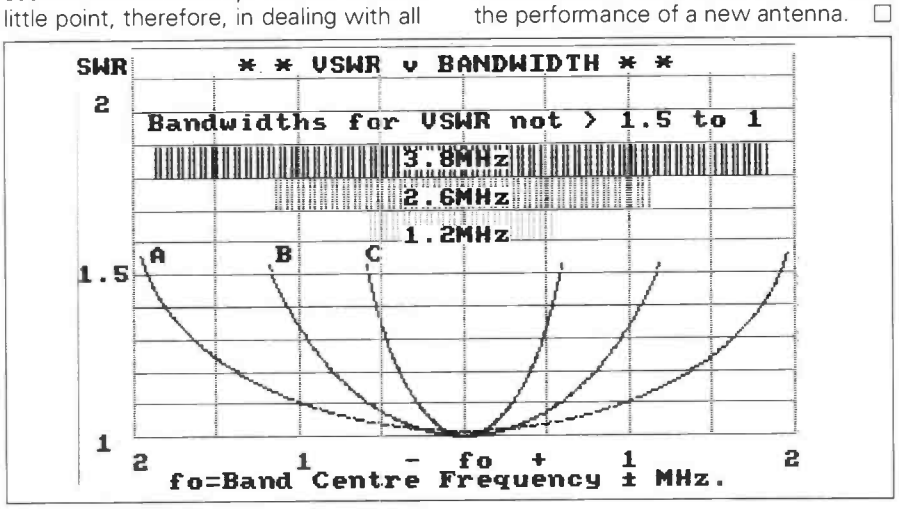


Fig. 14.1: Typical v.s.w.r. versus bandwidth of an antenna relative to centre frequency, fo.

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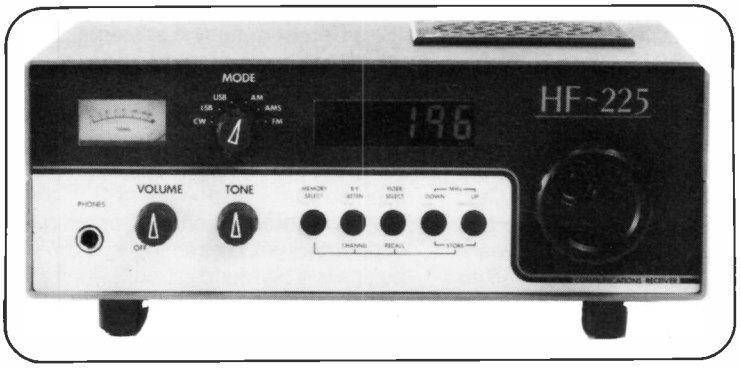


		Price	Carr
HF-225	HF general coverage receiver, 30kHz to 30MHz	**£395.00**	**£8.00**

(The HF-225 has been voted "Receiver of the Year" by World Radio and TV Handbook, against all other manufacturers' products"

Options

D-225	Synchronous AM and FM detector	**£39.50**	**£1.00**
K-225	Keypad for direct frequency entry	**£39.50**	**£1.00**
B-225	Internal NiCd battery pack	**£49.00**	**£2.50**
W-225	Active whip aerial	**£19.50**	**£2.50**
C-225	Delux carrying case for HF-225	**£23.86**	**£3.00**
S-225	Wharfedale speaker and lead	**£49.50**	**£3.00**

R-2000	Kenwood HF communications receiver. 150kHz to 30MHz	**£595.00**	**£8.00**

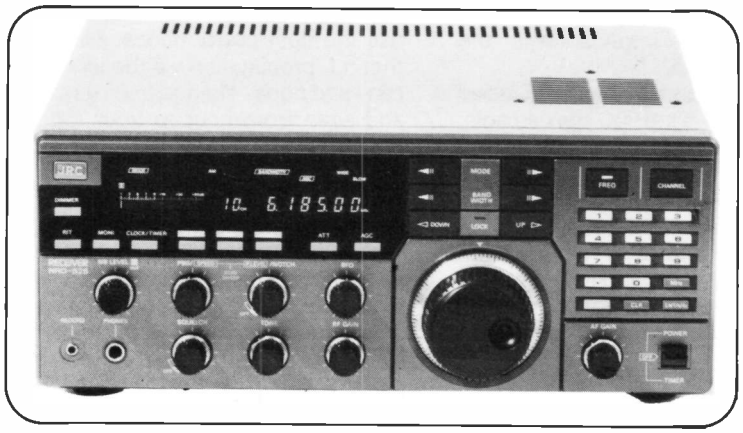
Options

DCK-1	12volt dc power kit	**£4.00**	**£1.00**
VC-10	VHF converter for 118 to 174MHz	**£161.94**	**£2.50**

R-5000	Kenwood HF communications receiver. 100kHz to 30MHz	**£875.00**	**£8.00**

Options

DCK-2	12volt dc power kit	**£9.29**	**£1.00**
VC-20	VHF converter for 108 to 174MHz	**£167.21**	**£3.00**
VS-1	Speech synthesiser for R-5000	**£32.26**	**£1.00**
YK88A-1	6kHz AM crystal filter	**£48.05**	**£1.00**
YK88C	500Hz CW filter	**£46.08**	**£1.00**
YK88CN	270Hz CW filter	**£54.64**	**£1.00**
YK88SN	1.8kHz SSB filter	**£46.74**	**£1.00**
SP-430	External speaker unit	**£40.81**	**£2.50**



NRD-525	JRC communications receiver. 90kHz to 34MHz	**£1095.00**	**£8.00**

Options

CMK165	VHF/UHF converter. 34-60, 114-174, 423-456MHz	**£391.35**	**£8.00**
CMH530	RTTY demodulator	**£102.19**	**£1.50**
CMH532	RS232 interface unit	**£91.75**	**£1.50**
CFL231	300Hz CW filter	**£126.37**	**£1.00**
CFL232	500Hz CW filter	**£126.37**	**£1.00**
CFL233	1kHz RTTY filter	**£126.37**	**£1.00**
CFL218A	1.8kHz SSB filter	**£117.89**	**£1.00**
NVA88	Matching external loudspeaker	**£62.86**	**£2.50**

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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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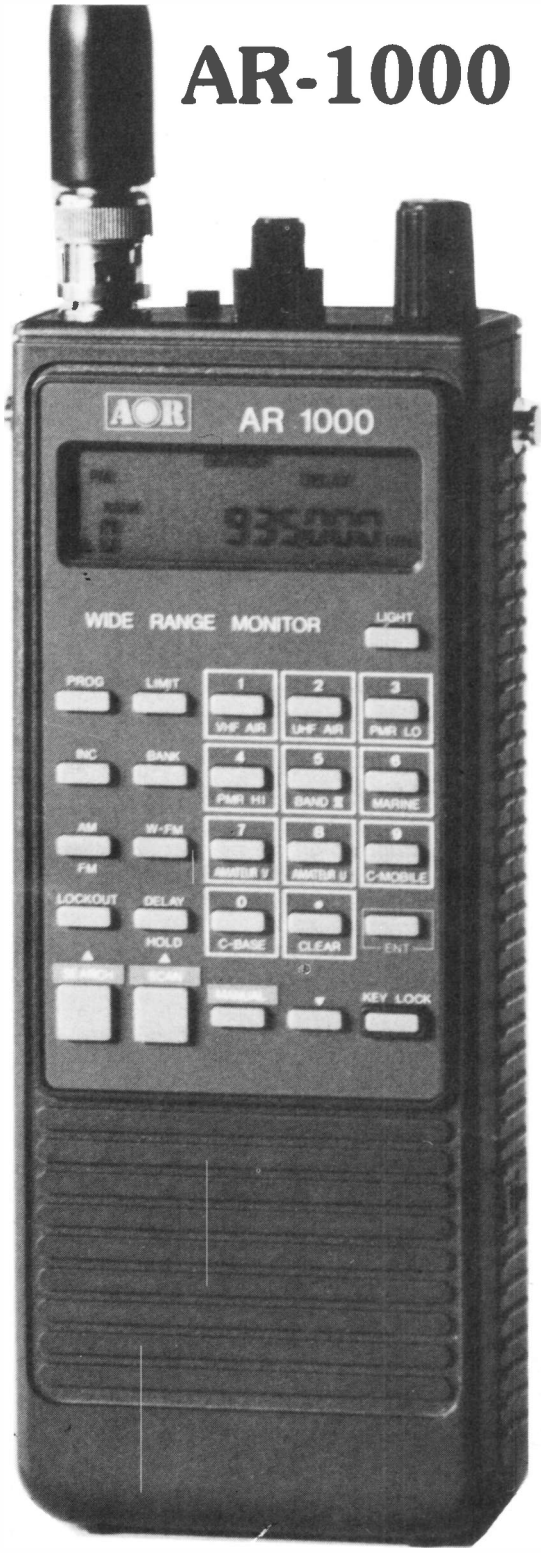

We are delighted to give firm information about the new AR-1000 handheld scanner from AOR. Their design aim of producing a handheld version of the AR-2002 but improving on the spec. at the same time seems to have been fulfilled.

BASIC SPECIFICATION.

Frequency ranges	8 to 600MHz continous, 805 to 1300MHz continous.
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	174.5-225MHz	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 a 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 shoud be.

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

The ARO-1000 comes complete with the following accessories:-

Set of 600mA/H NiCd batteries	Belt clip
240V mains charger	Carrying strap
DC power cord with cigar lighter plug	Earpiece
Soft carrying case	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.

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All branches are closed all day Monday.

AIRBAND

Godfrey Manning G4GLM

In this month's column, Godfrey gives the results of the Christmas Quiz that you've all been waiting for! He also helps with some useful sources of information.

Only two of you entered an answer for Photo A in the Christmas Quiz (*SWM* January) and unfortunately neither answer (Shackleton or Jaguar) was correct. The picture showed the distinctive forward-opening nosewheel door of a De Havilland Dove, complete with landing light and i.l.s. glideslope antenna.

Ten entrants attempted Photo B, and no-one was wide of the mark. It's a French designed, homebuilt, Colomban Cri-Cri, registered N120JN, although it carries an internal identity plate which says 'Cricket MC12'. I must therefore discount the entry by **Stephan Parfitt** (West Hunsbury, Northampton) who not only gave the registration but the fact that the photo was taken at Cranfield! Unfortunately, Stephan put the aircraft as an MC-15. The same error was committed by **Brian Grundy** (Guildtown, near Perth) but Brian asks if a twin rating is necessary to fly it (this rating can be obtained on a PPL). Good question! Having taken the four most complete correct answers, a random selection chose the winner: **Mike Pollard** (Chertsey, Surrey) to whom a Victor Tanker fuel gauge is now on its way.

Frequency and Operational News

The Civil Aviation Authority (CAA) *General Aviation Safety Information Leaflet* 1/90 lists three n.d.b.s on new frequencies but warns that all are subject to interference from French stations. They are: Henton, Buckinghamshire (HEN: di-di-di-dit, dit, dah-dit, 221kHz); Staverton, Gloucestershire (SVN: di-di-dit, di-di-di-dah, dah-dit, 398kHz); and Westcott, Buckinghamshire (WCO: di-dah-dah, dah-di-dah-dit, dah-dah-dah, 211.5kHz). I hear a rumour that Bournemouth now has ground movement control on 121.7MHz but have yet to see official confirmation.

Geoffrey Powell (Tamworth, Staffordshire) reports on Cambridge Bay air traffic control centre (8891kHz) which handles aircraft from Tokyo and parts of Asia crossing the polar route. **Tim Christian** (North Walsham) reminds us that Tokyo and Honolulu operate on 10048kHz in the morning and that Gander has a new allocation of 11336kHz for north Atlantic traffic. Note that I give h.f. channels in kHz as this is how you will always see them written in any official aeronautical information source.

Just to confuse you, the dear old millibar (used to measure atmospheric pressure when giving QFE or QNH) will eventually be replaced by the hectopascal (CAA *Aeronautical Information Circular* 8/1990). In fact these units are the same thing - the only change is the name! This will, of course, make a difference to the appropriate radio procedures.

You Write

Here's a typical day's work for Concorde as described by **Peter Barham** (Ashton-under-Lyne, Lancashire). Around 2000Z there will typically be Concorde north Atlantic flights working 5649kHz, for example Speedbird Concorde 3 Heavy (eastbound) and Concorde 4 (westbound). At 50°W westbound flights call Gander on v.h.f.; Peter suggests 126.9MHz (but published sources list 125.9MHz). Eastbound, v.h.f. contact with London on 132.6MHz is possible after passing 8°W. At, say, 2155Z the eastbound flight might contact operations on 131.9MHz.

British Midland DC-9-15 G-BMAC (45739) at Leeds & Bradford Airport.
Photograph Godfrey Manning

Information Sources

Let me put **Stuart Terry's** (Canterbury) mind at rest: just because 136-137MHz is now available for aeronautical communications doesn't mean that any stations have actually been allocated here yet! These new channels will start to be used as time goes on, no doubt. Stuart asks about u.h.f. 'spot frequencies ... that the RAF hand out' Well, these are not secret, so anyone selling a listing and claiming it to be 'confidential' is stretching his sales talk a bit far. Unfortunately, the RAF don't tend to 'hand out' anything, so you have to buy it from 1 AIDU, RAF Northolt, West End Road, Ruislip, Middlesex HA4 6NG. (Tel: 01-845 2300 X209). I suggest that the *En Route Supplement* for the part of the world of interest would be a good one to buy. These are full listings, not 'spot frequencies.'

Chris Durkin (Ormskirk, Lancashire) wants let-down plates for Monastir (Habib Bourguiba International), Tunisia. These are a set of charts that cover arrival routes, instrument landing procedures and standard instrument departures for the particular airport; a runway, taxiway and parking stand map is also included. Two sources sell these: Aerad Customer Services, Building 254, PO Box 10, London (Heathrow) Airport, Hounslow, Middlesex TW6 2JA (tel: 01-562 0795). Also, Jeppesen whose products can be ordered through the Oxford Airport Shop, Oxford (Kidlington) Airport, Kidlington, Oxfordshire OX5 7RA (tel: 08675 4321). As far as Monastir goes, my information is that the 08/26 runway is 9679ft long and 7ft above sea level. The International Civil Aviation Organisation location indicator is DTMB. Going on holiday, Chris?

Here's a tempting offer from Tim Christian (157 Mundesley Road, North Walsham, Norfolk NR28 0DD) who has updated his h.f. airband list. If you send £2 direct to Tim (to cover actual costs) it will buy you a copy of this plus plans for an airband collinear antenna. The latter is interesting since its construction relies on standard plumbing components (readers will know that I hate plumbing, but in the interests of aeronautical radio I will make an exception!). Also in the design is an effective way of making the all-important central insulator that this

antenna requires. Another source of information is the *ABC Air Travel Atlas*, a recent out-of-date version of which should be available for the asking from travel agents.

A source of callsigns is the *Air Band Radio Handbook* by David J. Smith (Patrick Stephens Ltd.), from our *SWM* Book Service, in which **D. Hardingham** (Glasgow) found the answer to **Tom Hunter's** (Ayrshire) question (January 'Airband'): EAGLE is Eagle Flying Services Ltd. who also use BLUE EAGLE. Now, where can D. Hardingham look up the aircraft which has been allocated any particular SELCAL? I suggest *High in the Sky* by Ken Barker (The Aviation Society) which ought to be available from The Aviation Shop, Spectators' Terraces, Manchester Airport, Manchester M22 5SZ (tel: 061 499 0303).

Help!

Here's an explanation of SELCALs for **John Murphy** (Wexford, Ireland). On north Atlantic operations (e.g. Shanwick, 2873kHz in the early morning) aircraft check in on frequency and their SELCALs are tested. The controller sends a two-note chime (which is audible on the frequency) which, by the actual pitch of the tones sent, will selectively activate the receiver in the chosen aircraft alone.

Confused **Mike Taylor** (Leeds) writes for the first time and I'm always pleased to help a beginner. Mike is finding difficulty in choosing a receiver and is given 'differing advice from every shop'. Well, such a choice is a personal preference. That aside, I suggested a reasonably objective approach under the heading Agony Column in the January 'Airband.' Also worth a look is a generalised introduction to v.h.f./u.h.f. applications: *Scanners* (3rd. edition) by **Peter Rouse GU1DKD** available from our *SWM* Book Service. The Realistic Pro-2005, Fairmate HP-100 and Jupiter II cover the v.h.f./u.h.f. airbands; the Sony ICF-2001D, on the other hand, covers the v.h.f. communication airband (but, for some strange reason, not quite all of the v.h.f. navigation band) and also covers the short waves (including oceanic allocations).

According to my information, the 134.25MHz North Sea Sector transmissions from the London Air Traffic Control Centre (LATCC) originate from both the Chedburgh and Trimmingham relays (the controller himself being in the main complex at West Drayton). Eastern Radar's controller has also now moved to West Drayton (see March 'Airband') but I believe the actual relay might be at Watton. This information will interest **Geoffrey Davill** (Hull).

Here's one where I must ask for your help. **Peter Finn** (Milford Haven) still can't find out where the North Atlantic Track Broadcast (133.8MHz) is transmitted from; Davidstow Moor (Cornwall) is apparently not the answer, but Birdlip (Gloucestershire) is more likely to be involved. Definitive answer, anyone?

Lastly, as far as helping each other goes, **M. Jackson** (Huntingdon, Cambridgeshire) raises the interesting possibility that some form of data link is being tried out in order to issue airways clearances. Has anyone any further details?

M. Jackson lives on an RAF base and is never at a loss for aircraft to see - apart from the quieter times at weekends.

The next three deadlines (for topical information) are March 30, May 4 and June 8. □

Godfrey flies the GAT-1 flight simulator at Wycombe Air Park. *Christine Mlynek.*

Abbreviations

CAA	Civil Aviation Authority	QFE	altimeter pressure setting giving height above aerodrome
ft	feet		
h.f.	high frequency		
i.l.s.	instrument landing system	QNH	altimeter pressure setting giving height above sea level
kHz	kiloherz		
LATCC	London Air Traffic Control Centre	SELCAL	selective calling
MHz	megaherz	u.h.f.	ultra high frequency
n.d.b.	non-directional beacon	v.h.f.	very high frequency
PPL	private pilot's licence	Z	universal co-ordinated time (UTC)

HEADPHONE MATCHING BOX

Richard Q. Marris G2BZQ

How do you plug your favourite pair of headphones into a variety of receivers having different audio output impedances? Build this simple matching box and overcome the problem.

I have several headphones with a variety of different impedances ranging from low to high. But - there is one pair which are my favourites. They are the lightest and most comfortable and have been in use for the last twenty years or so. Very sensitive, their impedance is 1kΩ. I also have a number of receivers with a variety of different audio output impedances and no doubt many readers are also in the same predicament.

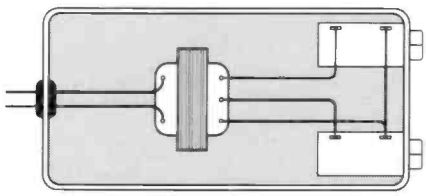
This small, easily-built project is an up-to-date version of a simple impedance matching circuit which has been used in one form or another for a number of years to match higher impedance phones to low impedance a.f. outputs.

Simple Circuit

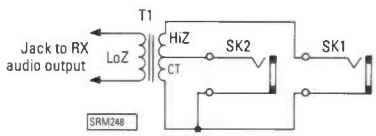
The circuit is very simple and consists of a cheap audio output transformer, a couple of sockets and a jack lead, all fitted into a plastics box. The transformer is stated to have a 1.2kΩ centre taped primary and an 8 to 20Ω secondary, giving a ratio of 60:1 or 150:1. If one half only of the primary is used the ratio becomes 30:1 or 70:1. This is not critical other than the fact that it matches a high impedance to a low one. Output transformers similar to the one specified can be obtained from several sources or culled from old transistor radios.

The transformer is connected to two open, non-shorting mono jack sockets, one across the whole of the primary winding, the other across half of the winding using the centre tap, of course. The low impedance winding is connected to a twin lead terminated with a mono jack to fit the receiver audio output socket. The prototype was housed in a white, rigid plastics, toilet soap box obtained from Boots.

The unit will match all low-impedance output receivers to headphones between 400Ω and 4kΩ by using one or other jack socket. □



Suggested layout of matching box.



Circuit diagram of headphone matching box.

YOU WILL NEED

Miniature output transformer (Marco TFK/21); Mono chassis socket, non-shorting, 0.25in (2off) (Marco CON/635/C82M); Mono jack plug 0.25in.; Small plastics box (see text).

Marco Trading, The Maltings, High Street, Wem, Shrewsbury SY4 5EN. Tel: (0939) 32763.

Abbreviations	
in	inch
kΩ	kilohm
Ω	ohm

SCANNING

Alan Gardener

New Products

The unit in question is the Icom IC-901E dual-band mobile transceiver. This is designed to operate on both the 144MHz and 430MHz amateur bands and offers a whole host of useful operating facilities. One of the most interesting is the ability to remotely site the front control panel away from the main unit with the two modules being interconnected with a fibre optic cable.

However the option that caught my eye was the add-on UX-R91E receiver unit. This extends the receive coverage considerably and provides many of the functions normally only found in dedicated scanning receivers. With the extra module reception of the a.m. broadcast band, between 520-1630kHz is possible in addition to 76-108MHz w.b.f.m., 108-137MHz a.m., 137-236MHz f.m., 300-500MHz f.m. and 800-950MHz f.m. Tuning step sizes are specified as being 1 or 10kHz on the broadcast band, 10 or 100kHz in the 76-108MHz range and 12.5 or 25kHz on the remaining ranges making it suitable for the reception of most transmissions in the UK.

As with many pieces of new equipment the only bad point seems to be the price, with the main unit costing around £800 and the receiver module adding another £300 to the package. I wonder if this equipment is likely to set a trend with other manufacturers following Icom's lead. Contact Icom (UK) Ltd, Sea Street, Herne Bay, Kent CT6 8LD for further details or telephone (0227) 363859. It was reviewed fully in *Practical Wireless* March 1990.

Active Antennas

Both of the other new items are active antennas. The first is from Dressler and is an updated version of the popular ARA900 model. The new version is called the ARA1500 and offers a frequency range of 50-2000MHz. Other changes include an improvement in the strong signal handling performance of the active amplifier and new design of interface unit. This is likely to include a special filter network designed to reduce unwanted mixing products in the receiver. The price is expected to be around £179 and you can obtain further details from Dressler Communications Ltd, 191, Francis Road, Leyton, London E10 6NQ. Tel: 01-558 0854.

The other new antenna is part of a range manufactured by a company called Comet - not to be confused with a well known electrical discount store! Several models are available including designs suitable for mobile and base station operation. One example is the CRZ12DB which offers a receive frequency range of 500kHz to 1500MHz and consists of a slim 1.24m white g.r.p. tube with a metal mount at the bottom. Power is fed to the antenna via an interface unit which is intended to be situated near the receiver. The price? Around £96 - further details are available from Arrow Radio Ltd, 5, The Street, Hatfield Peverel, Chelmsford, Essex CM3 2EJ. Tel: Chelmsford 381436.

The first new item this month will be of interest to those readers who are both licensed radio amateurs and scanning enthusiasts.

PRO-34 Modifications

This modification for the Tandy PRO-34 provides manual selection of a.m. on frequencies outside the v.h.f. airband and was sent to me by **Neil Buchanan** of Lisburn in Co. Antrim. Neil has been experimenting and has developed what he believes to be an easy way of modifying the receiver. As I don't own a PRO-34 I haven't been able to try out this method myself but Neil has been using the modified scanner for some time now with no obvious side effects - so why not try it?

As usual please be sure of your own ability before you start work and be warned that any guarantee relating to the equipment may be invalidated as a result of modifications. I think it may be worthwhile first of all outlining how Neil developed this mod as I am sure that a similar method could be used to provide manually switchable a.m. on many other scanners.

Neil noticed a change in voltage level on one of the pins of the connector used between the microprocessor control board and the r.f. board. This was normally at 0V but changed to 5V when the a.m. airband was selected. He also noticed that some of the other pins changed in level when new frequency ranges were selected. Pin 3 changed to 5V on the v.h.f. 'high band' and pin 16 changed to 5V on the v.h.f. 'low band'. By summing the voltages from pins 3 and 16 with a pair of diodes and then connecting the junction of the diodes to pin 4 via a switch it is possible to 'force' the selection of a.m. Neil adds that he did not bother to provide a.m. on u.h.f. as 99% of all transmissions in this range are f.m. However, a bit of detective work with a test meter on the rest of the pins should provide a solution if required. It should also be noted that a.m. remains the only mode on the v.h.f. airband.

I intend to keep the description of how to perform this modification fairly brief as I have not attempted it myself. However, I am sure that if you can follow my description you should be able to implement it without too much difficulty. The only tricky part of the modification is in finding a suitable location to fit the sub-miniature toggle switch. Neil mounted his on the top panel between the squelch control and the antenna socket. In order to do this you are advised to first desolder the antenna socket/power switch and remove the r.f. board in order to prevent internal damage. Make a note of the connections so that you can easily re-assemble the receiver. The diodes, which are general purpose silicon types such as IN4148, can be mounted above the multi-way connector. Ensure that they are well insulated in order to prevent shorting when the receiver is re-assembled.

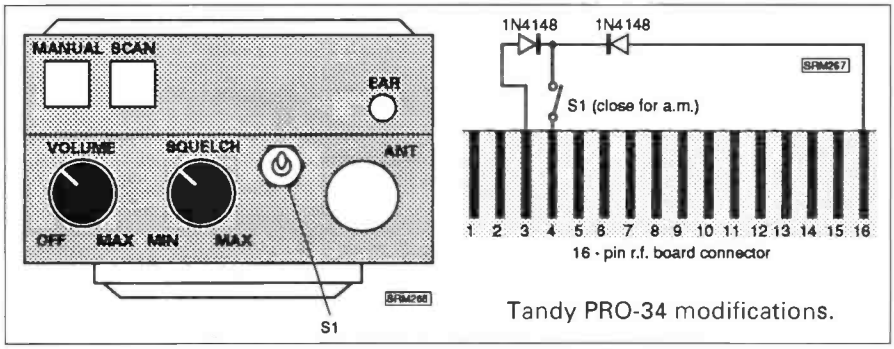
Having performed the modification you should now be able to select a.m. at your convenience, making what is already a popular receiver much more versatile.

My thanks to Neil for passing on these details which I know will be of great interest to many readers. I hope that this example of experimentation will lead to other modifications being developed. If you have performed a similar type of modification why not drop me a line so that it can be shared with other readers?

HF Converters

R. Ignacio of Liverpool has written to ask me about the suitability of an h.f. converter for use with his Tandy PRO-2005. In order to answer this question I think it would be a good idea to look at how h.f. converters operate.

The basic concept of an h.f. converter



Tandy PRO-34 modifications.

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is quite simple. The incoming short wave signals are translated in frequency to a range that can be received on a scanning receiver. Most converters consist of three basic sections, a low-pass filter, mixer and oscillator. The incoming short wave signals pass through the low pass filter into the mixer. The purpose of the filter is to limit the frequency range of signals reaching the mixer. This is in order to prevent signals that lie within the scanner tuning range from 'leaking' through the mixer and interfering with the wanted signals. In the mixer the short wave signals are 'mixed' (hence the name) with the signal from the oscillator stage. The oscillator usually has a crystal determining its operating frequency with most designs operating at either 50 or 100MHz. The mixing process produces a new band of frequencies which are directly related to the oscillator frequency and the incoming short wave signals. For example, if the oscillator frequency is 100MHz and one of the short wave signals is at 7MHz the mixer stage will produce signals at 107MHz (100+7MHz) and 93MHz (100-7MHz). Lets just concentrate on the signal at 107MHz and ignore its mirror image at 93MHz. This can now be tuned as if it was on 7MHz, by the same process signals on 10MHz can be tuned to on 110MHz and so on. In order to convert the frequency you have tuned, into the frequency you are actually receiving, all you have to do is subtract the oscillator frequency - in this case 100MHz, making the mental arithmetic easy.

The main parameter to check with commercial designs is that the output frequency range of the converter is compatible with the tuning range of your scanner. If you have manually selectable a.m. you should be able to tune in a minimum of 5kHz steps in order to be able to resolve short wave a.m. broadcast stations. If you have s.s.b. 100Hz tuning steps are really the minimum size that you can get away with. One thing a simple h.f. converter such as this cannot do is to allow you to receive s.s.b. on a scanner which is only capable of a.m. or f.m. reception. Some of the more sophisticated designs take an i.f. signal out of the scanner and demodulate the signals externally but it is debateable whether it is really worthwhile going to this much effort or expense.

I hope that this clears up a few of the mysteries surrounding converters and my thanks to R. Ignacio for writing to me.

What Can I Hear Part 13

In the final part of this series I take a look at what is likely to be the highest frequency range receivable with the present generation of scanning receivers.

The main use of spectrum between 1450-1530MHz is for terrestrial point-to-point links. Many of these are replacing old systems currently operating in the 457-470MHz bands which are gradually being phased out. Because of the propagation characteristics of microwave signals many of the services using them are not easily receivable without dedicated antenna systems. As we move higher in frequency it becomes more expensive to amplify signals to the same sort of power levels that are common in the lower frequency bands. For this reason system designers take advantage of the higher antenna gains achievable at these frequencies. This is because the much shorter wavelengths encountered in the microwave regions make high gain antennas more compact. For example, a dish antenna offering a gain of 20dB (equivalent to a 100 fold increase in transmitter power) would have to be around 10m in diameter at 150MHz, 3m at 300MHz, 1m at 1GHz or 0.5m at 2GHz. Clearly it is more economical to use a 1W transmitter and a 0.5m dish rather than a 100W transmitter and lower gain antenna.

The other advantage in using a high gain antenna is that the signal is concentrated in only one direction. This is ideal for point-to-point links as it has the advantage of permitting greater re-use of individual frequencies.

However, because most of the transmitted signal is concentrated into a single beam you only stand a chance of being able to receive it if you are located within the beam. This can create some interesting effects - for example I have often found that the signal being received at ground level from a remote microwave relay station is actually stronger than a signal being transmitted from the site. This is because I am within the main microwave beam of the remote station but not within that of the local transmitter. The narrowness of the transmitted beam is dependent on the gain of the antenna with high gain antennas possessing beamwidths of less than 1°. It is for this reason that the structures supporting microwave link antennas have to be so substantial, as any slight movement of the antenna can result in a loss of signal.

Frequency (MHz)	Service	Frequency (MHz)	Service
1450.0	Fixed Links Land Mobile	1668.0	Fixed Links (Emergency Services) Radio Astronomy
1530.0	Maritime Satellites (Space to Earth) Land Mobile	1670.0	Meteorological Satellites (Space to Earth)
1535.0	Maritime Satellites (Space to Earth)	1698.0	Meteorologica Satellites (Space to Earth) Fixed Links (Emergency Services)
1545.0	Aeronautica Satellites (Space to Earth)	1700.0	Meteorologica Satellites (Space to Earth) Fixed Links Land Mobile
1559.0	Aeronautical Radionavigation Radionavigation Satellites (Space to Earth)	1710.0	Fixed Links Land Mobile
1610.0	Aeronautical Radionavigation	1807.5	Fixed Links (Emergency Services)
1626.5	Maritime Satellites (Earth to Space)	1815.5	Fixed Links Land Mobile
1646.5	Aeronautica Satellites (Earth to Space)	2000.0	
1660.0	Radio Astronomy		
1668.0			

SCANNING

Moving slightly higher in frequency we encounter a large chunk of the spectrum allocated to various satellite up and down links. These include meteorological, radionavigation and communication satellites all of which play an important part in everyday land, sea and air travel.

Unlike the weather satellites operating at around 137MHz, the majority of these satellites sit in geostationary orbits at fixed positions 36000km over the equator. This removes the need to track the satellites but does mean that higher gain antennas are required in order to receive usable signals.

The Geos/Meteosat weather satellites transmit weather pictures and data on 1691 and 1694.5MHz but you will need specialised equipment in order to receive them correctly.

Likewise, the international maritime communication satellites which operate around the 1530-1660MHz region require specialised reception equipment. The demands for satellite links in these frequency bands are increasing rapidly with several aeronautical telephone services already sharing some of the channels on the maritime satellites.

Further expansion of the system is likely as mobile satellite terminals are now starting to be fitted in the cabs of long distance lorries, in order to maintain communications whilst travelling through hazardous or remote areas of the world.

Finally towards the top end of this segment lie more point-to-point links with the odd radio astronomy allocation thrown in for good measure.

Well, that ends this months column and our examination of the radio spectrum.

I know from the many letters I have received on the subject that it has been a very popular feature. I hope to continue along similar lines in future columns by looking at receiver specifications and designs. I would also like to try and include some operating hints and tips specifically related to scanning. So if you have any bright ideas or suggestions why not share them with others? □

Abbreviations	
a.m.	amplitude modulation
cm	centimetre
dB	decibel
f.m.	frequency modulation
GHz	gigahertz
g.r.p.	glass reinforced plastic
h.f.	high frequency
Hz	hertz
i.f.	intermediate frequency
km	kilometre
kHz	kilohertz
m	metre
MHz	megahertz
r.f.	radio frequency
s.s.b.	single-sideband
u.h.f.	ultra high frequency
v.h.f.	very high frequency
W	watt
w.b.f.m.	wide band f.m.
°	degrees

As usual, all letters to PO BOX 1000, Eastleigh, Hants SO5 5HB. Until next month - good listening.

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Part 7

Even those who know little about electronics have heard about micro-chips and the revolution they have brought about in electronic equipment. The proper name for these components is **integrated circuit**. An integrated circuit, often called an 'i.c.', is a single device which does the job of many components.

The i.c. is made by forming many components on a small chip of silicon. Simple i.c.s contain tens of components but the more complex i.c.s can contain up to hundreds of thousands of components. These may be arranged in circuit forms so that a single i.c. can perform the same job as many discrete components. The result is not only a huge saving of space but much simplified electronic construction. This little project is a useful illustration of the advantages of the integrated circuit.

A Block Diagram of a simple intergrated circuit, the Ferranti ZN414 radio i.c. is shown in Fig. 7.1. In this diagram blocks are used to represent circuit functions within the i.c. Notice that the diagram contains three triangles (or arrows) and a square, each of which represent a function within the complete i.c. The triangle symbols are commonly used in block diagrams to indicate and amplifying stage, with the 'arrow' pointing towards the direction taken by the signal.

The contents of the ZN414 i.c. are bounded by the dotted lines on the diagram. The ZN414 has only three connections: 1 (Output), 2 (Input) and 3 (Ground). The circuitry contained inside the ZN414 makes up a complete ten-transistor tuned radio-frequency radio receiver. A **tuned radio frequency** (or t.r.f. for short) radio receiver is one in which only tuned stages are at the radio frequencies. All of the radios we have built, so far, have been t.r.f. circuits.

The radio within the ZN414 has five stages. There are four stages of radio frequency amplification followed by a detector circuit. These stages are shown on the block diagram coupled together by capacitors. The output signal is at audio frequency and can drive an earpiece directly. The output is decoupled with a 0.1µF capacitor and the resistance, R, represents the load, which can be a high impedance earpiece or a transformer driving low impedance headphones. The ZN414 requires a 1.5 volt power supply,

So far the radio projects that we have built in this series have been made up from discrete, or individual components. Moving up in complexity, it is now the turn of the one-i.c. radio.

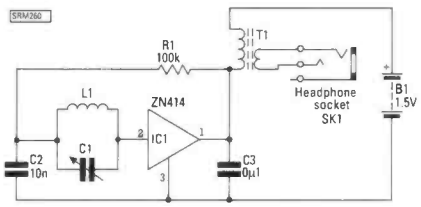


Fig. 7.2

a small single cell battery is ideal because it draws very little current.

Quite an impressive line-up with it all housed in a package which is the size and style of a single transistor. The connections for the two types of ZN414 housing are shown with Fig. 7.3. The previous radio circuits in this series have not included any radio frequency amplification. The ZN414 will provide a circuit with greater sensitivity because the radio signals are being amplified before they are detected to extract the audio information.

The circuit of the simplest possible radio receiver using the ZN414 is shown in Fig. 7.2. The ZN414 is represented by the triangle (arrow). The circuit shows that the entire radio requires very few extra components outside the ZN414. The insert layout drawing for the base is the commoner of the two packages in which this i.c. has been made.

The first thing to notice is that there is no antenna or earth connected to this circuit. The radio frequency sensitivity of the i.c. is such that the ferrite rod can be used to pick up the radio signals without resorting to an external antenna. This makes the radio self-contained in the same way as common domestic radio receivers these days. There is a single tuned circuit, provided by C1 and L1. L1 is wound on the ferrite rod used in the earlier projects and C1 is the variable capacitor used in the same projects. The 10nF capacitor, C1, connects the tuned circuit to ground at radio frequencies.

The output from connection 1, is decoupled by capacitor C3, as shown in the block diagram, Fig. 7.1. The audio output is at high impedance and could be used to drive a high impedance earpiece. In this circuit we have used the LT700 audio transformer from the the previous project to drive either the Walkman style headphones or a small loudspeaker. The ZN414 will just about drive a small speaker, although better results will be had with the headphones.

There is one extra component not marked on the block diagram, this is the resistor, R1. Resistor R1 provides an audio **feedback** loop. In effect it feeds a little of the audio signal back to the input. We will examine the use of feedback later in this series. The value of this resistor, 100kΩ, was chosen by the manufacturers as a compromise value. The value could be a little lower but if too low the circuit becomes unstable and begins to howl.

he layout of the 'One Chip Radio' is shown in Fig. 7.3. The layout is very simple but two essential points must be noted. The ZN414 must be connected the correct way round on the board - look for the 'flat' on the case. The battery must also be connected with the correct polarity. There are 3 link wires, which must also be included.

The supply voltage should not exceed 1.5 volts, connecting a battery of greater volatge will damage the i.c. I used a single HP7 cell (AA), although a larger single-cell battery could have been used. The HP7 lasts almost as long as its shelf life in this circuit, so a larger battery is hardly necessary. Connecting to the battery can be difficult without a proper holder. Holders, with connections, for single cell batteries are available.

The completed radio will be a significant improvement on those built so far in this series. It should be usable as a personal receiver from any location. I used my prototype to listen to cricket on Radio 3 at my desk. Try changing the number of turns on the ferrite rod to cover various portions of the a.m. broadcast band. It would also be possible to use a commercially wound ferrite rod coil. The Maplin Ferrite Rod Aerial (LB12N) could be used with this radio and would give, with suitable switching, medium and long wave coverage.

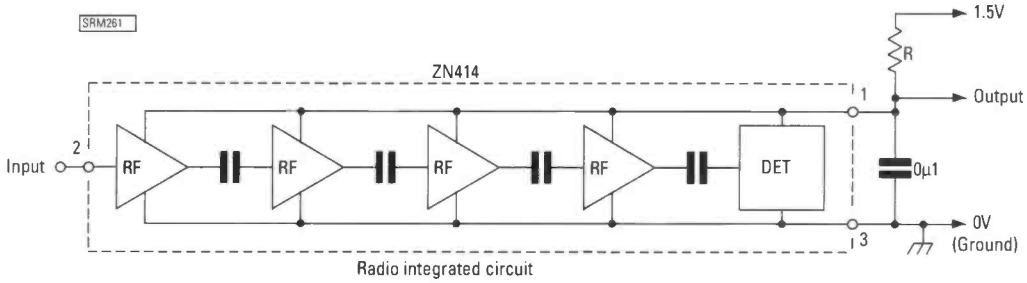
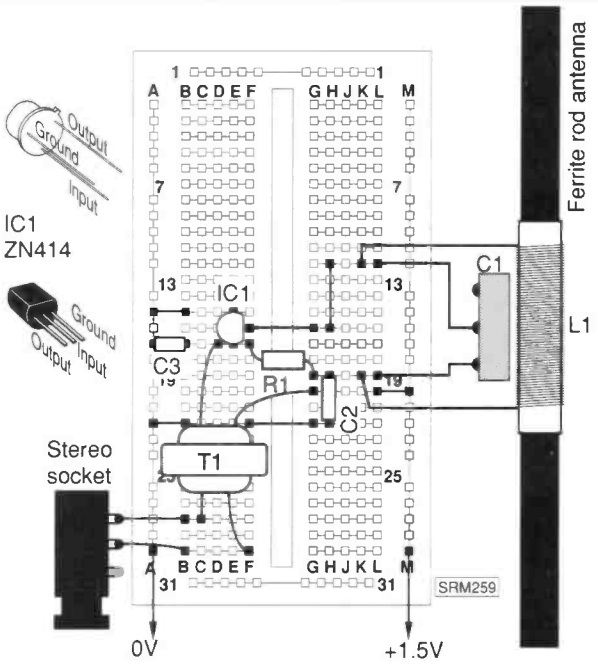


Fig. 7.1

Radio integrated circuit

Fig. 7.3



Parts for the One Chip Radio

L1, C1 and T1 as earlier radio projects
R1 100kΩ 0.25W resistor
C2 10nF miniature disc ceramic (Maplin BX00A or Electrovalue 81.01 or Marco CAP/Disc/50/0.01)
C3 0.1μF miniature disc ceramic (Maplin YR75S or Electrovalue 81.1 or Marco CAP/DISC/50/0.1)
IC1 ZN414 (Maplin QL41U or Marco ZN414Z)
Single cell battery holder.

Marco Trading, The Maltings, High Street, Wem, Shrewsbury SY4 5EN. Tel: (0939) 32763 (Catalogue £1) can supply most of the components required for this series.

Maplin Electronics, PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 554161.

Electrovalue Ltd., 28 st Judes Road, Englefield Green, Egham, Surrey TW20 0HB. Tel: (0784) 33603.

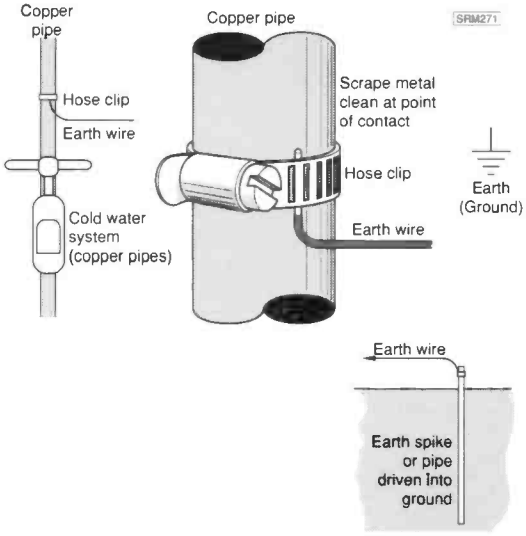
Antenna and Earth

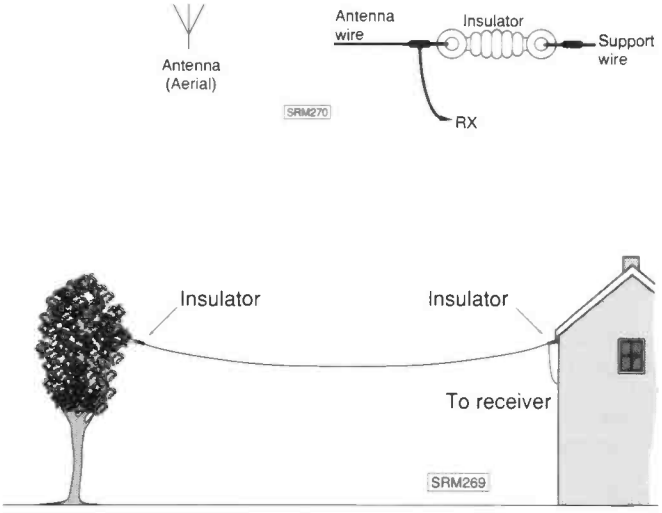
Most domestic radio receivers these days do not require an antenna or earth, but I well remember the days when every house had a radio pole at the bottom of the garden. The pole supported the antenna wire required for the radio sets of those days. We are familiar with television and f.m. radio antennas and short wave listeners are familiar with providing an antenna for reception of distant signals.

You can see the simplest outside antenna configuration in the diagram: a single copper wire suspended as high and as long as possible. The antenna is erected with suitable insulators to prevent signal leakage. The wire can be any good conductor, cheap pvc covered wire is suitable but the best antenna wire is thick copper wire. This is sometimes "hard drawn" copper because an antenna wire, if long, can stretch under its own weight. The insulators can be the classic 'egg insulators' or homemade from plastics material. I have even seen the polythene hoops around beer cans pressed into service as antenna insulators.

The antenna 'collects' the radio signals and conducts them to the receiver. It can also be an advantage to provide an earth return path for the signals. The **earth** (or **ground**) provides this return path. It has to make a good electrical connection with the ground. In former years, early radio experimenters drove long copper spikes or rods into the ground often to 3m deep or more and watered them in dry weather to provide a good contact with the earth.

In practice it is just as effective, or more so, to use the domestic cold water system if it has copper pipes. These pipes come up from the ground and if a good electrical contact is made with a cold water pipe it gives an efficient earth connection. Another possibility is to use the copper pipes of an household central heating system. Connection has to be made directly to the bare copper so it may mean scraping off that gloss paint so carefully applied to the pipes.





ADD-ON STENODE CIRCUITS

T.S. Christian

One resistor and one capacitor connected in the headphone lead provide effective Stenode frequency compensation for a receiver with a 450kHz crystal gate. Similar correction for the loudspeaker circuit can be achieved by a suitable design of enclosure.

Used properly, the 450kHz crystal gate, fitted to a number of Eddystone valved receivers, is an extremely effective device. Since the phasing control can be set to reject signals at either side of the centre frequency, Fig. 1 and Ref. 1, signals can often be resolved in crowded bands that are inaudible with a modern, 2.7kHz, s.s.b. filter.

Although Eddystone 450kHz crystal gates have a slightly broader, fixed, pass band (and rejection notch) than some designs, they are too narrow for satisfactory telephony reception. Careful setting of the b.f.o. relative to the peak of the gate will minimise the problem, but the limited range of audio frequencies passed always restricts signal intelligibility. It is possible, however, to improve intelligibility by audio-frequency correction circuits. This is background to the development of the Stenode circuit; see the article by L.A. Moxon in Ref. 2.

Since I prefer to keep my Eddystone receivers in as near original condition as possible (Strattons probably knew more than I do about valved receiver design, anyway!), any correction circuitry has to be external. On examination, this turned out to be remarkably simple.

These simple modifications are intended to allow the full potential of the crystal gate in an Eddystone receiver to be used for s.s.b. reception.

Correction Circuit Requirements

Fig. 2 shows the measured response of the gate in an Eddystone 730/4 receiver, set to reject the lower sideband, together with the desired minimum response for intelligible s.s.b. reception. Yes, 1500Hz is a bit narrow, but it does use the gate to its best advantage. If the receiver b.f.o. is set 200Hz from the peak of the crystal, on the opposite side to the sideband to be received, the difference between the curves, which corresponds to the required audio correction, is that shown in Fig. 3.

Note that high-frequency attenuation is needed to restrict the passband. Simply boosting all high audio frequencies progressively, as was done for a.m. broadcast reception in the original Stenode design, would result in an apparent degradation of selectivity.

An essential feature of the design of valved equipment, on which I cut my engineering teeth, was to achieve the required performance with as few components - especially active components - as possible. All components were expensive and bulky, and active components (valves) consumed a lot of power, generated a lot of heat, and were potentially unreliable. Thus, my instinct was to look to see what could be done using existing circuit elements rather than to take half-a-dozen op amps and start designing active filters.

Headphone Correction Circuit

I generally use a pair of S.G. Brown Type 'F' headphones: their limited audio response makes them much more useful under difficult conditions than modern hi-fi types - and there is less chance of permanent ear damage from noise spikes. Headphone output is obtained from most Eddystone valved receivers across the primary of the output transformer, as shown in Fig. 4. The equivalent circuit of this arrangement contains inductance, resistance and capacitance, as shown in Fig. 5. These

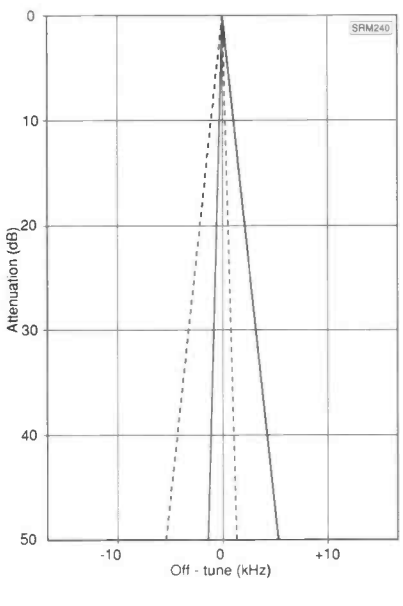


Fig. 1. Response curves of the i.f. amplifier of an Eddystone 730/4 receiver with the crystal gate switched in, and with the phasing control at maximum and minimum settings. (From Ref. 1.)

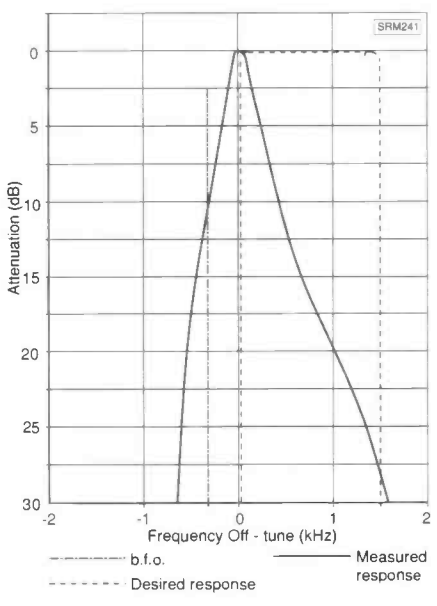


Fig. 2. Measured i.f. response of an Eddystone 730/4 receiver with the crystal gate switched in and the phasing control in the position for u.s.b. reception. The dashed curve shows the ideal frequency reponse for selective s.s.b. reception with the b.f.o. at the frequency indicated.

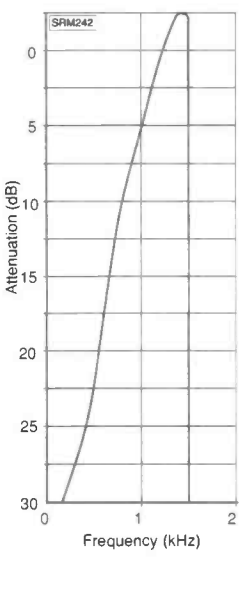


Fig. 3. Required response of a tone-correction circuit to obtain the ideal audio response for s.s.b. reception with the filter characteristics shown in Fig. 2.

ADD-ON STENODE CIRCUITS

are all the elements needed to obtain the Stenode correction shown in Fig. 3 - provided the values are correct.

Circuit Values

Measurements made with an Eddystone 730/4 receiver indicated a total inductance Ltot (headphones plus transformer primary) of 8.8H and a total resistance Rto$_t$ of 5kΩ. Output coupling capacitor C_{out} is 10nF.

My first attempt at tone correction was to series resonate the circuit inductance to about 1.2kHz, the series capacitance needs to be reduced to about 1.8nF. Adding a 2.2nF capacitor in series with the existing 10nF coupling capacitor gave the correct value. With the 5kΩ series resistance, the *Q* of this circuit was 12; this is too high and results in excess attenuation of the lower frequencies. A resistor of 100kΩ bypassing the series capacitor largely overcame the problem. The resulting circuit and values used are shown in Fig. 6. Here, the 100kΩ resistor is switchable, so that low-frequency heterodynes can be further attenuated.

Performance

Since the equipment needed to measure the audio output from a pair of headphones was not available, I measured the current through them by means of the voltage across a 1kΩ series resistor. The resulting response curve, Fig. 7, is thus not exact especially at the higher frequencies due to current through the stray capacitance of the headphone windings, but agrees well with listening tests carried out by myself and friends. Note that the effective shape factor of the filter is actually improved from about 6 down to 4. The performance of the Eddystone 730 on s.s.b. signals is transformed, and the variable rejection characteristics of the crystal gate can be exploited to the full.

Once this circuit has been made to work, like me, you'll probably prefer to use the receiver in this mode. Even a.m. broadcast reception can be improved by tuning to just one sideband.

Construction

The prototype was built around a miniature slide switch mounted directly onto a standard jack plug without a shell. The switch enables the correction circuit to be bypassed when the gate is out, or to demonstrate its effectiveness to visitors. This arrangement is a bit untidy, and really ought to be improved on - sometime. A piece of shrink sleeving should tidy it up.

Fig. 4

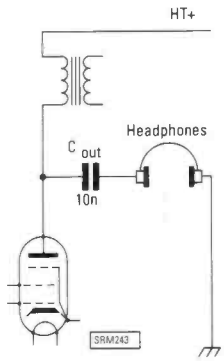


Fig. 5

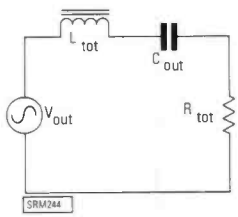


Fig. 6

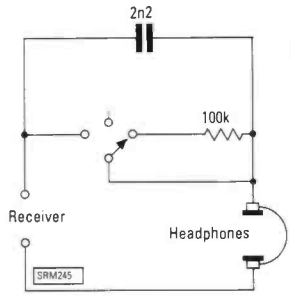


Fig. 4. Simplified output circuit of Eddystone 730/4 receiver. Plugging in the headphones disconnect the loudspeaker leaving the transformer primary as the anode load of the output valve.

Fig. 5. Equivalent circuit of Fig. 4. L_{tot} is the sum of the inductances of the output transformer primary and headphones.

Fig. 6. Headphone tone correction circuit. Note that the 100kΩ resistor can be switched out of circuit to attenuate low frequencies further.

Loudspeaker Compensation

Although the same principles can be used to design a compensated loudspeaker circuit, adequate results can be obtained simply by suitable design of the enclosure. Sufficient attenuation at 200Hz is obtained by providing a path difference between sound from the front and back of a loudspeaker of about 100mm. This achieves the opposite effect to that aimed at by hi-fi speaker designers and cancels out the lower frequencies. Interestingly, this condition is close to that of the design of the standard Eddystone round, diecast speaker.

Any small speaker mounted on a small baffle with no enclosure is effective. Try using small (50mm) transistor radio speakers to obtain a peaky high-frequency response. Two 8Ω, 50mm speakers in parallel, mounted in a 100 by 150mm 'baffleboard' set in a small enclosure with front vents, Fig. 8, should give both a good match to the 2.5Ω output of the receiver and good loudspeaker reproduction of s.s.b. signals. Actually, I find an ex-WD Tannoy re-entrant loudhailer as good as anything, although the Eddystone loudspeaker is quite acceptable.

Operation

Judging by recent examples of receivers with crystal gates I've acquired, the alignment of the crystal gate is a lost art. For best results, proceed as follows.

1. Switch on the receiver and allow it to warm up to thermal equilibrium (this takes about thirty minutes in a draft-free room at 20°C). Arrange to monitor the receiver i.f. amplifier output. The internal S-meter is the least satisfactory method; an oscilloscope connected across the auxiliary cathode-follower output provided in many Eddystone models is ideal. Replace the S-meter with a multimeter on the appropriate current setting to obtain better resolution.

2. First align the i.f. amplifier with the crystal gate switched out using an unmodulated signal generator giving the nominal centre frequency of the crystal within 1kHz. Keep the signal level down below S9 to avoid excessive a.g.c. action. If the selectivity is variable, use the narrowest setting. Loose i.f. transformer cores should be wrapped with plumber's ptfe jointing tape (one layer is usually sufficient), or a piece of thin rubber strip inserted. Peak performance cannot be achieved with sloppy cores.

3. Switch in the crystal. If the selectivity

is variable, set it to the widest setting. Set the crystal phasing control to its mid-point. Sweep the signal generator to find the peak due to the crystal: this will be within a couple of kilohertz of the nominal frequency in most cases.

4. Set the bandwidth control to minimum. With the signal generator set to the peak crystal frequency, trim the i.f. amplifier alignment.

5. Check for symmetry by offsetting the signal generator 1kHz either side of the peak. Adjustment of the phasing control should boost the signal slightly on one side of the passband and eliminate it entirely on the other. Insertion loss of the gate should be only 2dB or so. If these conditions are not achieved, repeat the alignment from step 1.

The following alignment faults would seem to be common.

Poor symmetry due to inaccurate alignment or the subsequent movement of loose i.f. transformer cores.

One broad rejection notch at around the mid-setting of the phasing control due to capacitative balancing of the filter bridge circuit. In this case the i.f. alignment frequency will be found to be 10kHz or so off the nominal, the filter ineffective, and the insertion loss large.

When a properly aligned crystal gate is switched in and out of circuit, the i.f. output for an on-tune signal should scarcely change. The only audible consequence should be loss of high-frequency signal or noise components. The phasing control will allow signal close to the passband to be boosted or rejected. Ringing is not excessive in the Eddystone gate design.

Receiver Settings

Switch on the receiver and allow it to reach thermal equilibrium. Using a crystal marker, internal or external, and with the crystal gate switched in, adjust the receiver tuning to exactly peak the marker signal. Now offset the b.f.o. pitch 200Hz (up to 300Hz is acceptable) to the side of the marker opposite to the sideband required. Check this setting frequently during warm-up and from time-to-time during operation.

Set the phasing control to maximum or minimum, again according to the sideband required. Tune in an s.s.b. signal without altering the b.f.o. setting. It should be clearly readable. Changing the setting of the phasing control will allow adjacent signals to be rejected, albeit at the expense of high-frequency components of the required signal. The ability to switch the 100kΩ resistor helps here.

Note that both the headphone and loudspeaker compensation methods involve about 15dB attenuation of the audio signal. Thus, not only will the a.f. gain control need to be further advanced, but the full power output of the receiver will no longer be available. This presents no practical problem for personal listening as adequate power is still available from the (valved!) output stage.

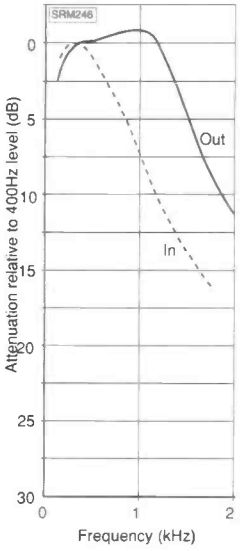


Fig. 7. Current through headphones measured without (dashed curve) and with the tone correction circuit (full curve).

Suitable Receivers

These tone correction arrangements should be effective (with some change of values for different output circuit values) with all Eddystone receivers with a 450kHz crystal gate. These include the 680 and 680X, 730 (all variants), 740, 888, and 940. It also improves the audio response when used with the 830 receiver on its c.w. setting (the crystal gate at 100kHz on this receiver has too narrow a passband for a.m. reception). The 1.6MHz gate in the S640 receiver is wide enough for s.s.b. reception without compensation.

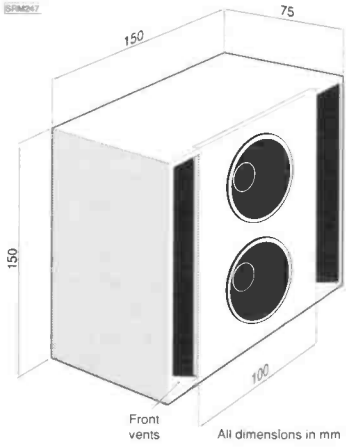


Fig. 8. Suggested loudspeaker enclosure design to provide tone correction. Note the side vents to reduce low-frequency response by cancellation. The whole front of the enclosure could be covered with a light speaker cloth.

Other receivers with crystal gates may be useable at suitable selectivity settings and with appropriate changes to circuit values. Some additions to the loudspeaker circuit may be necessary, such as a series capacitor, although again, most necessary compensation should be obtainable from the enclosure itself. Pre-requisites for success are stable local oscillator and b.f.o., and the patience to wait until thermal stability is achieved!

Postcript

As you may have gathered, I enjoy using valved receivers as well as collecting them. The feeling that my skill and experience has complemented the solid engineering of the set in the receiving of a rare or difficult station, beats playing electronic bingo with the most elaborate of receivers. Perhaps the fact that the modern generation of microcontroller-based equipment has been designed to eliminate the traditional skills of the radio operator accounts for the falling interest in amateur radio generally.

The use of a heterodyne frequency meter to establish frequency - a BC221 in good condition can be relied on to within 600Hz at 15MHz - can overcome the limited accuracy of analogue tuning scales where necessary. This, of course, requires more operator skill and gives you a few more good, solid knobs to twiddle. □

References

1. Stratton & Co, 1956. *User Manual for Eddystone 730/4 Receiver.*

2. Moxon, L.A. 1962. The 'Stenode'. *Wireless World* Vol. 68, pp 300- 304 (July).

Abbreviations

a.g.c.	automatic gain control
a.m.	amplitude modulation
b.f.o.	beat frequency oscillator
dB	decibel
H	henry
Hz	hertz
i.f.	intermediate frequency
kHz	kilohertz
kΩ	kilohms
MHz	megahertz
mm	millimetres
nF	nanofarad
ptfe	polytetrafluoroethelyne
Q	the goodness of a tuned circuit
s.s.b.	single sideband
u.s.b.	upper sideband
°C	degrees Celsius
Ω	ohms

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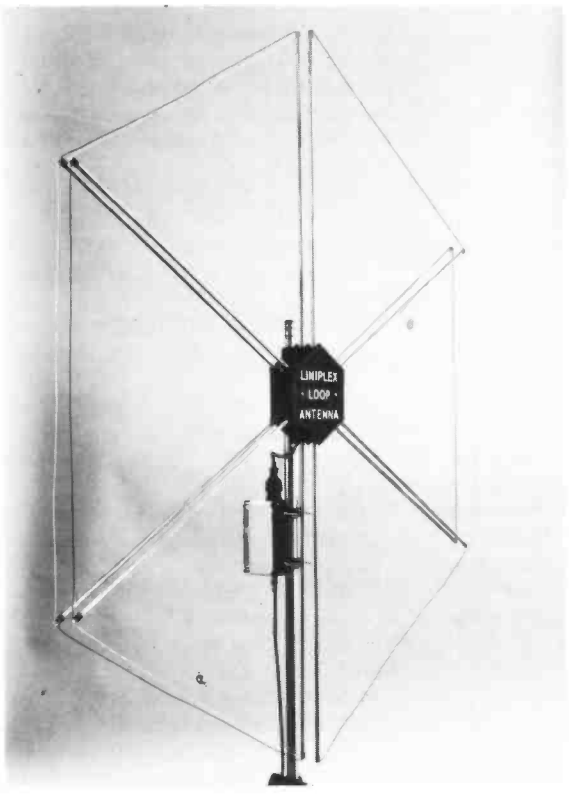

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DECODING THE DATA

Mike Richards G4WNC

Part 1

With the current escalating interest in RTTY and other data transmissions it is time to produce a simple guide for the beginner explaining some of the development and technical operation of these intriguing modes.

From my experience as a columnist with *Practical Wireless* and *Short Wave Magazine* it is clear that the existing guides are not satisfying the needs of total newcomers to listening are concerned.

Data - What is It?

Let's start from the very beginning. The term data is much used in this day and age and seems to be used to describe all manner of information. In fact we could say that all radio transmissions carry data, be it speech or other information so what do we really mean when we talk of data transmissions?

The most common usage is to describe any non-speech information. One exception to this is Morse code which although some people may like to describe it as a data mode is generally excluded from this definition. So what is all this non-speech information? One common example is simple text i.e. words are typed on a keyboard, converted so they can be handled by a radio transmitter, decoded at the distant station and converted back to printed text. This type of simple transmission is known as Radio TeleTYpe i.e. RTTY. There are of course many other sophisticated systems which automatically correct errors and many other enhanced features demanded by the commercial operators.

RTTY - The Inside Story

Following that brief introduction to RTTY and data, let's now look at how the RTTY system works in some detail. I'll start by dividing the system into processes and then examine each process in turn. The system can be split up into six distinct processes as shown here:

1: Text collection
2: Conversion
3: Transmission
4: Reception
5: Conversion
6: Display

The standard method of text collection is via some form of keyboard. A few years back this would have been a teleprinter, but nowadays a computer terminal would be used. So what does the computer do when a key is pressed?

As you may be aware, computers can only deal with numbers, so the first thing the computer does is to generate a number to represent the letter pressed.

Now as we all know, computers are really not clever at all, so in order to know what number to generate it needs some sort of table. As we are ultimately going to send this number to another computer we need some sort of standard table or code. For Radio Teletype signals this table or code is known as the International Telegraph Alphabet number 2. That's a bit of a mouthful, so it's abbreviated to ITA2.

So let's go back to the keyboard and press the letter uppercase A and see what happens. Having detected that the A key has been pressed the computer checks the table or code and finds that the number for A is 3.

The next thing we need to get to grips with is how the computer handles numbers. Despite all the jargon and complicated circuitry computers are really very simple - all signals being handled by two voltage states - either on or off!

In practice these two states are called either 1 or 0 with ON = 1 and OFF = 0. One of the most common logic systems is known as Transistor-Transistor Logic which is abbreviated to t.t.l. This system treats any voltage between 2.4 and 5V as logic 1, whilst voltages below 0.4 are treated as logic 0. So you see it really is quite straightforward. The next problem is how do you handle numbers when you only have two signal states? Well, the secret is to change the base of the numbering system. If you're a mathematician you'd better ignore this next bit. The way around the problem is to change the number base from the normal ten to two. So, instead of counting from one to nine and then carrying one, we count from 0 to 1 then carry one. Let's use a simple chart to illustrate the point.

Normal Decimal Numbering

Weight	1000	100	10	1
	2	5	2	3

= 2,523

From this you can see that the number two thousand five hundred and twenty three is made up of two thousands as indicated by the 2 in the thousand column followed by 5 hundreds, 2 tens and 3 ones. Having grasped the decimal system let's see what binary looks like.

Binary Numbering

Weight	8	4	2	1
	1	1	0	1

= decimal number 13

As you can see binary numbers look rather different to decimal, but the principle remains exactly the same. Our number 13 is made up of 1 eight, 1 four, 0 twos and 1 one add that lot together and you get 13 - simple isn't it! Your next question is probably - how did I arrive at the numbers at the top of each column which I have called the weight?

I will start by describing the decimal system which operates using a base of 10. With all numbering systems the first column shows the number of units. The value applied to the following columns is simply the number base itself for the second column, multiplied by itself once for the third column and twice for the fourth column. Here's a few worked examples using various numbering systems:

Decimal Numbering:
Column one = 1s
Column two = 10s (i.e. the number base)
Column three = 10 x 10 = 100s
Column four = 10 x 10 x 10 = 1000s

Binary Numbering:
Column one = 1s
Column two = 2s (i.e. the number base)
Column three = 2 x 2 = 4s
Column four = 2 x 2 x 2 = 8s

Octal numbering:
Column one = 1s
Column two = 8s (i.e. the number base)
Column three = 8 x 8 = 16s
Column four = 8 x 8 x 8 = 128s

From this you can see that there is really no limit to the numbering bases that can be used.

So how do we apply the binary numbering system to a computer? The

DECODING THE DATA

trick is to use a different wire for each digit, so in the example shown earlier we would need four wires to represent the number thirteen, i.e. one wire per column. Real computers actually operate using multiples of eight wires i.e. 8, 16 or 32.

I think now is the time to introduce a couple of new computer terms - BIT and BYTE. The first BIT is an acronym of BInary digiT. Now any one of the columns shown earlier in the binary numbering example can be referred to as a single binary digit i.e. a bit. The term byte just refers to a number made up of eight binary digits or bits. Here is another example showing the use of both terms:

128	64	32	16	8	4	2	1
1	0	1	1	0	1	0	1

Converted to decimal this number is 181.

This whole binary number is a single byte, whilst any single digit within the byte is called a bit.

Having established the basics of how computers handle numbers, we can return to our original conversion problem of changing a key press into something that can be applied to a transmitter. You will remember that the computer detected the key press and used a code table to work out what number should be generated when that key was pressed. So now within the computer an eight bit binary number equivalent to decimal three has been generated. This number is 00000011. For the next step you will need an understanding of the terms parallel and serial data.

Parallel and Serial

So far we have shown how the computer handles numbers using eight wires for an eight bit number. These eight wires are commonly called the data bus simply because it's a bus system carrying data! Information in this format is called parallel because all the parts of the number are available at the same instant.

When dealing with transmission systems, be it land line or radio, we only have one path available so we really need to be able to take the information one bit at a time.

Let's give an example to help clarify the point. Imagine the postman delivering eight important letters to one address. The problem he encounters is that only one envelope at a time will fit through the rather small letterbox. The solution is simple and obvious, the letters are posted one at a time!

The same happens with our data problem i.e. we send each bit of the number one one after the other this is serial data. With our computer data each bit is a very important part of the whole number or byte and it is vitally important that they all stay in the right order, so that we can reverse the process at the other end. So this is the basis of serial data. Before we move on I ought make one point clear about the ITA2 code. Although I have talked about computers operating with eight bit binary numbers, the ITA2 code is actually a five bit code. This might seem a little confusing, but really all it means is that the highest three of the eight bits used in the computer are ignored.

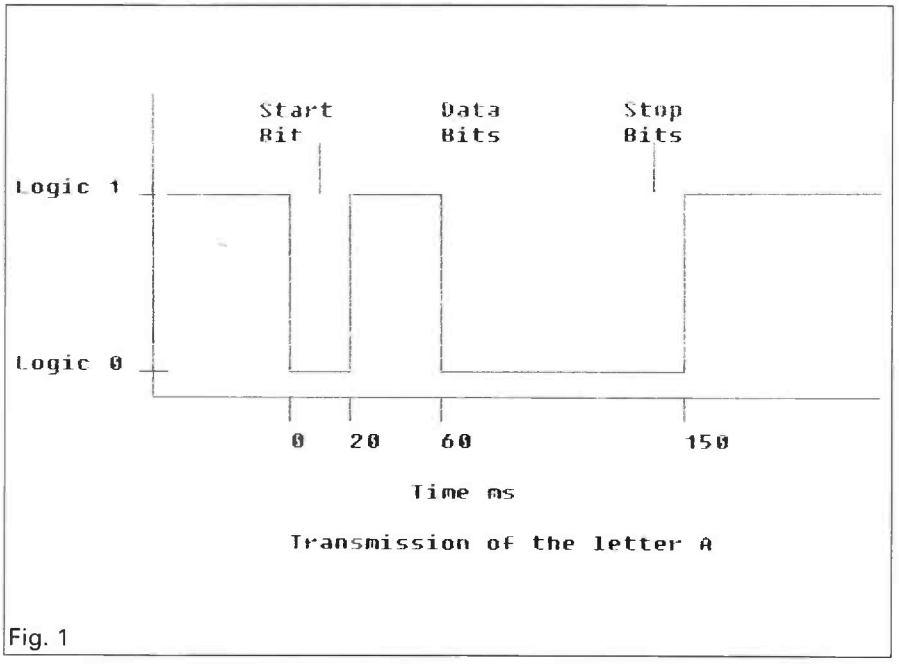


Fig. 1

I think the next thing to do is to summarise our progress so far. We started with the letter A being pressed on a computer keyboard. This was followed by the computer detecting that key press and using a ITA2 code table to assign a number to that key, which in this case was 3 or binary 00000011.

We also know that this number is handled in the computer using eight wires which are known as a data bus. In addition we know that in order to send this data to a remote station using either a land line or a radio link we need to convert it to a serial format and send one bit at a time.

The next stage is to sort out the practicalities of how we handle this serial data. I will start by describing the most common form of serial data which is known as ASYNCHRONOUS DATA. In this mode each byte of data is separately packaged for transmission using the following system.

1: Indicate that the transmission is about to start with a start bit.

2: Send the data one bit at a time starting with the lowest and ending with the highest.

3: Indicate that the transmission has ended by sending stop bits.

So let's assume that we have one wire available for transmitting data from the computer and that the normal condition on this wire is +5V or logic 1. Timing is a vitally important element of any data transmission system as the receiving equipment need to know when each bit of the byte is available. So for every data link we need to specify the speed, which is normally expressed in bauds and represents the maximum frequency of the data. So to use a common speed of 50 baud, this means that the data changes 50 times every second or every 20 milliseconds. If we now return to our original example with the letter A, let's see what that looks like in graphical form.

Now for an explanation of Fig. 1. You will see that we start with a steady logic 1 condition on our output from the computer. When the transmission begins this changes to a logic 0 for 20ms and represents the start bit which tells the receiving equipment that data transmission is just starting. The start bit is followed by the first data bit which in our case is logic 1. This is followed by the second bit which is also logic one. The remaining three digits are all logic 0. On completion of the last digit a one and a half digit stop bit is sent to signal completion of the transmission.

The use of one and a half stop bits originated with mechanical teleprinters but many modern computer based systems only actually send one stop bit. You will note that although the computer handled the number as an eight bit number internally it only transmitted five digits.

So there you have it, a very basic outline of how a computer converts a key press into serial data for subsequent handling by a transmission system. In the next part I'll describe how this signal is passed over a radio link. □

COBRA SR925 SCANNING RECEIVER

Jack Aldridge

Scanners are always popular subjects with our readers and here the Cobra SR925 base station is put through its paces.

My mind was put at ease when I unpacked this scanner as it looked as though it would be very easy to use. There wasn't a frightning array of switches, lights and buttons facing me. If fact, I found that I didn't need to read the manual before I could get the scanner to operate. Of course, after reading the manual I found the scanner did more than I had first achieved.

The Cobra SR925 is a very neat unit, with a dark grey case. The controls are either dark grey on a pale grey panel or pale grey on a dark grey panel.

Both the volume and squelch control were slider controls, which I think is quite unusual. The display was easy-to-read as it was back lit at all times. The main on/off switch was placed to the right of the liquid crystal display.

The speaker is fitted into the top of the unit and is probably about 60 or 70mm diameter, judging from the speaker grill. The audio tone was quite pleasant and quite good for listening to airband messages and things like that.

There are no tone controls on the set, but it was quite adequate for the listening I did whilst I had the set on review.

On the back of the set is a socket for an external speaker which is a must for the serious user. I also suspect that this could be used for headphones if you need to use the radio without disturbing those around you. Unfortunately my headphones don't have the appropriate connector so I couldn't try that out.

There are two main ways of operating the radio, the first is to enter frequencies into the sixteen different memories and then search these in turn, the other is to enter two different as limits and then search between these. You can manually move up in 25kHz steps from any frequency by pressing the HOLD button, one 25kHz step for each operation of the control.

The trouble is that it takes a very long time to get from one frequency to another. Consequently it wasn't a facility I used very often.

As I'm not very well up on what frequencies to listen on, I find the searching between two fixed points my best method of tuning. I also keep a notepad close at hand in case I do find something interesting and want to return to it later. The first time I tried a search between two frequencies, I got into a real muddle. Once I had re-read the instructions and had another go it all became clear. It was just a case of choosing a memory to enter the lower limit into and then entering the upper limit afterwards. Once you press the search button the scanner does the rest. When it reaches the upper limit frequency the scanner resets to the lower limit and continues to search.

Programming a memory was really easy, you select the channel number (between 1 and 16) press the manual button, enter the frequency finishing with the E button (E for enter, I suppose). To scan the 16 memories, you just press the SCAN button, this was one of the largest buttons on the control panel and lebeled in red.

There are two levels of squelch available, the easiest is the Auto Squelch. This is a latching button on the right-hand side of the display panel and is set at the factory.

The other alternative is the sliding squelch control. This is harder to operate, except for those users who perhaps operate an f.m. amateur rig. It takes a while to get the right level of squelch for the range of frequencies you are tuned to. I did find the Auto Squelch was quite well set as any time I made comparisons between the squelch level I had set and the factory set level, there was a negligible difference.

Most of the other facilities on the Cobra SR 925 are, I think, fairly common to all scanners. There was a primary frequency control for selecting your favourite frequency - which had to be stored in Memory 1. When this is operated, the scanner returns to the frequency held in Memory 1 every three seconds to check for any activity.

The next button to the right was a speed control, this gave you two speeds of scan and search, the high speed was fifteen channels or frequencies per second and the low speed was five channels or frequencies per second.

Personally I prefered to slower of the two, although the radio had no trouble in detecting and stopping when you used the highest speed of scan. I found this to be especially true when listening to the airband. Living quite close to an airport I find the airband messages an interesting aspect of the hobby. But because the messages are rather short, when you know your local frequencies you need to move between them very quickly. This the Cobra SR 925 did without any problem at all. It made following the various aircraft as they flew over the house really quite easy.

The WX button or weather search is next on the front panel, this searches all seven of the NOAA weather frequencies.

The second row of buttons were ones like delay, lockout, limit and search. These I feel need no further explanation as they have been covered in just about all the reviews you read as well as in Alan Gardner's column from time to time.

If you try and program an out of limits frequency, or press the buttons in the wrong order, the display reads ERROR and you can start again.

One really nice feature about the radio is that is doesn't sit there and squeak at you at every press of the button! Ten out of ten for that to the manufacturers.

DX-TV DATAFILE No. 1

STANDARD TEST CARDS
Keith Hamer and Garry Smith

For those enthusiasts who avidly read Ron Ham's 'Television' column or followed our series 'Introduction To DX-TV' in *Short Wave Magazine*, this new series of DataFiles should prove to be very helpful. Now that you know *how* to receive television signals from around the world it's a good idea to know where they are coming from. With the impending F2-layer activity which is expected to propagate television signals over distances in excess of 5000km, we will endeavour to cover as many world-wide television services as possible, featuring details about their history, transmitters, programming hours, test cards and programme captions so that long-distance television (DX-TV) enthusiasts will be able to identify the origin of received signals. To achieve this we will need the co-operation of fellow enthusiasts around the world. If you can send any information (including photographs or video cassettes showing test cards and identification captions) about your country's television services, we would be very grateful indeed.

In this first article we are featuring some of the standard test cards and patterns used by various television services.

Early Test Cards

During the halcyon days of black and white television, test cards appeared in numerous forms and featured all manner of designs. Although looking aesthetically pleasing on the screen some were, in fact, of little use as a test card! A great deal more effort went into the production of a good design than many people realise.

The majority of test cards (or *test patterns* as they are now sometimes called) used prior to the early seventies were generated optically and there were various ways of achieving this. Some test cards were placed directly in front of studio cameras whilst others were transferred onto small transparencies and viewed by a flying-spot scanner. Test cards were also produced from equipment which had the particular design etched onto the face of a pick-up tube. These were known as 'monoscopes'.

A few test cards were generated electronically but the technology at the time meant that only relatively simple patterns, compared to what's on offer today, were available to the various broadcasters.

Test Card Design

The main purpose of a test pattern is to check receiver performance and allow the picture geometry to be satisfactorily set up by means of its various controls. Test cards provide a greyscale for contrast and brightness adjustment, usually a central circle and a grid of some description for line and frame linearity adjustments. Frequency gratings are normally included and these often consist of a series of blocks or columns with their vertical lines becoming finer and closer together depending upon the frequency which the step is supposed to represent. Some early test cards, notably

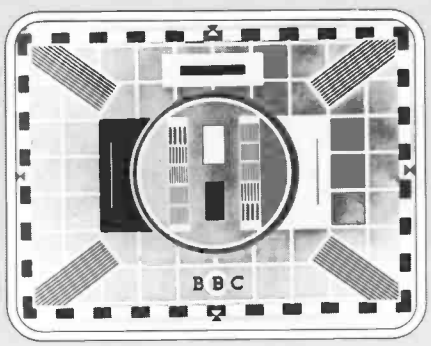


Fig. 1: The BBC Test Card 'C'. This was used by many television services around the world with minor modifications. Test Card 'C' was also used by the BBC for Regional opt-outs until the early 1970s.

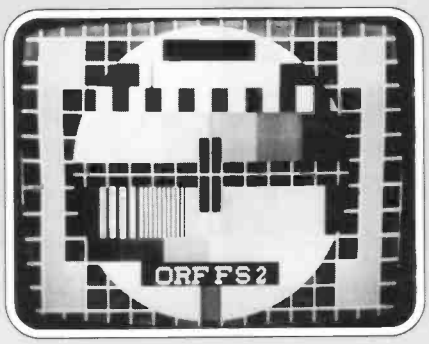


Fig. 2: The electronically-generated test card produced by Philips and known as the PM5544. When radiated with a digital clock insert it is referred to as the PM5534. This particular example is used in Austria.

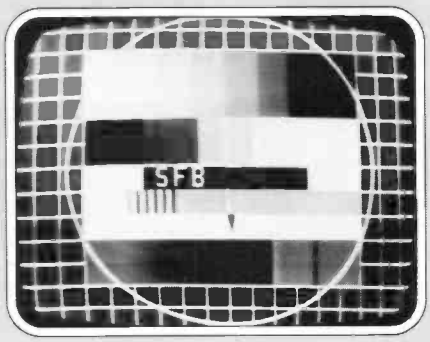


Fig. 3: The FuBK pattern is an alternative electronic test card used by many television services around the world. It was originally designed in West Germany and is now used on satellite television services.

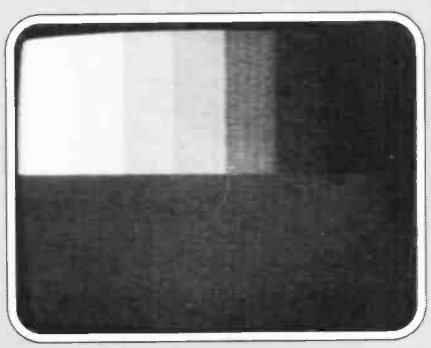


Fig. 4: Some TV services radiate colour bars prior to normal test transmissions, some have the lower half blank as here.

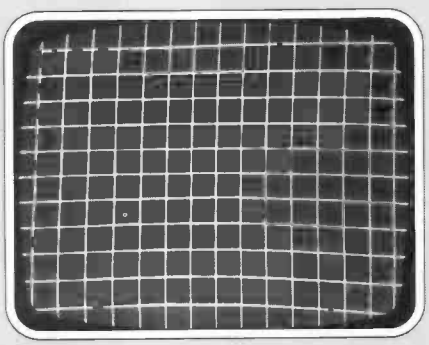


Fig. 5: The cross-hatch or grid pattern was used at one time by a few European networks but nowadays it is seldom shown.

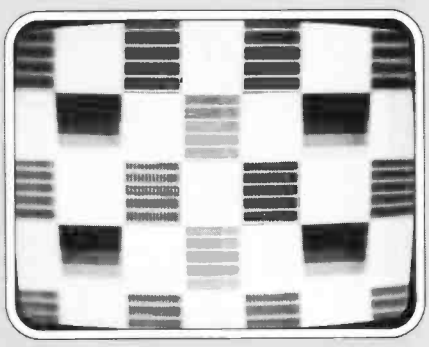
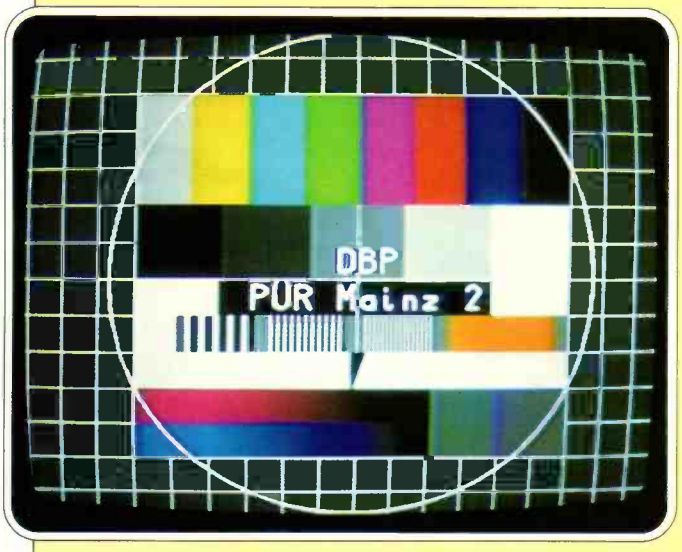


Fig. 6: The chessboard test pattern, shown here in a modified form, was at one time regularly used by Spain and Zimbabwe.

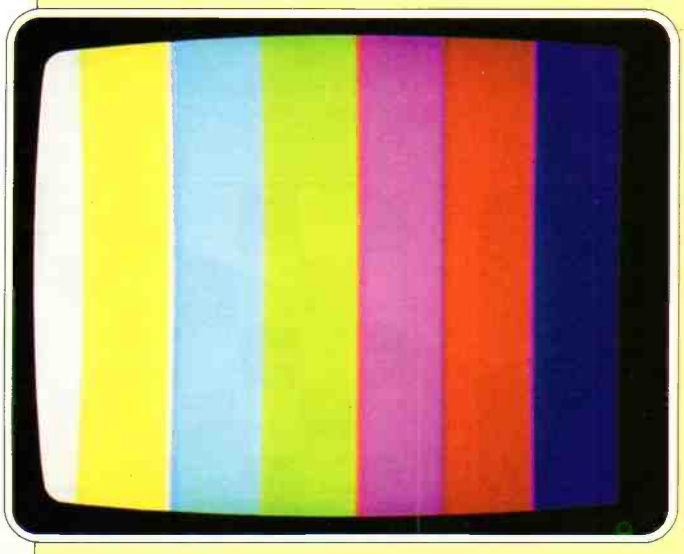
BBC-2 Test Card 'F'.

DBP KANAL 5 FuBK test card (W.Germany).



PUR MAINZ 2 FuBK test card (W.Germany).

SAT 1 SENDESCHLUSS Caption (W.Germany).

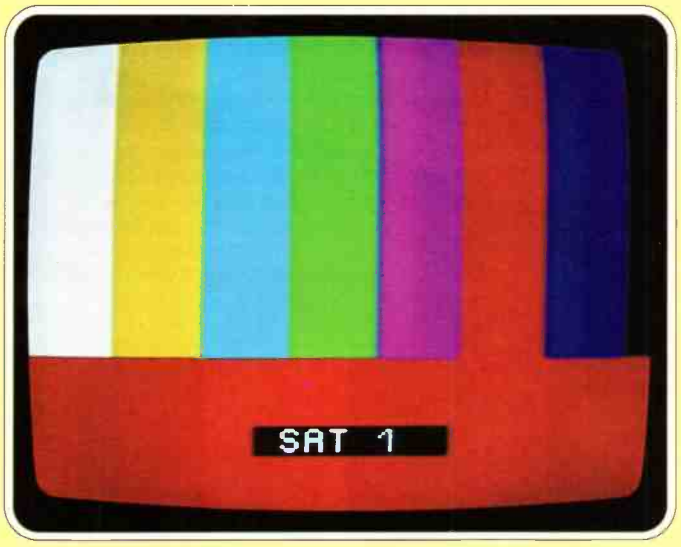


Standard colour bars (AFRTS - USA).

Colour bars (CNN-NEWS, USA).

SFB 1 FuBK test card (W.Germany).

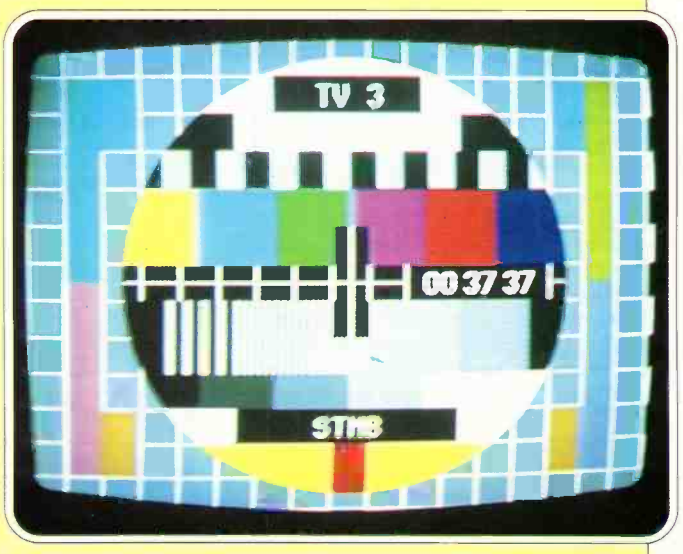
KREUZBERG FuBK test card (W.Germany).



SAT 1 Colour bars (W.Germany).

SENDESCHLUSS Clock caption (W.Germany).

Twin-set of colour bars (Argentina).



TV 3 PM5534 Test card (Singapore).

DX-TV DATAFILE No. 1

those used outside the United Kingdom, had frequency fans or 'wedges' where the lines converged.

The first design to be used in the United Kingdom to encompass all the necessary features was the BBC Test Card 'C' (Fig. 1) which was used from January 1948 until 19 April 1964. With various small modifications this test card became the standard design and was used by many television services around the world.

Colour Checks

When colour television arrived on the scene more sophisticated features were incorporated into test cards which were intended for checking receiver colour performance and, in many cases, assist with decoder fault finding.

Two distinctive electronically generated test patterns began to emerge around the end of 1969: the PM5544, designed by Philips and the FuBK which was developed in West Germany. Both these test patterns are now widely used all over the world and anyone with a satellite receiving system will no doubt have already seen these particular test patterns, perhaps with a few variations.

Modified Test Cards

The companies involved in designing the first electronic test patterns sold generating equipment throughout the world and even produced versions adapted for use on other transmission systems. The PM5544 for instance is encountered in some 525-line System M countries where the NTSC colour system is used. The PM5544 knows no boundaries! The Philips PM5544 test pattern in its original form is shown in Fig. 2. and the FuBK in Fig. 3. Both these test patterns have variations, some of which are obvious but others are more subtle. In the forthcoming series of DX-TV DataFiles we will be covering various television services and highlighting the differences in test cards, where applicable, because these small modifications can serve as a valuable aid to identifying the source of the signal.

Within recent years there has been an increasing number of other test pattern designs, some of which have been specially commissioned as a 'one-off' by individual television services. Although test transmissions are becoming shorter because of longer programme hours (and the ever-present trend to show teletext pages in place of the test card), the DX-er is occasionally faced by a non-descript pattern such as colour bars which may precede the normal test pattern or be used for special tests.

There are other patterns which may also be classed as 'standard' test signals. In this first DX-TV DataFile we are featuring just some of the more common standard test patterns which long-distance television enthusiasts may encounter.

Colour Bars

This pattern can display either a full set of colour bars or it may have the lower half blank and include optional identification in this portion. An example of this, with the lower half blank, is shown in Fig. 4.

Cross-Hatch or Grid

The grid can be black or white and of various sizes/pitch. A typical example is shown in Fig. 5.

Chequerboard or Chessboard

This consists of alternate black and white squares of equal size. The squares may be small or large. Variations include some of the squares being substituted by greyscale steps. This type of pattern (Fig. 6) was used regularly by some television services until the early eighties but nowadays it is seldom used.

Line Sawtooth

This is a monochrome test pattern which appears as a gradual transition from black to white (or *vice-versa*) across the screen. It is so-called because of the shape of the waveform required to generate it. A typical example is shown in Fig. 7.

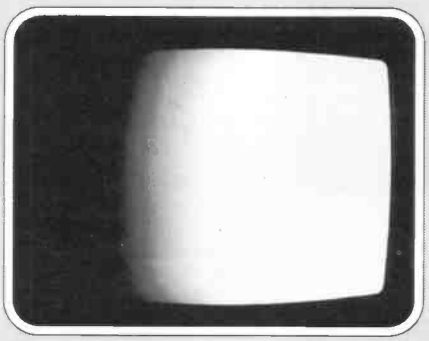


Fig. 7: The monochrome line sawtooth test pattern. This appears as a gradual change from black to white across the screen.

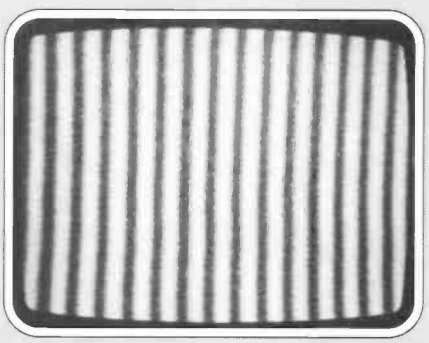


Fig. 9: The electronically generated, vertical stripes, test pattern is radiated on rare occasions by Russia and Spain. The number of stripes can vary.

Low-Frequency Test

This usually appears as a thick, central, white, vertical band with black areas either side. The BBC used to radiate a broad black cross on a white background during the 1950s and early 1960s and this particular pattern was referred to within the BBC as the 'Art Bars' - short for 'Artificial Bars' as they were the first to be electronically generated. This pattern is shown in Fig. 8.

Vertical Stripes

This electronically generated signal consists of alternate black and white stripes. The number of stripes can vary (Fig. 9).

Pulse and Bar

This is used in various forms by many television services, usually outside normal test transmission periods. The BBC version is shown in Fig. 10.

In subsequent DX-TV DataFiles we will be looking more closely at test cards and identification captions used by individual television services. As we mentioned at the beginning of this article, we would be very pleased to hear from overseas readers who are able to send information about their local television services. Please write to the authors via the Editor.

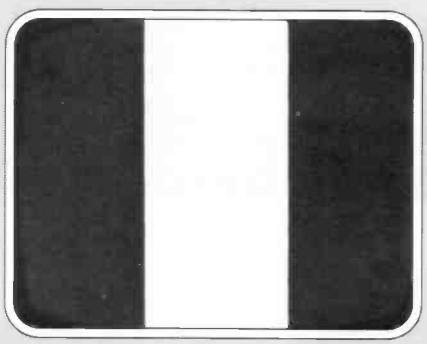


Fig. 8: This low-frequency test pattern is still radiated by a few European countries prior to the normal test card.

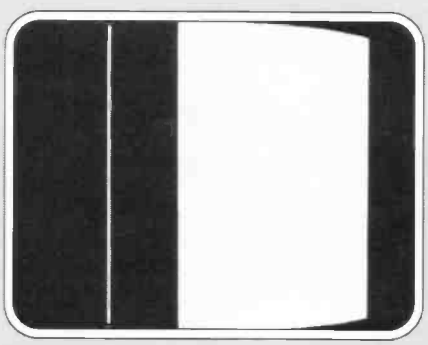


Fig. 10: The basic pulse and bar test pattern. Many European countries still use variations of this during the early stages of a test transmission.

COBRA SR925 SCANNING RECEIVER

Frequency Coverage

The Cobra SR 925 has quite a wide frequency coverage. The lowest band of frequency is 29.000MHz and there are no breaks until 54MHz. Then the next frequency segment is 118MHz to 174MHz. Finally it covers 406 to 512MHz. In amongst all those frequencies there seems to be plenty of interest to be found. As always the biggest problem is where to look, this is where the various frequency guides that you see advertised in *Short Wave Magazine* come into their own. Once you know where abouts to look for the kind of listening you prefer then it doesn't take long to track down the interesting signals. With the scanner you get an a.c. adapter and a telescopic antenna.

Unusually, the set has no provision for battery operation, the memories are retained by a capacitor inside. Apparently, the message MEMORY LOSS will appear on the l.c.d. if the capacitor discharges completely. Apparently this takes about four hours and after this all the memories read '000.000'. Having no battery compartment means that the scanner is only a base station model and can't be taken out on portable operation. Although reading the handbook, there is a mobile power cord available from the American retailers, so perhaps the UK agents might be able to supply the same accessories. There is also a mobile mounting bracket mentioned.

The Handbook

The booklet that came with the Cobra SR 925 was a sixteen-page A5 document. Each of the features are described individually and in detail. When it comes to programming the scanner, the operation of each button is described and you are also told (and shown in diagrams) what the display of the scanner should read. That was useful as I was able to tell whether I was operating the scanner correctly as I went along.

Pages fourteen and fifteen list all kinds of users for the different frequency bands covered by the scanner. As the set is of American origin, I'm not quite sure how much use this is to users in the UK. The only way I had of checking was to compare the list against the various publications, but after a short while it became obvious this would waste a lot of my valuable listening time, so I abandoned the task.

Summary

I found the scanner very easy to use, which was a pleasant surprise as I sometimes find it a little difficult to manage some of the 'modern technology'. To use a well-worn phrase, the unit was 'user friendly'!

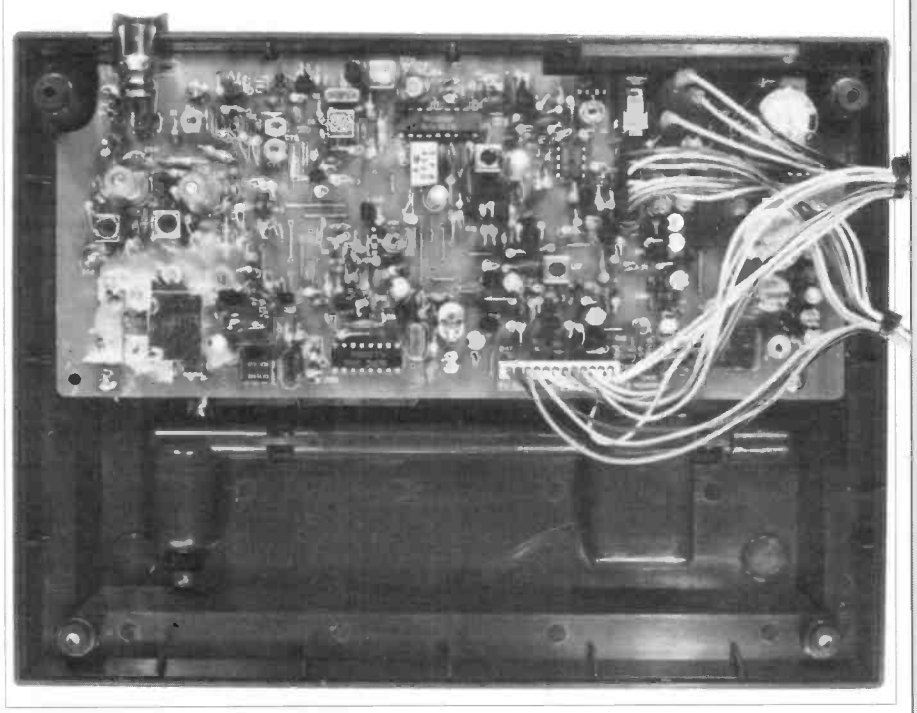
It doesn't have some of the more complex options available, but that didn't make it any less of a useful piece of equipment. For the beginner, or those like me who take a little longer these days to learn new things, the Cobra SR925 should be just right.

The Cobra SR925 costs £159.95 from **Nevada, 189 London Road, North End, Portsmouth PO2 9AE. Tel: (0705) 662145**. My thanks to them for letting me 'play' with the review set. □

Abbreviations	
a.c.	alternating current
dB	decibel
IF	intermediate frequency
kHz	kilohertz
l.c.d.	liquid crystal display
MHz	megahertz
mm	millimetres
RF	radio frequency
SINAD	signal to noise and distortion
THD	total harmonic distortion
W	watts
µV	microvolt
Ω	ohms
%	per cent

Specification

Frequency Coverage:	29-54MHz; 118-174MHz; 406-512MHz
Memories:	16
RF Sensitivity:	0.3µV at 29-54 & 136-174MHz 0.5µV at 406-512MHz (±3kHz deviation 12dB SINAD) 0.7µV 118-135.975MHz (60% modulation 12dB SINAD)
IF Selectivity:	-55dB at ±25kHz
Antenna:	Telescopic (supplied)
Audio Output:	1W into 8Ω at 10% THD
Size:	240 x 64 x 180mm
Weight:	730g
Power:	AC adapter (supplied)



Grundig Satellit 500 Review, March 1990.

The price for this radio was left out of the review in the March issue. The price is £299.95. Also the synchronous detector allows fine tuning in 100Hz steps, not 100kHz as stated. We appologise for any inconvenience caused by these errors.

STARTING OUT

Brian Oddy G3FEX

Although a few germanium transistors are still available for special applications, silicon transistors are now used extensively for low-level and high-power audio applications. Over the years a variety of audio amplifier circuits have been devised, all of which are based on the three basic configurations associated with bi-polar transistors, namely common emitter, common base and common collector.

Combinations of these circuits are frequently used in the audio stages of a receiver, for example the common emitter audio pre-amplifier described last month could be preceeded by an emitter follower stage so as to obtain the high impedance required at the output of the detector. Similarly an emitter follower can be used to match the relatively high output impedance of the pre-amplifier to a pair of low impedance headphones - see Fig. 1. The common base configuration is less often employed in a.f. circuits, but it does enable a low impedance at its input to be matched to a high impedance at its output. Because the current gain is less than unity it is not suitable for resistance-capacity (R-C) coupling to similar stages, but it can be R-C coupled to a common emitter or emitter follower stage.

A considerable current gain and a high input impedance can be obtained by directly connecting two transistors in cascade as shown in Fig. 2. In this arrangement, known as a Darlington pair, TR1 acts as an emitter follower and TR2 as a common emitter amplifier. A small increase in the base current of TR1 will cause a large increase in its emitter current. Since the emitter current of TR1 is the base current of TR2, there will be a considerable increase in the collector current of TR2. The overall current gain will be approximately equal to the product of the current gain of TR1 and TR2. A Darlington pair can be purchased as a single package with just three connections, i.e. emitter, base and collector. Such a device is ideally suited as an audio pre-amplifier when a very high gain is required, e.g. after the detector in a direct conversion receiver.

Some of the basic circuits which may be used in the audio stages of a receiver were outlined last month in this series. Variations and additional circuits are also in common use.

Push-pull Amplifiers

The operation of a conventional push-pull Class B audio power amplifier was outlined last month, but it should be noted that the push-pull arrangement is not confined to Class B operation. It is often used with Class A stages or for an alternative mode of operation known as Class AB, in which a compromise is reached between the low distortion and low efficiency of Class A and the higher efficiency, but higher distortion of Class B. Class AB operation is achieved by increasing the forward bias applied to the bases of the power transistors so that the conduction angle is appreciably greater than 180°, but less than 360°. A substantial quiescent collector current may therefore exist.

It is in fact advantageous to operate a Class A power amplifier in push-pull rather than in the single ended mode, since the high quiescent collector current, which is essential for satisfactory operation in Class A, flows through the primary winding of the output transformer in one direction in a single ended stage and an undesirable magnetic flux is set up in the core. A carefully designed transformer is therefore required, which may have to be physically large to ensure a good response at low frequencies. This problem does not arise in the Class A push pull arrangement, since the quiescent currents pass in different directions through the primary winding and the fluxes due to them cancel. A relatively small transformer with a high primary inductance can therefore be used. This is an important advantage since the output transformer is often a major source of distortion and poor performance in cheap amplifiers.

Single-ended Push-pull

A considerable improvement in performance and a saving in cost can be obtained by eliminating the output transformer altogether! A configuration sometimes referred to as single-ended push-pull, enables all of the available power to be delivered direct to the loudspeaker and the need for a lossy output transformer is obviated - see Fig. 3. In this arrangement two identical power transistors (TR1, TR2) are connected in series across the supply and their junction is joined to a centre-tap on the supply via the 35Ω loudspeaker (LS1). During quiescent conditions the voltage at the junction of TR1 and TR2 will be approximately equal to half the overall supply voltage. The power transistors have to be individually biased, so a special driver transformer with two isolated secondary windings is employed, which permits the potentials from the dividers formed by resistors (R1, R2 and R3, R4) to be applied to their bases. The secondary windings on T1 are connected to the bases of TR1 and TR2 in the opposite sense, so that an incoming signal will drive them 180° out-of-phase with each other i.e. one will be positive going when the other is negative going. Cross-over distortion is minimised by biasing each transistor so that it is operating just above the cut-off point required for true Class B operation, consequently there is a small quiescent collector current. The matched pairs of either *npn* or *pnp* power transistors required for this type of amplifier have been available for many years and quite high-powered versions can now be obtained at a remarkably low cost.

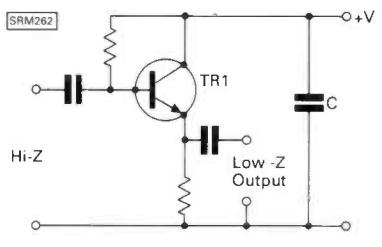


Fig. 1

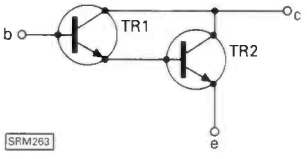


Fig. 2

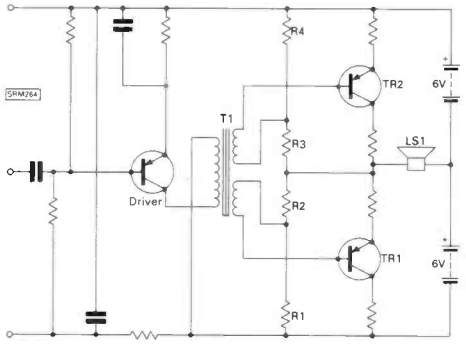


Fig. 3

Complementary Symmetry.

For some years the production of *npn* and *pnp* transistors with identical electrical characteristics, except for the difference in polarity, was limited by inherent difficulties in the manufacturing process and only low power versions were available. Subsequent advances in technology enabled complementary pairs (*npn/pnp*) of power transistors to be produced and during the last decade they have been readily available at low cost. The availability of complementary pairs of transistors led to the developement of transformerless push-pull audio power amplifiers and when the production of complementary pairs of power transistors got under way equipment manufacturers were able to incorporate relatively inexpensive transformerless amplifiers into their products.

The basic circuit of this type of power amplifier, which is usually referred to as a complementary symmetry push-pull amplifier, is shown in Fig. 4. In this arrangement the power transistors are operated as emitter-followers in push-pull Class B. The collector of the *npn* transistor (TR1) is therefore connected directly to the positive terminal of the centre tapped power supply and likewise the collector of the *pnp* transistor (TR2) to the negative terminal. The emitters are connected to the centre tap of the supply via a low impedance loudspeaker (LS1), which forms the emitter load for each transistor. This configuration enables the input signal to be applied to the bases of the transistors in parallel, because the phase difference required for push-pull operation is obtained by using transistors of opposite polarity. TR1 is an *npn* device, so the positive half cycle of the input signal will drive it into conduction and current (I1) will flow through the load. During this period TR2 will be cut off, because the base of a *pnp* device has to be made more negative than the emitter to make it conduct. The negative half cycle which follows will cause TR2 to conduct and current (I2) will flow through the load. At this time TR1 will be cut off. Each half cycle of current through the load will combine and the waveform of the output will resemble that of the input. To minimise cross-over distortion it is necessary to bias TR1 and TR2 so that they are operating just above the cut-off point required for true Class B, but the biasing arrangements have been omitted in this simplified circuit.

Until complementary pairs of power transistors became available in quantity, some equipment manufacturers designed and built quasi-complementary push-pull power amplifiers which employed a complementary pair of low power (*npn/pnp*) transistors in the driver stage, but a matched pair of *npn* power transistors were operated as a single-ended push-pull output stage in Class B. When very high power levels of audio are required it may still be necessary to construct the amplifier along those lines.

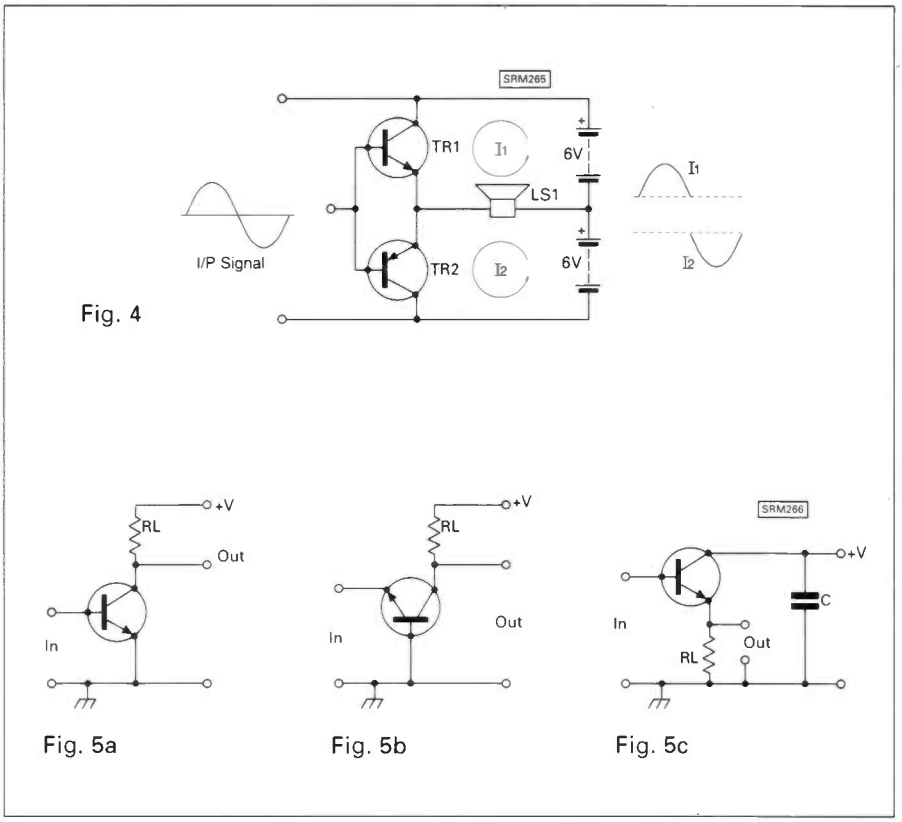


Fig. 4

Fig. 5a

Fig. 5b

Fig. 5c

Appendix

Any one of the three terminals of a bi-polar transistor may be used as the common or grounded connection, consequently there are three possible configurations as outlined below. Note: Typical values for a small-signal *npn* silicon transistor are indicated in brackets.

In the common emitter configuration the input signal is applied between base and emitter and the output is obtained between collector and emitter - see Fig. 5a. The input impedance is fairly low (500-1.5kΩ), but the output impedance is high (30k-50kΩ). The current gain varies with different types of transistor (25-200). There is a 180° phase change between input and output. This circuit roughly corresponds to a grounded cathode valve amplifier in which the input signal is applied between control grid and ground and the output is obtained across the anode load resistor.

In the common base configuration the input is applied between the emitter and base, and the output is obtained between the collector and base. The base is grounded at signal frequencies - see Fig. 5b. The input impedance is low (30-150Ω), but the output impedance is very high (300kΩ-1MΩ). The current gain is less than one (0.98), but since the ratio of output to input resistance is high (500000/50), there is a high voltage gain (>100) and hence power gain. There is no reversal of phase between input and output.

This arrangement is well suited for radio frequency amplification, especially at v.h.f. and u.h.f, as it is very stable without neutralisation. It corresponds roughly to a grounded-grid valved amplifier, in which the input signal is applied between cathode and ground and the output is taken from the anode.

In the common collector or emitter follower configuration the input is applied to the base and the output is obtained across a load in the emitter circuit. The collector is effectively grounded at signal frequencies - see Fig. 5c. The input impedance is high (20-500kΩ), but output impedance is low (15-1kΩ). The current gain is almost equal to that of the grounded emitter circuit (25-200), but the voltage gain cannot exceed one and the power gain is low. There is no reversal of phase between input and output.

This arrangement corresponds to a cathode follower valved circuit in which the input is applied between control grid and ground and the output is obtained across the cathode load resistor. The anode is effectively grounded at signal frequencies.

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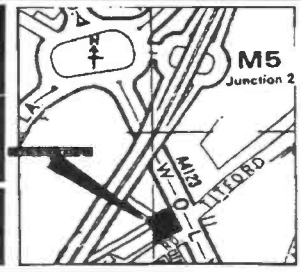

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THE LONG WAVE LONG ARM LOOP

George Millmore

Although it is possible to combine both the m.w. and l.w. loops on the same 'frame', this was ruled out, partly because the m.w. loop was already completed and partly because it would require four coaxial cables to connect the loops to the r.f. amplifier. This could cause problems when rotating the loops.It is therefore better to construct a separate l.w. version.

The Long Arm Loop was first described in the September 1987 issue of *Short Wave Magazine*, George Millmore has now designed a long wave version described here.

The Frame and Coil

The frame is made from 6mm thick plywood, screwed and glued together as shown in the drawing.

The coil is close-wound with 26s.w.g. enamelled copper wire. Drill three small holes in the bottom of the frame and thread the wire through these to anchor it. Wind on the fifty turns and drill three more holes to anchor the wire as before.

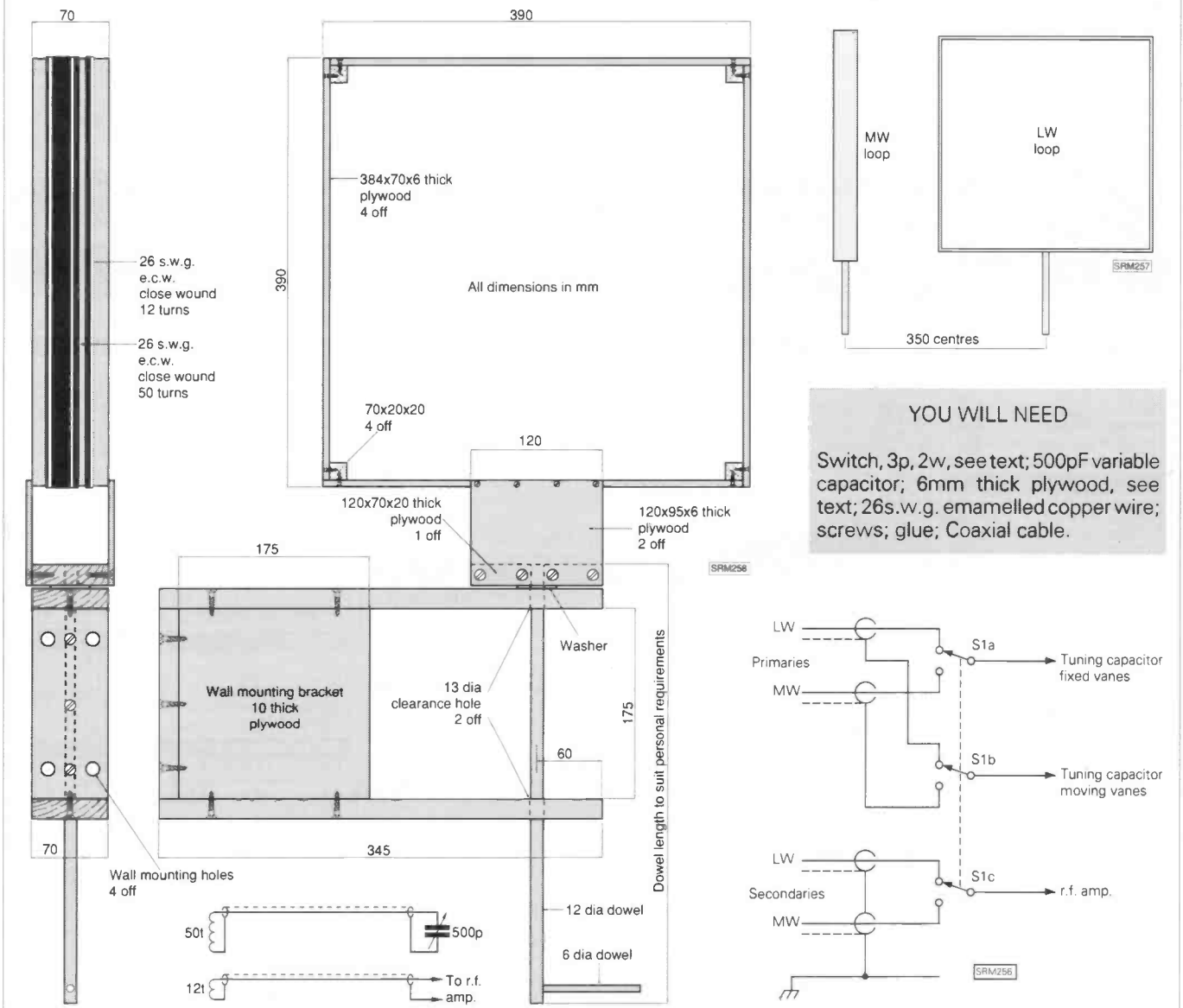
The secondary winding is wound and anchored in the same way and consists of 12 turns. The frame is square as it was found to be easier to wind a large number of turns on this rather than any other shape. Don't forget to scrape the enamel off of the ends of the wire before soldering the coaxial cable which is used to connect the coils to the tuning capacitor and amplifier.

It is only the 'head' of the loop that is of different construction, the base and mounting are as described in the September 88 issue of *Short Wave Magazine*. If the new loop is mounted as shown in the drawing, both loops can be rotated without fouling each other. The loop not in use should be turned at 90° to the other.

Switching the Loops

If a three-pole, two-way switch is used both loops can share the same r.f. amplifier and tuning capacitor. Any type of switch that will provide this combination can be used. However, if it has more than two ways then the spare contacts should be connected the adjacent ones to avoid the possibility of an open circuit. □

Abbreviations	
l.w.	long wave
m.w.	medium wave
mm	millimetre
r.f.	radio frequency
s.w.g.	standard wire gauge
3p,2w	3-pole, 2-way



YOU WILL NEED

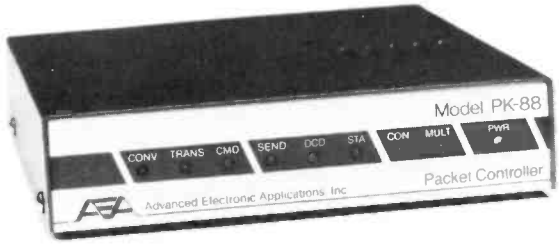
Switch, 3p, 2w, see text; 500pF variable capacitor; 6mm thick plywood, see text; 26s.w.g. emamelled copper wire; screws; glue; Coaxial cable.

ICS

ICS Electronics Ltd

Amateur Data Communication by Radio

PK-88 Packet Radio TNC



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AMATEUR BANDS ROUND-UP

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

When I last started to write the column I was feeling smug; the antenna farm had survived, and thereby disproved the old axiom: 'If it doesn't fall down in a gale, it ain't big enough!' Alas, pride goeth before a fall, in both senses, as the triband beam lost it's driven element in the second gale thanks to the breakage of a spacer between boom and element; and this demoralisation was somewhat rubbed-in when work on the repairs commenced in earnest.

Anything 'radio' that is to be used outside needs to be waterproofed. By definition if a feeder comes from antenna to shack, it is falling all the way; if water gets in, it will then follow the laws of nature and head downwards. In the process alas, it infects the inside of the cable with a disease which can't be cured by a mere drying-out. Yours truly isn't a chemist, but it seems that the water inside the cable reaches the braid and corrodes it, and then the corrosion products migrate into the polythene insulation and make it much more lossy, although its insulation may test perfect with a d.c. test meter. Up aloft the s.w.l.s tribander leads a harder life than the transmitter's one next door, insofar as the regular exercise of the transmitter on 14MHz will cause at least some warming to occur in the element traps helping to keep them dry. Some old coaxial cable deteriorates due to leaching of the plasticiser from the sheath, too.

As far as I am aware, there is no form of SO239/PL259 connector or adapter which is waterproof; and the mere act of putting an 'U' in the cable run to ensure the water can't run into the connector disregards the fact that water WILL get in, and then, by capillary action run down and then up against gravity, thus spreading the disease as before. (For the inverted-U configuration, read 'up then down'!). Some thoughts on sealing ways-and-means: Heat-shrink sleeving right over the connector; or the self-amalgamating rubber tape sometimes to be found in car parts stores as 'radiator hose repair tape' or in boat chandlers; or at the bottom end the builder's merchant and a roll of 'Denso' tape (but this stuff 'ain't arf sticky on people!'). Some people swear by the silicone rubber RTV material, but in this case avoid the grades that smell of acetic acid, as indicated on the package, as the acid can corrode coaxial connectors. Incidentally, if you use the Belling-Lee TV coaxial connector with an aluminium shell and plated steel 'olive', then water will add electrolytic corrosion (dissimilar metals) to the main problem. Belling-Lee connectors (not the junky imitations) are super things which can carry up to a kilowatt of r.f. in properly matched lines, and they are, at 75Ω, truly matched connectors - but they were NOT intended for use outside.

Obviously, you'll devote lots of time and attention to the antenna proper, but don't forget that masts and guys also take a pasting from the elements. While doing the overhaul it doesn't hurt to check all the guys, stays and mechanical parts equally thoroughly, maybe finishing off with a lick of paint. You may get some surprises... inside my mast's upper section, we found upon taking all to pieces that it contained several quite large snails which certainly couldn't have climbed up from below!

Summing it up, Totally seal everything as best you can, and then recollect that the sun's rays will degrade most things in time, and combat this by dropping everything annually for a careful inspection and repair as neccessary before re-erecting. Tip: if you start with a surplus of coaxial cable in the feeder run, then you can, each year, cut a piece off the antenna end - say, a couple of feet - which you can take indoors and open up; when you have 'filleted' it, if you see corroded braid or inner, or dirty-looking polythene, then you can throw it away and instal new stuff; if it looks OK in your sample, there is enough left to avoid a join in the run, so up it goes for another year!

Then, with all this done, when the winds blow you can sleep well knowing that at least you have done your best to avoid problems!

Events

As always, things happen. Dave G0DAX, is a devoted watcher of the Russian scene and mentions various points of interest. There have been some changes recently; in addition to the Latvian and Lithuanian prefix changes, Franz Josef Land is signing 5K2, so UA1O becomes 4K2O. UK4L is a special-event station from Lenin's home town of Ulianovsk. White Russia are using EW1 for special-event stations, and an interesting prefix is US1GB, for an international flavour. Is there a general interest among amateur-band s.w.l.s in the Russian scene - if there is and enough is written in about it, we'll make a feature of it?

During the CQ WW WPX Contest weekend, T32T will be going for the silverware, from Christmas Island but we understand they will be there between March 21-28, with demand for other modes being mopped up outside the contest, using other T32 calls. One of the operators will be VP2ML, editor of *The DX Bulletin* and *The DX Magazine*, honing his skills as part of the team. From a different source, we hear that the team will be there for a fortnight rather than a week, and that they will move on to Jarvis Island, 4-18 April, and then to Palmyra and Kingman Reef for a week at each of the latter two. QSL route not mentioned by either source.

For a couple of years we can expect to be able to log Burkino Faso activity, thanks to XT2BW. His QSL route is via WB2YQH.

The documentation supplied in respect of XW8KPL, XW8KPV and D2/LU6ELF have all been accepted by ARRL's DXCC Desk, so the transmitting types will be shunting their cards out and claiming the new ones; but we s.w.l.s of course will doubtless have better things to do with our precious cards!

Another interesting one is 9L1US, who should be active before you read this column; he is Dave, ex-J52US.

Letters

As always, some grave, some full of laughter. **Maurice Dunn BRS 92599** uses an Icom R71E and a full-size G5RV antenna; he is pretty new to the s.w.l. game, and was mightily chuffed to hear his first VK, namely VK4DLB, at 10.25 on the morning of January 18, frequency 21.336MHz. This one's QSL address is: VK4DLB, PO Box 1389, 4510 Caboolture, Queensland, Australia.

A trip to Russia for two months is in prospect for **P. Keighley** of Leamington Spa, and as a result his activity has been somewhat reduced. He is going as part of the back-up team for the 'North Pole 90' expedition and will be at the base camp where EK0AB will be operational. That should be the experience of a life-time.

R. Hastie of Exeter rushed a note off about his hearings on Top Band. He had a tune through the area 1.843MHz up to 1911 around 11.30 on the evening of February 7, and was surprised to notice such calls as PA0IJM, ES5DE, UV3DHE, RB4ANR, UA3DDP, RA3AUU, UB4JHL, YB5ZND UB4UEG, UC2IBZ, RV6AFD, EI9Q, and G3IUW, all s.s.b. They were heard on a 65' wire, fed through an a.t.u. to an FRG-8800. The night was stormy and windy, and most of the signals were around the S7 to S9 mark. Reader Hastie wonders whether this is exceptionally good, as he's never heard anything like it in 45 years as an s.w.l. In answer, we would say that this is about the time when the band begins to 'come to life' in terms of DX signals. Most of those mentioned are European, but the RV6 is getting near to Asia. The YB5 station puzzles us a little, and we suspect that he is not from Indonesia but is in fact a mis-hearing of Y35 which would be in East Germany. However, either might be possible. If it was in fact a YB5, then it was good Top Band DX on any standard, particularly on Phone. Certainly worth speculating a report to prove the point! Of course, most of the activity on Top Band is on c.w., and with the improved signal-noise ratios given by c.w., the whole world may be worked - there are nowadays scores in excess of 200 countries confirmed on Top Band only. There are one or two devoted types who have managed all continents on Top Band s.s.b., but all the high scores on this band are mainly c.w.

Steve Reader has his station in Bedworth, Warwickshire and covers all amateur bands up to and including 432MHz. The main receiver, is the old KW-202 which, as Steve says, 'can handle the big signals better than the solid-state receivers, which more than makes up for the slight loss of sensitivity.' We would question the lack of sensitivity, as the one we used years ago was quite as 'hot' as any modern receiver if not better, thanks to the absence of frequency synthesis. On the higher bands, there is an FRG-7. A home-brew receiver serves for the six-metre band, while the Eddystone 770R and 770U cover the v.h.f./u.h.f. allocations. A new FRG-

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73 from Dave G4KQH, Technical Manager.

come into play here; firstly, one man's S-point is another man's two S-points(!) but more important, secondly, the stations further away from the hill will have their low-angle signals lifting over the hill, whereas Mike's only reception from the west is by way of signals reaching him from very high angles. These by definition will have made many hops to reach him from DX. Mike might find it interesting to listen around the sunset and/or sunrise times for stations along the 'grey line'. One often finds that signals are considerably enhanced at such times.

Alistair Boyd of Livingston does much of his listening, for various reasons, while mobile, on 14 and 28MHz, both s.s.b. and c.w. Copying c.w. from the car isn't too difficult once you get the hang of it, any more than 'phone. The trick is to concentrate on the important things, namely callsign name and QTH, which can be remembered until one is ready to stop and enter up into the log. After all, on Phone one doesn't fret if a letter or word is lost but you have the sense of the thing; the same goes for c.w. The trouble here is that one must learn to write it down correctly for the Morse test, but in the practical activity one will only note what is important, just as for Phone.

Another all-mobile operator is **Rod Colvin** of Woodley, Berks who uses 18 and 7MHz to and from work. At the moment the interest is in collecting-up all the USA states, and at the time he wrote Rod had logged them all except Idaho and Mississipi.

M. Evans (Newport Salop) has a two-element beam for 21MHz, home-brewed and fed with open-wire line down to an a.t.u. which he finds will peak signals on 28, 24, 21, 18 and 14MHz - which can't be bad! As he says, the beam cost him twelve pounds, and was man enough to stand all the weather could throw at it. As he says, his favourite twelve-metre band is a rag-chewers band, and the call-collectors usually quickly go away again! W6SAI, the antenna writer, was noted one day, and using a commercial mini-beam - probably because Bill is, like yours truly, getting-on a little from his earlier, more active years.

Special Event

Over Easter weekend, Saturday 1500Z to Sunday 1500Z, listen out for GB4SMC, on the Shropshire & Montgomery Canal at Brynderwen Lock, Abermule. All sorts of people will be sponsoring the station at a penny a contact, so we shall - we hope! - be working the stations at a fair old rate anywhere between 1.8 and 29.7MHz, or even via the GB3PW or GB3CW repeaters if things slow up! The aim of the sponsorship is to raise funds equally for a couple of good causes, namely 1. the restoration of the Shropshire & Montgomery Canal with all the prospects for 300 jobs that would bring into the area; and 2. To raise funds for the Powys REMAP(Disabled) group. Remap nationally exists to devise and make special-purpose aids on a one-off basis in conjunction with the medical staff in the area. Such an activity might, for instance, include a special-purpose modification to a disabled amateur's rig. Please note, we cannot solicit donations over the air by the terms of the SES Letter of Variation, but we would be as pleased as Punch if readers sent in donations. The aim is to raise £5000, but if we beat nthis the surplus will go to fund research into Cot Death at Addenbrooke's Hospital. Our thanks, in advance. To keep costs down QSLs will go by way of the Bureau system, but s.w.l. reports will be welcomed addressed to the writer at the usual address, especially if the writer happens to be operating. Thanks to Strumech we will have a 60' trailer-mounted antenna on Bridge 146 so the event is visible, and we will have a display covering the Shropshire Canal society, IWA, BWB and so on, plus representation from Powys REMAP and the local Powys Amateur Radio Club. If you want to see it, welcome; but PLEASE, park in the layby a hundred yards on the Newtown side of the station and walk back - the road here is both busy and heavily road-hogged!

Finale

That's it for another time. Deadlines are: April 9, May 14 and June 11, addressed as always to your scribe at Box 4, Newtown, Powys SY16 1ZZ. Not just lists of calls, but all your news and views, problems and whatever - in fact whatever you care to mention! Of course, if anything happens to be entre nous then please say so, and we won't mention it in the column. Bye now!

DECODE

Mike Richards G4WNC
200 Christchurch Road, Ringwood, Hants BH24 3AS

Readers Letters

My first letter for this month addresses the thorny ongoing problem of interference. **Ken Whayman** of Bexleyheath is a comparative newcomer to utility listening though he has been proffessionally involved through his service as a naval radio operator in the early sixties. His recent interest was sparked off by a desire to make fuller use of his sons Sinclair Spectrum +2.

After checking through this column he decided to send off for the J&P RMS 3 program and cassette port. Despite still being able to copy Morse by ear it's obviously rather more relaxing to see it printed out on the screen in front of you! The first step to cracking the interference problem is of course a good antenna system and Ken uses a centre-fed "T" with a top section of about 10m and a vertical section about 5.5m long. The antenna is set-up to run between the house and a distant tree and the nearest point to the house is some 7m distant. The feed from the base of the vertical section to the receiver is made up of coaxial cable which is actually tacked along the top of the garden fence. Ken finds that this simple and compact antenna works well for him on all bands which is good to hear.

Having provided a good antenna system the next most important area is the earth. Ken's solution here is quite novel and comprises a length of 15 amp mains cable with all three conductors bunched together. One end is connected to the ground terminal on the receiver whilst the other is attached to a baked bean tin which is buried about 1.5m deep! He even has a plastic pipe next to the earth which he uses to keep it damp in the summer!

One point I would add is that if you are providing a separate earth it is vital that the earth lead is kept as short as possible and ideally less than 2.5m otherwise you may find that it is completely ineffective, from an r.f. point of view, at some frequencies. With regard to Ken's use of a baked bean tin for an earth, the ideal item for this task is an old copper water tank. Despite all these precautions Ken still had some interference problems but by using a logical approach over a period of time they were all reduced to an acceptable level. Specific items that reduced the interference were:

1) Upgrading the lead between the computer and monitor to good quality coaxial cable.

2) Fit r.f. chokes in the lead between the receiver and the computer. The actual ones used were Tandy part No 273-104.

3) Power the t.v. from a different mains outlet.

This latter point will of course be very dependant on the configuration of your domestic wiring. So there we are one listeners experiences with interference reduction. **Robert Evans** is one of the growing band of Microreader users having obtained his just a few weeks ago. Robert has now logged many c.w. stations and, judging by the log he sent in, has also cracked RTTY reception. Apparently he found amateur RTTY very easy to resolve but the commercial stations a little more difficult. The reason for this is primarily that there are many signals that sound much like RTTY but are in fact totally different systems. The solution is of course to use a frequency list to point you in the right direction.

There are many of these lists on the market, ranging from the comprehensive Klingenfuss and Ferrels guides to the easy to use Walters and Stanton publications and finally my own small frequency list! Incidentally Robert uses a Trio R-600 receiver with a selection of single wire antennas to cover the short wave bands.

Tony Leavesley lives in a beautiful 17th century listed building in York. Sounds idealic, but if you are a utility enthusiast like Tony there are a few dissadvantages. The main problem is that being an attractive listed building external antennas are not allowed. Perhaps not the end of the world as a large old house should have a good size loft. Unfortunately the loft is very restricted making a long wire rather difficult.

I know from letters I receive that the problem of restricted antenna space is very common though the reasons vary greatly. The most common solution is to use an active antenna, but which one? If you fancy having a go at some home construction C.M. Howes produce a very economical kit which I have heard good reports about. I believe you can also buy the Howes active antenna electronics ready built, so if you shy away from soldering this may be a good choice. If however you want a fully built unit there are many on the market and a glance through the adverts in *SWM* should give a good selection.

One point to note is the low frequency coverage of the antenna as many of them only go down to about 500kHz. This lack of low frequency coverage could be a problem if you are interested in receiving some of the low frequency stations such as the re-broadcast Meteosat images from Offenbach Meteo.

Ted Rickett is the proud owner of a Pocomm ARF-1000 automatic decoder and has sent me a selection of his loggings for inclusion in my frequency list. Ted is another reader with antenna problems but he currently has two solutions. The first is the use of an old Joystick indoor antenna which as far as I know are now out of production. Ted's was recovered from an old building that was about to be demolished. The second antenna comprises a a double loop of wire around his sitting room! The total length is about 50m and it is held in place with Blue Tac, not something I could get away with! The important point though is that it works. Ted uses two receivers, a Yeasu FRG-7700 and a modified ex-MoD R210. Ted reports very good results with the R-210, which he bought ready modified from J. Birkett of Lincoln.

Matching of the long wire antenna to the receivers is achieved with an ex-MoD a.t.u. which covers 1.8MHz through to 14MHz. **Jonathan Creaser** of Reading has been very busy lately judging by the very comprehensive log he sent me. The equipment in use at Jonathan's station comprises a Sony ICF-7600D with a long wire antenna and an a.t.u. The decoding is achieved with a VIC-20 running the popular RX-4 program from Technical Software. Just one request from Jonathan - does anyone know of a Morse practie program for the VIC-20?

SEEN & HEARD

Station Info.

Dick Moon from South Africa is a very keen DXer and usually follows interesting loggings with a QSL. His efforts have been well rewarded and he has quite a collection of QSL cards and letters. One of the off-shoots of QSLing is that the stations usually send you details of transmitters that they operate and sometimes include frequencies and schedules. One of Dick's most interesting 'catches' was the British Airways Speedbird Concorde 004, though I think this was actually a phone contact. Anyway back to the point which is a selection of interesting station details which you may find useful.

Frequency: 12.867MHz
Callsign:
Power: 10kW from AN/FRT-96 transmitter
Antenna: Omni-directional.
Location: 80km from San Miguel, Phillipines.
QSL Address: Department of Navy, US Naval Communication Station, FPO, San Francisco 96656, USA.

Frequency: 6.738MHz
Callsign:
Location: Hickam, Hawaii
QSL Address: Department of Air Force, Headquarters 1957 Communications Group (AFCC), Hickam Air Force Base, Hawaii 96853-6345

Frequency: 6.556MHz
Callsign:
QSL Address: Cocos (Keeling) Island Air Terminal, Cocos (Keeling) Islands, Indian Ocean, Australia 6799

PC HF-FAX

Regular readers may remember that I recently made mention of a reader using this fax program for IBM PC compatible computers. At the time the only source I was aware of was in the USA, but that is no longer true as this package is now handled by Comar Electronics in the Isle of Wight.

Just to make things really interesting Comar have even sent me a review copy of the program! I have only had time for a short play with the program but it looks very impressive and the screen resolution with VGA graphics is excellent. I will obviously be putting together a review which will appear in brief form in this column but probably in a little more detail in our sister magazine *Practical Wireless*. Just to whet your appetite here's an out line of some of the major features of this program.

Let's start with the hardware requirements which are basically an IBM PC compatible with a minimum of 384K RAM. On the video side the program supports CGA, EGA, HGA or VGA graphics adaptors. A serial port is required for the decoding module along with MS DOS version 2.1 or higher. All the standard drum speeds are catered for e.g. 60, 90, 120, 180 and 240 r.p.m. As far as the IOC settings are concerned these are handled by setting the clock rates. You have the option of viewing the received image in a number of formats ranging from full gray scale monochrome through black/white for charts and custom colours. This latter option is useful for identifying temperature differences on rebroadcast Meteosat images.

Once an image has been received there are a wide range of manipulation tools available to tidy up the image. For complicated charts there is a zoom option which allows you to take a closer look at selected areas. The image can also be flipped and inverted to your hearts content! If you have a VGA card you even have the option to lighten or darken the image to taste! Of course the received images can be saved to disk for later retrieval. They can also be converted to PCX format for handling within a desktop package. So there we are a brief run down of some of the major features of this impressive program. If you find you cannot wait for the review Comar Electronics can be contacted at: 1A Birmingham Road, Cowes, Isle of Wight PO31 7BH. The phone number is (0983) 200308.

FAX Frequency List

Jan Nieuwenhuis from The Netherlands is a regular contributor to this column and has just released his own FAX frequency list based on his own loggings over a period of time.

The book comprises some thirty A5 pages which are divided up into six chapters. The first chapter is an alphabetical list of FAX stations listing country, frequency, callsign and notes for all frequencies associated with that station. The main content of the notes was the known transmission times which is a great help to the listener. This is followed by the frequency list which contains the same information as the previous section but of course indexed by frequency. The next section is a callsign list which is useful for digging out more information on a station when you only have the call. As a number of alternative frequencies are listed, this can be used to select a better frequency for monitoring that station.

The penultimate section comprised a very useful list of QSL addresses. I know that this section is likely to be very accurate as Jan is very keen on this area of the hobby and often sends me details of his QSLs. The final section contained a simple listing of the abbreviations used in the book. One interesting little extra with this publication was that the text was broken-up with samples of the QSL cards that Jan has received. Your next question of course is how do I get hold of a copy? The answer is simple, just send 1.9 Dutch Guilders to Jan and he will send you a copy airmail providing you live in Europe. Outside Europe the price is 10.0 Guilders and in Holland it's 1.8 Guilders. The address to send to is Jan Nieuwenhuis, Vloedlyn 12, NL-1791 HH Den Burg, The Netherlands.

Frequency List

For a copy of my latest full list please send three first or second class stamps to the address at the head of the column. Don't forget, a few more logs to add to the frequency list would be appreciated, no matter how large or small. The selection of frequencies for this month is presented in the usual format of frequency, mode, speed, shift, callsign, time and notes.

4.704MHz, FAX, 120, 576, AOK, 2030UTC, USN Rota
8.459MHz, FAX, 120, 576, NOJ, 1802UTC, USCG Kodiak
10.61MHz, RTTY, 50, ?, ?, 1655UTC, MENA Cairo
11.25MHz, RTTY, 50, 425, ?, 1125UTC, ADN English news.
11.3MHz, RTTY, 50, 425, ?, 1130UTC, ANSA French News
13.003MHz, RTTY, 75, ?, CTU2, 0800UTC, PN Monsanto
13.437MHz, RTTY, 50, ?, RPFN, 1716UTC, PN Monsanto
13.524MHz, RTTY, 50, ?, YIO72, 1718UTC, INA Baghdad
13.92MHz, FAX, 120, 576, AXM35, 0820UTC, Canberra Meteo
14.497MHz, RTTY, 50, ?, CSY, 1707UTC, Santa Maria air
16.136MHz, RTTY, 75, ?, BZR66, 1139UTC, Xinhua Beijing
16.21MHz, RTTY, 50, ?, DDK, 1621UTC, Meteo
18.364MHz, RTTY, 50, ?, 9PL, 1702UTC, Kinshasa Air
19.39MHz, RTTY, 50, ?, Y7A76, 1130UTC, MFA Berlin
19.823MHz, RTTY, 50, ?, 5AF, 1104UTC, Tripoli Air

INFO IN ORBIT

Lawrence Harris
5 Burnham Park Road, Peverell, Plymouth, Devon PL3 5QB

Storms

The storms of mid-January took their toll of both my roof and satellite dishes but hopefully both are covered by my insurance policies! I have a home-made dish for Meteosat made of an open structure using chicken wire supported by a wooden frame. It provides a good signal and looks acceptable if not impressive.

When the official forecast indicated strong winds were likely I disconnected all the cables and the down-converter and brought them inside. The dish was then moved against a wall to minimise wind resistance.

The other dish is very substantial and normally points at GOES-E. During the height of the storm the dish blew over and the shape got distorted. I set it up a few days later and was relieved to find that its performance was not seriously affected. I'm still hoping to find a supplier of Yagis for 1690MHz - any suppliers reading this please get in touch!

You might wonder what the professionals do when storm force winds are forecast? Some years ago I was a controller on the Infra-Red Astronomical Satellite project and part of the safety procedures included wind speed monitoring. On such occasions we had to 'stow' the dish, that is, point it vertically up and apply the brakes. Fortunately I recall that there were very few instances when that proved necessary.

Secrets

A letter from 'north of Watford' together with a tape of satellite sounds came from a reader who doesn't want too much revealed because he suspected that he might have picked up secret satellite signals. The recorded sound, however, was probably of a more mundane nature because it was heard on frequencies used by the Fleetsatcom geostationary satellites. The Americans publish this data because military information is obviously encoded. There are many amateurs occasionally listening in to these transmissions so I don't believe that we have any problem with secrecy. The reader may not be aware that the law on reception of signals was changed last year; details were published in *SWM* at the time.

Shuttle Monitoring and LDEF

Mr J. D. Pyle wrote from Peterborough to say that he had been able to listen in to January's shuttle mission with his Lowe HF-125 receiver tuned to 21.393MHz u.s.b. He heard the crew talking with the lady mission controller as they prepared to rescue the Long Duration Exposure Facility (LDEF) satellite at 1517UTC, or, as mission control said, quotes Mr Pyle, 2 days 3 hours and 41 minutes into the mission. The broadcast was organised by the Goddard Amateur Radio Club. I was unable to listen to that shuttle flight owing to illness.

LDEF was originally deployed in April 1984 by STS-41C some 300 miles up and carried 57 science and technology experiments. It would have been retrieved 4 years ago but for the Challenger disaster.

Ken Whayman of Bexleyheath is primarily a shortwave listener who is interested in RTTY and FAX decoding and writes to say that he wants to venture into space! Ken has a Spectrum 128 computer and was thinking about buying a Commodore C64 or a VIC 20 and was wondering whether they could be used for displaying satellite pictures.

I mentioned this problem in a recent column so may I summarise by pointing out that these and similar computers having only a small amount of memory cannot be used very effectively for decoding and displaying weather satellite pictures. At best it could be possible to display 8 grey levels given the availability of suitable software. When you see the

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IMPORTANT

Contrary to Mr James Finch's claim, (Solid State Electronics of Southampton) in his letter to this magazine, the Jupiter does have a 705MHz IF strip! It pays to deal with a company that knows its own products and has the qualified engineers able to give you support and correct advice when purchasing your equipment. WATERS & STANTON, 17 years in the business. Perhaps not a "world first", but an honest statement!

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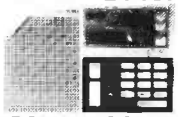

150kHz – 30MHz

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results produced by framestores and more sophisticated computer systems you can appreciate the reasons for not using small memory computers.

Ken comments on the many receivers that can tune into the 137MHz APT band and asks for advice on purchase. I mentioned the importance of choosing a proper weather satellite receiver in a recent column so I won't list all the details here but I have written to Ken separately.

I have only sampled a few receivers, those that I have bought or made myself so I wouldn't want to recommend specific models without at least trying them myself for comparison purposes.

Finally Ken asks about antennas. He uses a horizontal 'T' antenna and wonders about using a discone. Satellites are usually spin-stabilised and so for the best results, particularly when you want to produce good quality pictures from the signal, a crossed dipole is the best and they are not expensive - they cost about £30 - £40.

I do believe that receiving satellite signals and producing pictures from them is a most instructive and absorbing hobby and I am regularly asked about the availability of books on setting up suitable systems. I have compiled my own collection of notes spread over several years while I was going through the traumas of designing suitable equipment. If I can interest our editor I shall try to produce a guide to the various systems available and include details on designing your own.

Meanwhile I have received some manufacturers' literature which I read carefully and keep for reference.

The NOAA satellites

During the winter months the mid-afternoon visible pictures from NOAA 9 on 137.62MHz show low contrast because of the low angle of solar illumination. Even after carefully adjusting the black and white settings on the framestore the picture contrast of the UK is so poor that I usually use the infra-red pictures from NOAA 9 instead. Some readers may have the type of framestore which does not incorporate black and white level adjustments and unfortunately this will mean that they cannot adjust the unit to achieve a full 64 grey levels from the infra-red pictures.

The dynamic range of the visible pictures from NOAAs 9, 10 and 11 allows a full 64 levels to be obtained. The picture data transmitted in the infra-red section of the APT signal is more limited in its dynamic range and requires a circuit to allow adjustment of the span of the A to D convertor to use the full capability of the framestore.

With this circuitry fitted you can get near perfect pictures from any APT satellite but the best improvements are always noticed with the infra-red pictures.

Listening to the signal of NOAA 9 as it travels northbound towards the pole you will hear the change when the spacecraft enters the region. The visible part of the NOAA picture has then changed to a water vapour image and the audio effect is quite marked.

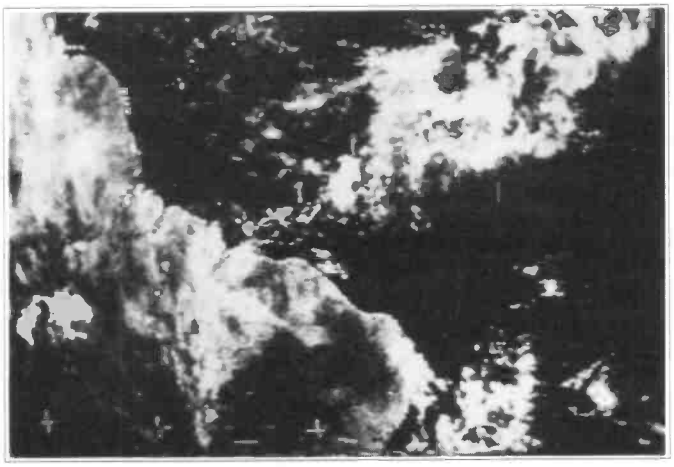

Fig 1: From Met-4 of the C4D format which includes the Amazon area taken last August.

During the morning pass of NOAA 10 (which transmits its APT on 137.50MHz) you can hear the reverse effect. Around 8am each morning, give or take half-an-hour or so, this APT satellite is travelling south passing over the north pole and coming into sunshine over the UK. Not long after its signal is first heard on a winter morning, the sound of the APT changes from the tick-tick of the infra-red and water images to the tick-tock of the infra-red and visible images. The spring, summer and autumn morning NOAA 10 pictures give you an excellent means of forecasting the day's weather, and you may be more accurate in your forecasts than the official bodies whose observations are made some hours previously.

NOAA 11, also transmitting on 137.62MHz remains the best source of mid-day pictures of the UK and European environments, passing over as it does between about 11am and 3pm each day, some 2 hours before NOAA 9 and so enjoying a rather higher sun angle. On those occasions when the 2 spacecraft are both above the horizon at the same time you will find that NOAA 9 is not transmitting APT but can still be tracked by tuning into its beacon frequency. The NOAAs use 136.77 or 137.77MHz for this purpose.

The Russian APT scene

The quiet spell when there was little change on the Russian satellite scene appears to be over with the reactivation of the Okean satellite and met 3/3 changing from continuous transmissions to only visible.

In mid January, after a long spell of many months without any cosmos transmissions I heard the recognisable tones of an oceanographic satellite transmission.

The picture was of the visible format showing clouds over land and including a number sequence along the side of the picture. I think that this was Okean 1 doing a test transmission. Kepler elements for Okean are slightly more difficult to get hold of so I have made some requests but perhaps too late for inclusion here.

A few days later I heard a further transmission from Okean which lasted for about 3 minutes. The familiar number sequence was included along the side of the frame and indicates the state of various pieces of on-board equipment. The number sequence includes a small grey scale called a gradation wedge and just above that scale, the number 1022 was visible. If you monitor the number in this position you will see that it increments each minute. It is the starting time in minutes relative to Moscow and converting the figure to GMT gave 1402UTC which was the actual time of the transmission. This proved that the picture was a realtime one since replays of recorded pictures always show the true time of picture collection.

Further pictures from Okean have been received at my station during February, one on the 4th lasting from 1102UTC until 1109UTC but unfortunately I could not identify the land mass and so was not able to produce some new Kepler elements.

The Okean series, like those before it, transmit on 137.40MHz but are instantly recognisable as oceanographic APT satellites from the sound of their signals. Their pictures do not include the characteristic bars and grey scale that the met series transmit.

The Russian Mets

The long running Russian meteorological satellites 2/16, 2/17 and 2/18 have continued without problems. Met 2/16 is passing northbound during the day and providing pictures on its APT frequency of 137.40MHz. At one time, many months ago, when in darkness, it transmitted a type of infra-red picture with a low scan rate. Just when circuits were being published for the proper decoding of this unusual format the transmissions ceased!

Met 2/17 on 137.40MHz is not currently in operation over the UK because it is passing over us in darkness for both the morning and evening passes.

The last of this series, Met 2/18 is passing northbound over the UK during the day and transmitting APT on 137.30MHz. This series does not transmit in darkness and so during southbound passes over the pole no transmission is heard until sunlight is reached at which time a strong APT transmission is received.

Met 3/2 and 3/3

During January the pictures from 3/3 remained very good and I saw a pass which included Cyprus and the whole of the eastern end of the Mediterranean. On 3 February at 1708UT I heard signals from 3/3 over to the far west, so low that my predictions program would not give me times for the pass. Identification was not difficult because apart from the frequency the pass happened about 110 minutes after the previous 'last' pass.

At the time of writing transmissions are now being received from Met 3/2 and 3/3 is no longer on. Both use 137.85MHz.

Meteosats 3 and 4

For some weeks now Meteosat pictures have been received via Meteosat 3 and are therefore somewhat noisier, at least on my equipment. The satellite suffers from a problem with one or more of the dipoles and so deep fades are seen. This satellite was being manoeuvred towards the USA as mentioned in a previous column when problems struck Meteosat 4. Consequently, while Met-4 is undergoing examination, Met-3 has been drifted back for operation. Hopefully the problems will soon be corrected.

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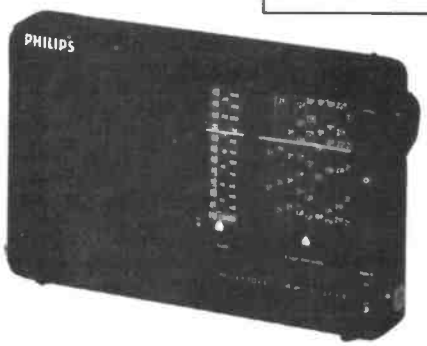

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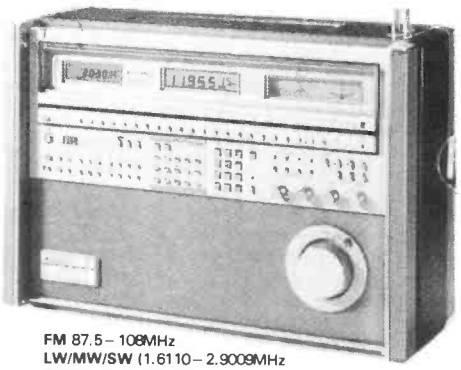

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SEEN & HEARD

BAND II DX

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

Weather

I had set aside January 25 to write for *PW* and *SWM*, the wind was really blowing and a fair bit of rain was falling so, on with the office fire and the trusty Amstrad PCW and work began. By 1030 our mains had been on and off several times which is no good for computing and around 1045 we lost the supply completely. At midday we were being battered by hurricane force winds and Joan and I just watched helplessly from the window as tiles were ripped from the roof.

Once again my Short and Mason barograph showed a dramatic fall in atmospheric pressure, Fig. 1, as the great storm went through the region leaving a trail of destruction and sadly the loss of lives. Despite the high winds, I did get a chance around 1530 to get outside to examine the damage and take some photographs of the angry storm clouds as they crossed the south downs, Fig. 2. A second, but less severe storm passed through on the 27th. One good thing about the wild weather was that I recorded 5.97in of rain in January, plus another 3.71in by the time of posting this work on Feb. 14. Don't forget you can obtain a weather map by using the BBC's CEEFAX page 581 and ITV's ORACLE page 161 also a shipping forecast on ORACLE page 162.

Although I did see part of the lunar eclipse through thin cloud cover at 1800 on the 9th, a serious observation was rendered impossible due to overcast skies.

Tropospheric Openings

While the predominantly high pressure of 30.55in (1034mb) fell to 30.35in (1028mb) during the morning of January 19, I counted at least a dozen foreign voices and many co-channel 'warbles' in Band II. The pressure returned to its former level between 1500 on the 19th and noon on the 20th and at 0845 on the 21st I heard BBC Radios Bristol and WM and a Belgian station, all around 95.5MHz.

Fig. 2: Angry storm clouds over the South Downs.

Info

"You may like to know that CEEFAX and ORACLE provide an excellent engineering news service, presumably aimed at TV dealers and aerial contractors," wrote **Dave Taskis** (Romford) and detailed CEEFAX page 698 and ORACLE ,ITV and CH4, on pages 297 and 697 respectively. Dave uses a Sony ICF2001D receiver for his interests in aeronautial mobile and data reception and gets "wonderful results" on Band II with a Technics STG7OL stereo tuner and a TRIAX OMNI FM2 antenna from Aerial Techniques. Thanks for the tip Dave,

I tried this on February 2 and turned up page 297 on ORACLE and learnt that County Sound's Delta Radio entered service for the Haselmere area, using vertical polarisation on 97.1MHz from Holycross, at 0745 on January 25. A quick tune on my ancient ex-military R216 followed and there I found a reasonable signal from this new station.

"A look at Teletext on 697 and 297 can often be worthwhile for Engineering informations," wrote **Peter Finn** (Milford Haven) on February 9 and points out that there are IBA Engineering Information broadcasts at 0545 each Tuesday on Ch4 and suggests that readers with a video recorder could record the programme ready to watch at a more convenient time. He added, "I would mention just two things from this weeks programme, one was about Radio Forth (97.3MHz) and concerned a relay at Bathgate on 97.6MHz which is due on air in 2 weeks. Another was about Signal Stafford on 96.9MHz due to start trade tests on 7 Feb and using vertical polarisation".

A good few miles south of Stonehaven, **George Garden** (Edinburgh) found a high spot looking down over the hills and a large valley and using his car-radio received a good signal from Radio Tay in Dundee. However, George was really interested in the identity of the station immediately adjacent which, although fading, was very strong at times. "It talked about events in Hawick and Galashiels which is in the Scottish border country," said George who soon found out that it was IBA Radio Borders. He said that this is a new region a bit further south from Black Hill with studios based in Melrose.

"I read about this new area in the local paper and it is interesting that although Radios Tay, Forth and Borders are all separate entities, they are owned, all three, by Radio Forth in Edinburgh and some programmes use all three transmitters," said George. He was amazed to find that he could still hear a weak signal from R.Borders on the low ground near Laurencekirk and points out that a car-radio is a good way of testing the extremes of a signal. "Borders radio programmes have been received here on a daily basis from Eyemouth (in noisy stereo) and Selkirk (fair stereo with little noise) since the programmes began on 22 January," wrote **David Glenday** from Arbroath on February 4. "Both transmitters were broadcasting a test tone the previous day. Selkirk on 96.8MHz and Eyemouth on 103.4MHz," David added.

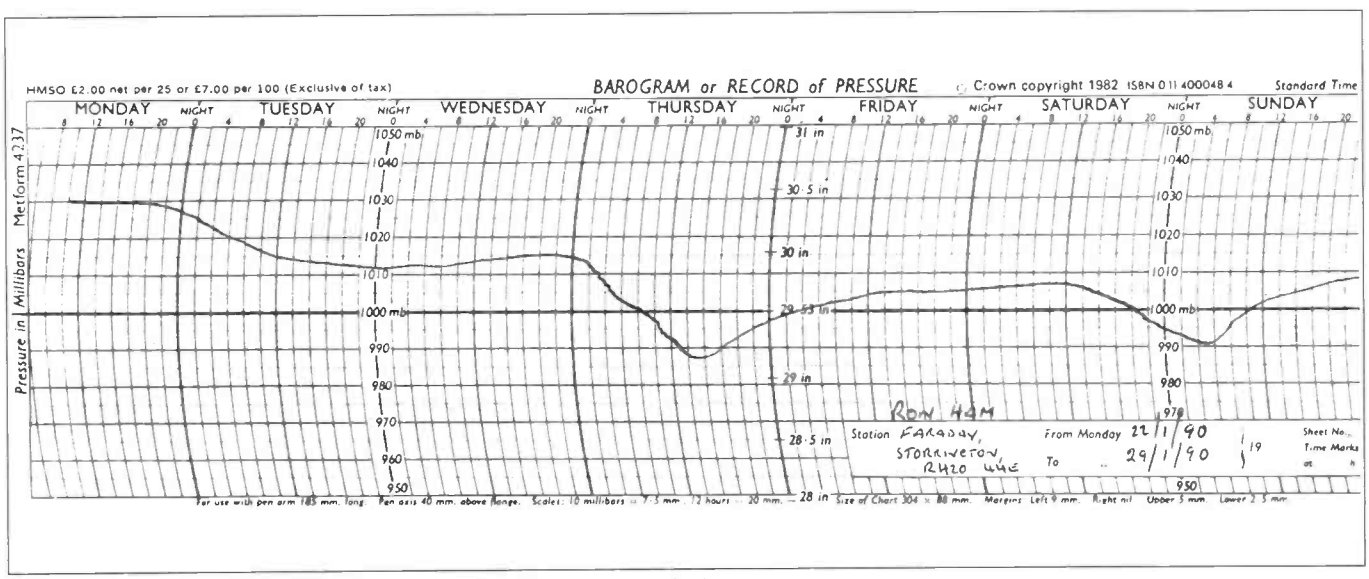

Fig. 1: Ron's Short and Mason barograph for the storm period.

SEEN & HEARD

TELEVISION

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

By the time you read this many of our new DXers will be looking forward to the 1990 Sporadic-E season and hoping to see for themselves, on their own sets, some of the super television pictures, from Scandinavia to the USSR, that I frequently receive from my readers and publish in this column. Do remember lads and lasses, be patient, because we only receive long distance (DX) signals by kind permission of a disturbance within the troposphere or the 'E' region of the ionosphere. The former occupies the first 8km and the latter forms, between sunrise and sunset,about 100km above the earth's surface.

Briefly, tropospheric DX is caused by changes in weather and movements of high pressure systems and longer distance DX, via Sporadic-E, occurs when the 'E' region of the ionosphere suddenly breaks up into clouds of more densely ionised gas. Although there are always exceptional circumstances like a super opening, the general rule is that the paths of signals between 30 and 80MHz are influenced by Sporadic-E and above 80MHz are enhanced by changes in the troposphere. This means that we can look for DX in Band I (48-68MHz) when Sporadic-E is present and in Bands III (175-230MHz), IV (471-608MHz) and V (615-856MHz) during favourable weather conditions. Mid-April to mid-September, with peaks in June and July, are the expected limits for Sporadic-E and any time that the atmospheric pressure is high, say above 30.2in (1022mb) and the weather is fine and clear is ideal for a tropospheric opening.

The TV Bands

Bands I and III are recognised internationally as v.h.f. and Bands IV and V as u.h.f. Unlike the u.h.f. bands, the two v.h.f. bands are no longer used in the UK for domestic television which of course, for the time being, leaves the way clear for Asiatic and continental signals to be received here when conditions permit.

Each band is broken up into channels and receiver dials are usually scribed with their numbers, such as 2, 3 and 4 for Band I; 5 to 12 for Band III and 21 to 68 covering Bands IV and V. The television section of the *World Radio TV Handbook* will show which countries transmit their programmes on these channels. This book is published annually and a copy is likely to be found in the reference section of your local library or the latest edition can be purchased from PW Publishing Ltd, FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP, price £18.99 plus 75p post & packing.

DX Indicators

Radio engineers and enthusiasts have known for several decades that signals transmitted around 50MHz are the most vulnerable even to a mild outbreak of Sporadic-E, therefore good television check points are Chs. E2 and R1 which, in frequency terms, is 48.25 and 49.75MHz respectively. On these channels you are likely to see programmes and/or test cards from Scandinavia and Spain on Ch. E2 and Czechoslovakia, Poland and the USSR on Ch. R1.

These events can literally last from a few minutes to several hours and experience has shown that a Sporadic-E disturbance often spreads upwards taking in the Italian Chs. Ia and Ib (53.75 and 62.25MHz), E3 (55.25MHz), R2 (59.25MHz) and E4 (62.25MHz). In addition, transmissions from other countries such as Portugal, Switzerland and Yugoslavia can appear on Ch. E3, Hungary and Romania on Ch. R2 and Finland and Iceland on Ch. E4.

Extra lines and background patterns appearing on your domestic television receiver usually indicates the early stages of a tropospheric opening. Then is the time to tune through Band III looking for pictures from Belgium, France, Germany and Holland. This too can spread and sometimes really clobber the entire u.h.f. band, but more about all this in the future because, it's time to talk about the activity reports for the first couple of months of 1990.

Band I 'F2'

John Woodcock (Basingstoke) found unlockable pictures in Band I on January 11 and 23 and at noon on the 23rd heard very strong middle east type music in the band. From New Radnor, **Simon Hamer** reports seeing "smeary" signals on Ch. E2 around 1230 on January 17, 18 and 30. "Plenty of 'F2' reception, I wish I was able to identify the source," wrote **Bob Brooks** (Great Sutton) on February 1. I agree Bob, all that good DX going to waste, hi. Periodically in Janaury, Bob found the usual smeary and jumbled signals via 'F2' openings around Chs. E2 and/or R1.

Band I Sporadic-E

Bob Brooks saw Spain's TVE NEWS at 1406 on January 3 and 1940 on the 5th, programmes from Norway, Spain and Yugoslavia during the evening of the 11th, a clock caption, teletext, and a test card (MTV BUDAPEST) from Hungary at midday on the 13th, a Norwegian regional test card (STEIGEN) at 1212 on the 15th, a cartoon, skiing and the PRAGUE (PRAHA) logo from Czechoslovakia at 1640 on the 16th and programmes from Spain around 1630 on the 22nd. Simon Hamer logged pictures from Sweden (SVT1) on January 16, Finland (YLE TV1) on the 19th, Norway (NRK with DAGSTERGEN (news) at 1830 on the 21st, Iceland (RUV), Norway and the USSR on the 23rd, Austria (ORF1) on Ch. E2A (also 49.75MHz), Hungary (MTV1), Italy (RAI-UNO) and the USSR on February 3 and Denmark (DR), Czechoslovakia (CST1), Italy and Poland (TVP) on the 4th.

"An exciting moment occured on January 5 when I decoded Hungarian teletext via Sporadic-E on R1," wrote **David Glenday** (Arbroath) and added, "I've received similar stuff from Spain, Austria and Italy on my Philips via the D-100, this Hungarian reception proves that SECAM teletext can also be decoded on a PAL-only telly." David reports that where we see CEEFAX or ORACLE uppermost on our screens, their top line page header is titled KEPUJSAG. That evening he received strong pictures from Austria and resolved their teletext header (ORF-TELETEXT) and some detail from their title page 100. He also caught Spain's TVE1 from 1610 to 1625 on the 3rd, the Russian CNOPT (sport) caption at 1557 on the 11th, some pictures from Italy from 1720 to 1800 on the 12th and a caption from Estonia ('EESTI NAITUS') at 1725 on the 15th.

Picture Archives

During the 1989 Sporadic-E season, **David Hunt** (Brighton) received pictures in Band I from Estonia Fig. 1, Iceland Fig. 2 and Sweden Fig. 3, using a deluxe D-100 converter into a Sharp video recorder with a discone antenna. Note the strength of those signals and the co-channel interference on Fig. 3. In February and March 1989, **Lt. Col. Rana Roy** (Meerut, India) received typical 'smeary' pictures from Malaysia, Figs. 4 and 5 on Ch. E2 via an 'F2' opening and from Lahore in Band III, Figs. 6 and 7 while tropospheric openings were in progress in July and September. It was the good u.h.f. conditions last May that enabled David Glenday to receive one of Germany's NDR idents from the transmitter at Cuxhaven Fig. 8, on the 20th and **George Garden**

Fig. 1: Estonia

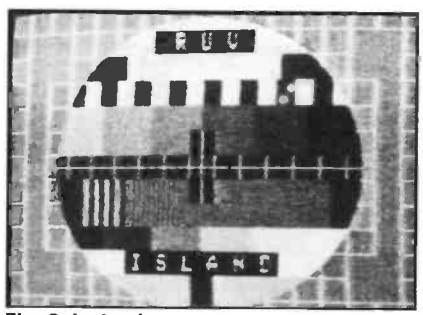

Fig. 2: Iceland

Fig. 3: Sweden

Fig. 4: Malaysia

Fig. 5: Malaysia

Fig. 6: Lahore

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Fig. 7: Lahore

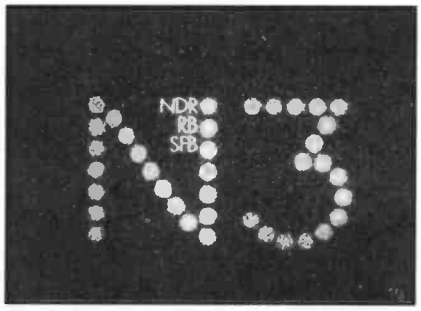

Fig. 8: W. Germany

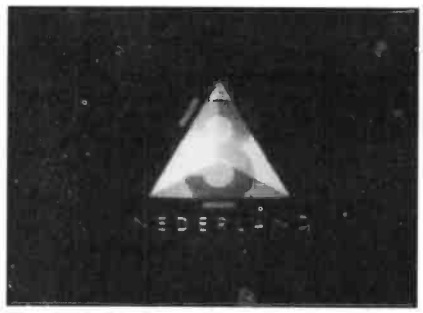

Fig. 9: Holland

Fig. 10: Holland

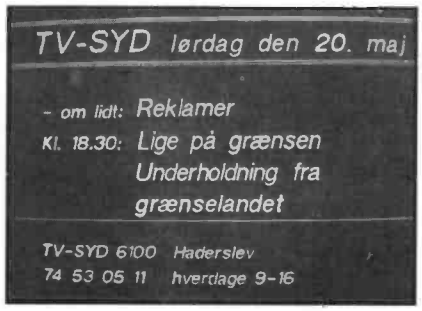

Fig. 11: Denmark

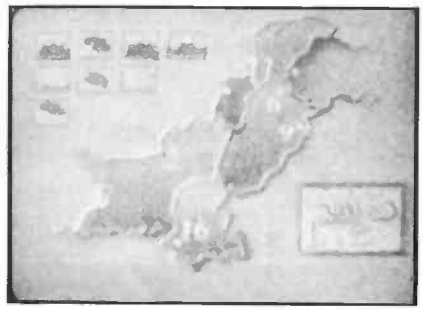

Fig. 12: Lahore

(Edinburgh) to catch a Dutch logo Fig. 9, from his favourite DX spot high on Cairn O Mounth on the 22nd. David also saw an announcer from VERONICA on Nederland 2 Fig. 10, on Ch. E47 on the 17th and a regional programme caption from Denmark Fig. 11, on Ch. E30 on the 20th. Many of our readers are interested in the weather so this time I have included the "weather report and temperatures in cities", Fig. 12, which Rana Roy received from Lahore TV during a tropospheric opening at 0800 on January 31, 1989.

Tropospheric

David Glenday received pictures from Belgium (BRT-2) and Holland (NED2&3) in the u.h.f. band on January 3 and John Woodcock logged (CANAL+) from France in Band III at noon on the 10th and 23rd. I noticed some weak co-channel interference on several u.h.f. programmes over the midnight period of February 8/9 shortly before the very high pressure of 30.5in (1032mb) began to fall at midday on the 9th. My barograph has shown so many ups and downs, ranging from 30.6in (1036mb) to 29.2in (988mb) during the past few weeks I am not surprised that there has been little tropospheric DX to report.

YOUR NEXT THREE DEADLINES ARE: APRIL 16, MAY 18 & JUNE 15

LONG MEDIUM & SHORT

Brian Oddy G3FEX
Three Corners, Merryfield Way, Storrington, West Sussex RH20 4NS

Although British Summer Time (BST) commenced on March 25 it is important to continue to quote the time in your reception reports to overseas broadcasters and LM&S in Universal Time Co-ordinated (UTC), which is one hour behind BST. UTC is for all practical purposes the same as Greenwich Mean Time (GMT).

Long Wave DX

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

The final stage of the l.w. band plan was implemented on February 1 without a hitch and the broadcasters are now operating at 9kHz intervals throughout the band. The upper band limit is now 279kHz and the chart hereto shows some of the frequencies now in use. The main advantage offered by the plan is that future l.w. and m.w. receiver designs can be based on a relatively inexpensive frequency synthesiser instead of a tunable local oscillator, since only 9kHz steps will be required to receive any station in either band.

MW Transatlantic DX

Several of the broadcasts from Canada and the USA have been received for the first time by **David Hunt** in Brighton. During an initial check he heard WINS in New York, NY 1010 at 0200 and CKCW in Moncton, NB 1220 at 0247. On subsequent occasions he logged the Caribbean Beacon, Anguilla 1610 at 0030, CJYQ St.John's, Newfoundland 930 at 2245 and VOCM also in St.John's on 590 at 2259. Encouraged by these results, David is now busy constructing a "Sooper Loop", so no doubt he will soon be hearing even more DX!

The construction of a giant 1.4m spiral loop has been completed by **Mark Thompson** in Wakefield. It is mounted on the wheels of an old TV stand so that it can be easily moved to any position. The loop is performing well and already several new stations have been logged! It has also enabled Mark to identify a station which he heard last month on 1410kHz - it proved to be WELM Elmira, NY. The earliest signal to reach him stemmed from VOCM on 590 at 2157. He also heard CBN in St.John's on 640 at 2339, their 10kW transmission rated SIO 333, whereas the signals from CJYQ on 930 were rather weaker, peaking SIO 222 at 2354. At 0201 he picked-up the 1kW transmission from CFYQ in Gander, Newfoundland 1010, which was radiating the same programme as CJYQ. Although three broadcasts from S.America reached him, he was unable to identify two. The signal from Radio Globo in Rio, Brazil on 1220 rated as SIO 333 at 0043.

The broadcasts from Radio Globo on 1220 were also received by **Jim Willett** in Grimsby around 0010. At 0420 he heard Radio Buenos Aires, Argentina on 1350. Using his trusty RCA AR77 receiver, Jim also picked-up five signals from Canada, four from the USA and three from the Caribbean area, see chart. In Bristol, **Tim Shirley** found the propagation conditions between the USA and the UK to be rather poor, but he heard some potent signals from Canada. On one occasion he rated the 50/10kW transmission from CHAM in Hamilton 820 as SIO 444 at 0400.

Other MW DX

Many interesting signals were heard, the most distant stemmed from North Africa. Listening in Co.Down, N.Ireland **Eddie McKeown** picked-up the 200kW transmission from Tanger, Morocco on 1233, which he rated as 22222 at 1952. Two of the broadcasts from Algeria were logged by **Sheila Hughes** in Morden, namely Ain Beida 531 (600kW), rated as 33333 at 2345 and Alger 981 (600/300kW), noted as 33322 at 0003. The extensive log complied by **Mark Selby** (Aldershot) included Rabat, Morocco 819 (25kW), rated as 43434 at 0530 and three stations in Algeria: Ain Beida 531, 43343 at 0345; Algiers 891 (600/300kW), 44344 at 2200; also Alger 981, 44333 at 0155.

Quite a number of the broadcasts from Spain were received by **Ike Odoom** in Glasgow. His interesting log included several of their low power outlets, the most notable being the 5kW transmission from Oviedo on 1521, which he rated as SIO 222 at 0500. The broadcasts from Yerevan, USSR on 702 (100kW) attracted the attention of Tim Shirley at 0200. He also logged some of the many other transmissions from the USSR, see chart.

MW Local Radio DX

Many local radio DXers search for the ground wave signals from the transmitters during daylight, but the sky wave signals from distant transmitters can also be logged after dark, as the latest chart clearly shows!

In common with some other ILR stations Radio Clyde and Radio Forth are now broadcasting different

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programmes on their m.w. and v.h.f. outlets. Ike Odoom informs me that Radio Clyde have adopted the name 'Clyde 2' for their m.w. service on 1152kHz and Radio Forth now refer to their programme on m.w. (1548kHz) as 'Max AM'.

A report on a transmission from Sunshine Radio on 1413kHz was noted in the LM&S text for Feb'90, but **Martyn Williams** (Sunningdale) informs me that the correct title is Sunrise Radio, being the third of the IBA's community stations. Their broadcasts are primarily intended for listeners in Hounslow, Brentford, Ealing, Southall, Greenford and Acton, but no doubt they will be interested in reception reports from other areas too, see Station Addresses. Another community station, to be called Spectrum Radio, should start broadcasting in May via Lots Road, London on 558kHz.

Short Wave DX

Long distance reception in the h.f. bands has been disrupted by the effects of solar flares during some days and prolonged fade-outs have been noted from time to time. During most days however, potent signals have reached the target areas chosen by broadcasters around the world.

"Just like a local" is perhaps the best way to describe reception of the **25MHz (11m)** broadcasts from Radio RSA in Johannesburg in the UK! Their afternoon transmission to Europe on 25.790 (Eng 1400-1600) often peaks SINPO 55555, as noted at 1453 by **Darran Taplin** in Tonbridge. Their transmissions have also been reaching Quebec, Canada, where **Alan Roberts** rated them as 35334 at best. During most days Alan has also been hearing the 11m broadcasts from RTB Brussels 25.645; RNI Oslo 25.730; Radio DW Cologne 25.740; BBC via Daventry, UK 25.750; RFI Paris 25.820; Radio Denmark, Copenhagen 25.850; Radio For Peace Int, Costa Rica 25.945 and BRT Brussels 26.060.

The broadcasts from the BBC via Daventry, UK 25.750 (Eng to Africa 1100-1615) have been attracting the attention of **Rhoderick Illman** in Thumrait, Oman. He quoted 44444, but sometimes there is slight fading. He also listens to Radio Nederlands Sunday broadcast via Flevo 25.970 (Du to Africa 1030-1125) which reaches him at 44433.

Good reception over long distances has been noted in the **21MHz (13m)** band during most days. Some of Radio Australia's broadcasts have been reaching the UK despite the fact that they are intended for other areas. Their transmission to Indonesia, Malaysia and Singapore via Carnarvon 21.525 (Eng 0100-0900) was rated as SIO 433 at 0657 by **Alan Smith** in Northampton. Since the Commonwealth Games they have also been using 21.775 (Eng to ? 0610-1100), which **Kenneth Reece** (Prenton) rated as 44433 at 0905.

There are many other 13m broadcasts to target areas outside Europe during the day. Those noted stemmed from Radio Finland via Pori 21.550 (Fin, Sw, Eng to S.E.Asia, Australia 0800-0925), rated as 33533 at 0924 by **David Edwardson** in

Long Wave DX Chart

Freq kHz	Station	Location	Power (W)	DXer
153	DLF Donebach	Germany (W)	500	A,B,F,G,H,I,J,K,L,O,P
153	Brasov	Romania	1200	J,L*
162	Allouis	France	2000	A,B,D*,F,G*,H,I,J,K*,O,P,Q
171	Medi 1-Nador	Morocco	2000	J
171	Kaliningrad	USSR	1000	A,B,F,G,H,J,L*,P*
177	Oranienburg	Germany (E)	750	A,B,F,H,I,J,K*,O,P,Q
183	Saarlouis	Germany (W)	2000	A,B,F,G*,H,I,J,K*,O,P,Q
189	Motala	Sweden	300	B,J,Q*
198	BBC Droitwich	UK	400	D*,H,J,K*,O,P,Q
198	BBC Westerglen	UK	50	B,F,I
198	Leningrad	USSR	150	H*
207	DLF Munich	Germany (W)	500	A,B,F*,H*,J,Q
216	Roumoules	Monaco	1400	A,B,F,G*,H,I,J,K,O,P,Q*
216	Oslo	Norway	200	B,J
225	Konstantinow	Poland	2000	A*,B,D*,F,G*,H,I,J,P,Q*
234	Junglinster	Luxembourg	2000	A,B,D*,F,G*,H,I,J,K*,O,P,Q
234	Kishinev	USSR	1000	J*,L*,Q*
243	Kalundborg	Denmark	300	B,D*,E,F,G,H*,I,J,K*,N*,P
243	Erzurum	Turkey	200	N*
252	Tipaza	Algeria	1500	A*,B*,H*,J*,Q
252	Lahti	Finland	200	B*,J*,N*
252	Atlantic 252	S.Ireland	500	A,B,C,D*,E,F,H,I,J,M,N*,O,P,Q
261	Plovdiv	Bulgaria	500	N*
261	Burg (R.Volga)	Germany (E)	200	F,H*,N*,P*,Q
261	Moscow	USSR	2000	A*,E,J,K*,N*
270	Topolna	Czechoslovakia	1500	A,B,D*,E,F*,G,H,J,N*,P*,Q
270	Orenburg	USSR	15	N*
279	Minsk	USSR	500	A,B,F,J,N*,P*

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

DXers:
A: Darren Beasley, Bridgwater.
B: Kenneth Buck, Edinburgh.
C: Andy Cadier, Folkestone.
D: Jim Cash, Derby.
E: John Coulter, Winchester.
F: Peter Easton, Edinburgh
G: Sheila Hughes, Morden.
H: Eddie McKeown, Co.Down, N.Ireland.
I: Ike Odoom, Glasgow.
J: Philip Rambaut, Macclesfield.
K: Mark Selby, Aldershot.
L: Tim Shirley, Bristol.
M: Chris Shorten, Norwich.
N: Cliff Stapleton, Torquay.
O: Darran Taplin, Tonbridge.
P: Phil Townsend, London.
Q: Neil Wheatley, Newcastle-upon-Tyne.

Local Radio DX Chart

Freq kHz	Station	ILR BBC	Power (kW)	DXer
585	R. Solway	B	2.00	H,I,L
603	Invicta Snd(Coast)	I	0.10	G,M
603	R. Gloucester	B	0.10	M
630	R. Bedfordshire	B	0.20	C,D,M
630	R. Cornwall	B	2.00	G,I
657	R. Clwyd	B	2.00	G,M
657	R. Cornwall	B	0.50	G
666	DevonAir R	I	0.34	C,G,M
666	R. York	B	0.80	M
729	BBC Essex	B	0.20	D,G,J,M
738	Hereford/Worcester	B	0.037	G,M
756	R. Cumbria	B	1.00	E*,F,H,L
756	R. Shropshire	B	0.63	G
765	BBC Essex	B	0.50	D,G,J,M
774	R. Kent	B	0.70	D,G,M
774	R. Leeds	B	0.50	E*
792	Chiltern R	I	0.27	M
792	R. Foyle	B	1.00	H
801	R.Devon	B	2.00	G,H*,I
819	Hereford/Worcester	B	0.037	C,G,M
828	2CR	I	0.27	C,G
828	Chiltern R	I	0.20	M
837	R. Furness	B	1.00	H
837	R. Leicester	B	0.45	C,D,G,M
855	R. Devon	B	1.00	G
855	R. Lancashire	B	1.50	E*
855	R. Norfolk	B	1.50	D,K,M
873	R. Norfolk	B	0.30	D,E*,G,M
936	GWR (Brunel R.)	I	0.18	G
945	R.Trent (GEM-AM)	I	0.20	M
954	DevonAir R	I	0.32	G
954	R. Wyvern	I	0.16	C,M
990	R. Aberdeen	B	1.00	E*,H,L
990	Beacon R. (WABC)	I	0.09	M
990	R. Devon	B	1.00	G
990	Hallam R.(C.Gold)	I	0.25	M
999	Red Rose R	I	0.80	H*
999	R. Solent	B	1.00	D,G,M
999	R.Trent (GEM-AM)	I	0.25	M
1026	R. Cambridgeshire	B	0.50	D,M
1026	Downtown R	I	1.70	H
1026	R. Jersey	B	1.00	D,G
1035	R. Kent	B	0.50	D,G,M
1035	NorthSound R	I	0.78	A*,L
1035	R. Sheffield	B	1.00	E*
1035	West Sound	I	0.32	H
1107	R. Northampton	B	0.50	D,M
1116	R. Derby	B	1.20	M
1116	R. Guernsey	B	0.50	D,G
1152	BRMB (Xtra-AM)	I	3.00	C
1152	R. Broadland	I	0.83	C*,M
1152	R. Clyde (2)	I	3.60	H
1152	LBC (L.Talkback R)	I	23.50	D*,G,M
1152	Metro R. (GNR)	I	1.80	L
1161	R. Bedfordshire	B	0.10	M
1161	GWR (Brunel R.)	I	0.16	G
1161	R. Sussex	B	1.00	D
1161	R. Tay	I	1.40	A*,H
1170	R. Orwell	I	0.28	M
1170	TFM Radio (GNR)	I	0.32	L
1170	Ocean Sound	I	0.12	D,G
1242	Invicta Sound(Coast)	I	0.32	G,M
1251	Saxon R	I	0.76	E*,M
1260	GWR (Brunel R.)	I	1.60	G
1260	Leicester (GEM-AM)	I	0.29	M
1278	Pennine R.(C.Gold)	I	0.43	H*
1305	R. Hallam (C.Gold)	I	0.15	M
1305	Red Dragon R	I	0.20	G,M
1323	R. Bristol	B	0.63	E*
1323	Southern Sound	I	0.50	G
1332	Hereward R	I	0.60	D,M
1332	Wiltshire Sound	B	0.30	D,G
1359	Essex R.(Breeze)	I	0.28	D,M
1359	Mercia Snd(Xtra-AM)	I	0.27	M
1359	Red Dragon R	I	0.20	E*
1359	R. Solent	B	0.85	G
1368	R. Lincolnshire	B	2.00	M
1368	R. Sussex	B	0.50	D,G
1368	Wiltshire Sound	B	0.10	C
1431	Essex R.(Breeze)	I	0.35	M
1431	Radio 210	I	0.14	G
1449	R. Cambridgeshire	B	0.15	M
1458	GLR	B	50.00	C,G,I,M
1458	GMR	B	5.00	E*,H*
1458	R. Newcastle	B	2.00	C,E*,L
1458	Radio WM	B	5.00	C
1476	County Sound Gold	I	0.50	D*,G,H*,M
1485	R. Humberside	B	1.00	M
1485	R. Merseyside	B	1.20	E*,H*
1485	R. Oxford	B	0.50	M
1485	R. Sussex	B	1.00	D,G
1503	R. Stoke-on-Trent	B	1.00	E*,H*,M
1521	R. Mercury	I	0.64	G,M
1521	R. Nottingham	B	0.50	M
1530	R. Essex	B	0.15	D,M
1530	Pennine R.(C.Gold)	I	0.74	E*
1530	R. Wyvern	I	0.52	G
1548	R. Bristol	B	5.00	E*
1548	Capital R. (Gold)	I	97.50	G,M
1548	R. Cleveland	B	1.00	L
1548	R. Forth (Max AM)	I	2.20	A*,E*,H,L
1548	R. Hallam	I	0.74	B
1557	R. Lancashire	B	0.25	E*
1557	Chiltern R	I	0.76	H,M
1557	Ocean Sound	I	0.50	G
1584	R. Nottingham	B	1.00	M
1584	R. Tay	I	0.21	E*,H
1602	R. Kent	B	0.25	G,M

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

DXers:
A: Peter Easton, Edinburgh.
B: Robin Harvey, Bourne.
C: Francis Hearne, Bristol.
D: Sheila Hughes, Morden.
E: Eddie McKeown, Co.Down.
F: David Middlemiss, Eyemouth.
G: George Millmore, Wootton, I.O.W.
H: Ike Odoom, Glasgow.
I: Tim Shirley, Bristol.
J: Chris Shorten, Norwich.
K: Steven Verhaegen, Brussels.
L: Neil Wheatley, Newcastle-upon-Tyne.
M: David Wratten, Cambridge.

SEEN & HEARD

Medium Wave DX Chart

Freq kHz	Station	Country	Power (kW)	DXer
520	Hof-Saale	Germany (W)	0.2	J*
531	Ain Beida	Algeria	600	D*,K*
531	Leipzig	Germany (E)	100	F*,H*,I
540	BRT-2 Wavre	Belgium	150/50	F*,H*,I,K*,M
540	Solt	Hungary	2000	I*
549	DLF Bayreuth	Germany (W)	200	B*,F*,H*,I,K*
558	Valencia	Spain	20	I*
567	RTE-1 Tullamore	S.Ireland	500	A,B*,F*,G,H*,I,K*,L,M
567	Volgograd	USSR	250	L*
576	Stuttgart	Germany (W)	300	F*,I,K*
576	RNE Tarragona	Spain	?	K*
585	Orf Wien	Austria	600	K
585	FIP Paris	France	8	H*
585	RNE-1 Madrid	Spain	200	F*,I*
585	BBC-R3 Dumfries	UK	2	B*,G
594	HRF Frankfurt	Germany (W)	400	F*,H*,K*
603	Sevilla	Spain	20	I*
603	BBC-R4 Newcastle	UK	2	B*,F*,G,H*,I
612	RTE-2 Athlone	S.Ireland	100	A,B*,F*,G,H*,I,K*
621	RTBF-1 Wavre	Belgium	300	A,G,H*,K
630	Vigra	Norway	100	F*
639	Liblice	Czechoslovakia	1500	K*
639	La Coruna	Spain	100	F*,H*,I*
648	Palma de Mallorca	Spain	10	I*
648	BBC Orfordness	UK	500	B*,D,F*,H*,I,K
657	Burg	Germany (E)	250	I*,K*
657	RCE-2 Madrid	Spain	20	H*
666	Bodenseesender	Germany (W)	300/180	B*
675	Marseille	France	600	B*,F*
675	Hilversum-3 Lopic	Holland	120	G,H*,K
684	RNE-1 Sevilla	Spain	250	D*,H*,I*
702	Aachen/Flensburg	Germany (W)	5	K*
702	Yerevan	USSR	100	L*
711	Rennes 1	France	300	F*,H*,K*
720	BBC-R4 Lisnagarvey	N.Ireland	10	B*,I
720	BBC-R4 Lots Rd London	UK	0.5	H*
729	RTE-1 Cork	S.Ireland	10	A
729	Oviedo	Spain	50	F*,I*,K*
738	Poznan	Poland	300	D*,K*
738	RNE-1 Barcelona	Spain	250	I*
747	Hilversum-2 Flevo	Holland	400	B*,F*,G,H*,K*,M
756	Brunswick	Germany (W)	800/200	F*,H*
765	Sottens	Switzerland	500	K*,L*
774	BBC-R4 Enniskillen	N.Ireland	1	I
774	RNE-1 San Sebastian	Spain	60	I*
783	Burg	Germany (E)	1000	B*,F*,H*,K*
792	Sevilla	Spain	20	H*,I*
792	BBC R.Ulster	UK	1	B*
801	BRF via Munich	Germany (W)	420	I*,K*
810	SER Madrid	Spain	20	I*,K*
810	BBC-Scot.Westerglen	UK	100	B*,C,H*,I
819	Sud-Radio	Andorra	900	I*
819	Rabat	Morocco	25	K*
837	Nancy	France	200	I*,K*
837	R.Popular, Sevilla	Spain	10	I*
846	Rome	Italy	540	H*,K*,N*
855	Murcia	Spain	125	F*,I*,K*
864	Paris	France	300	D,G,K*
873	AFN Frankfurt	Germany (W)	150	B,D,F*,I,K*,N
882	BBC-Wales Washford	UK	70	B*,F*,G,H*,I,K
891	Algiers	Algeria	600/300	K*
900	Milan	Italy	600	H*,I*,K*
909	BBC-R2 Moorside Edge	UK	200	F*,H*
909	BBC-R2 Westerglen	UK	50	B*,I*
918	R.Intercont. Madrid	Spain	20	I*,K
918	R.Ljubljana	Yugoslavia	600/100	I*
927	BRT-1 Wolvertem	Belgium	300	F*,G,H*,I*,K
927	RRE Evora	Portugal	1	J*
936	Radio Bremen	Germany (W)	100	F*,G,I*,K*
945	Toulouse	France	300	I*,K*
963	Pori	Finland	600	F*,H*,I*,K*,M*
972	NDR/WDR Hamburg	Germany (W)	300	B*,F*,I,K*
981	Alger	Algeria	600/300	D*,K*
990	RIAS Berlin	Germany (W)	300	I,K*
990	SER R.Bilbao	Spain	10	I*
1008	Hilversum-5 Flevo	Holland	400	D,F*,H*,I,K,M
1017	SWF Wolfsheim	Germany (W)	600	B*,F*,H*,I,K*
1035	Milan	Italy	50	F*,H*
1044	DDR-1 Burg	Germany (E)	250	B*,F*,I
1053	BBC-R1 Barrow	UK	1	F*
1053	BBC-R1 Droitwich	Uk	150	N*
1062	Kalundborg	Denmark	250	B*,D*,F*,H*,I
1071	Brest	France	20	H*,K
1080	Katowice	Poland	1500	K*
1089	BBC-R1 Moreside Edge	UK	150	F*,H*
1089	BBC-R1 Westerglen	UK	50	B*
1098	Bratislava	Czechoslovakia	750	F*,K*
1107	AFN via Munich	Germany (W)	40	D*,K*
1125	La Louviere	Belgium	20	F*,H*
1125	BBC Llandrindod Wells	UK	1	B*
1125	Zagreb	Yugoslavia	200	K*
1134	Zagreb	Yugoslavia	300	B*
1143	Century R. Dublin	Ireland (S)	?	F*,J
1143	Kaliningrad	USSR	150	F*,K*
1161	Strasbourg (F.Int)	France	200	F*
1170	Bernburg	Germany (E)	20	K
1179	Solvesborg	Sweden	600	F*,H*,I,K*
1188	Kuurne	Belgium	5	H*,K*
1197	BBC-R3 Bournemouth	UK	0.5	H*
1206	Bordeaux	France	100	F*,H*,I*
1206	Wroclaw	Poland	200	D*,K*
1215	BBC-R3 Moorside Edge	UK	100	F*,H*
1215	Tartu	USSR	50	L*
1224	COPE Madrid	Spain	20	I*
1233	Prague	Czechoslovakia	400	H*,K*
1233	Tanger	Morocco	200	F*
1260	VOA Rhodos	Greece	500	E*
1260	Valencia	Spain	20	I*
1269	Neuminster	Germany (W)	600	F*,H*,I,K*
1278	Strasbourg	France	300	K
1278	RTE-2 Dublin/Cork	S.Ireland	10	F*,I*
1287	Litomysl/Liblice	Czechoslovakia	300/200	D*,F*,K*
1296	Kardzali	Bulgaria	150	K*
1296	BBC Orfordness	UK	500	F*
1314	Kvitsoy	Norway	1200	F*,H*,I,J
1323	R.Moscow via Leipzig	Germany (E)	150	F*,I
1332	Rome	Italy	300	K*
1341	BBC-Ulst.Lisnagarvey	N.Ireland	100	F*,H*,I,M
1350	Nancy/Nice	France	100	F*,H*,I*,K*
1368	Manx Radio, Foxdale	I.O.M	20	F*,I*,J*
1377	Lille	France	300	I,K
1386	Kaunas	USSR	1000	D*,H*
1395	R.Tirana via Lushnje	Albania	1000	D*,F*,K*
1395	Simferopol	USSR	?	L*
1404	Brest	France	20	H*,I,K
1422	Heusweiler	Germany (W)	600	F*,H*,I
1422	Riyadh	Saudi Arabia	20	E
1431	Dresden	Germany (E)	250	F*,I*,K*
1440	Marnach	Luxembourg	1200	F*,H*,I,K*
1449	BBC-R4 Redmoss	UK	2	I
1467	TWR Monte Carlo	Monaco	1000/400	F*,H*
1476	RCE Bilbao	Spain	20	F*
1494	Clermont-Ferrand	France	20	K
1494	Komrat	USSR	30	L*
1503	Stargard	Poland	300	D*,F*,H*,J*
1512	BRT Wolvertem	Belgium	600	D*,F*,H*,K
1521	Oviedo	Spain	5	H*,I*
1530	Vatican Radio, Rome	Italy	150/450	A*,K*
1539	DLF Mainflingen	Germany (W)	700	F*,H*,K*
1557	Nice	France	300	K
1566	Sfax	Tunisia	1200	F*
1575	RBI via Burg	Germany (E)	250	H*
1584	Pamplona	Spain	2	I*
1593	Langenberg	Germany (W)	400/800	D,F*,H*,I*

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

Wallsend; AIR Delhi, India 21.735 (Eng to Asia, Pacific areas 1000-1100), 44444 at 1035 by Rhoderick Illmam; RFI via Issoudun, France 21.685 (Fr to Africa, Middle East 0900-1800), 55555 at 1200 by **Peter Easton** in Edinburgh; Vatican Radio, Rome 21.485 (Fr, Port, Eng to Africa 1000-1215), 54555 at 1210 by **John Nash** in Brighton; Radio Sweden, Stockholm 21.570 (Eng, Sw, Fr to S.Asia, Australia 1230-1400), 33443 at 1230 by **Carl Yates** in St.Helens; RTB via Wavre, Belgium 21.460 (Fr, Ger to Africa 1100-1645), 55545 at 1350 by **Ted Agombar** in Norwich; Radio RSA Johannesburg, S.Africa 21.590 (Eng to India, Pakistan 1300-1400), SIO 333 at 1350 by **Brian Hallett** in Burgess Hill; Radio Austria Int, Vienna 21.490 (Sp, Eng, Ger, Fr to S.Europe, W.Africa 1300-1700), 55555 at 1430 by **Robin Clark** in Plymouth; BBC via Ascension Island 21.660 (Eng to S.Africa 0900-1745), SIO 333 at 1447 by **Colin Shaddick** in Barnstaple; Radio Prague, Czechoslovakia 21.505 (Cz, Eng, Ar to Africa 1500-1825), SIO 222 at 1543 by **Julian Wood** in Elgin; Radio Sweden, Stockholm 21.610 (Sw, Fr, Eng to USA 1430-1600), SIO 555 at 1558 by **Darren Beasley** in Bridgwater; Radio Norway Int, Oslo 21.705 (Norw, Eng to W.Africa 1700-1800), SIO 354 at 1740 by **Kenneth Buck** in Edinburgh.

Some of the many broadcasts to Europe were also noted: UAE Radio Dubai 21.605 (Ar, Eng 0615-1730), rated as SIO 444 at 1040 by **John Coulter** in Winchester; Radio Bucharest, Romania 21.550 (Eng 1300-1356), 53333 at 1325 by **Chris Shorten** in Norwich; Radio RSA Johannesburg, S.Africa 21.590 (Eng 1400-1600), 44444 at 1420 by **David Wratten** in Cambridge; WCSN Scotts Corner, Maine 21.780 (Eng 1400-1600), 54444 at 1500 by **Ken Whayman** in Bexleyheath; WHRI Noblesville, USA 21.840 (Eng 1500-1700), 44334 at 1503 by Eddie McKeown; Radio Japan via Moyabi, Gabon 21.700 (Eng, Jap 1500-1700),

DXers:
A: Darren Beasley, Bridgwater.
B: Peter Easton, Edinburgh.
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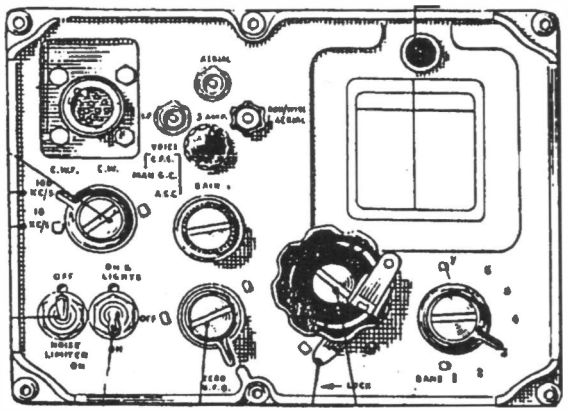

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34232 at 1535 by **John Sadler** in Bishops Stortford; Radio Kuwait, Sulaibiyah 21.675 (Ar ?-1800), 33433 at 1627 by **Robin Harvey** in Bourne; WYFR via Okeechobee, Florida 21.615 (Eng , Ger, It 1600-1845), 45444 at 1629 by **Andy Cadier** in Folkestone; RCI via Sackville, Canada 21.545 (Fr, Eng, Pol, Ger 1530-1800), 54544 at 1720 by **Cliff Stapleton** in Torquay; Radio RSA Johannesburg, S.Africa 21.535 (Eng, Du 1800-2000) - SIO 333 at 1800 by **Alf Gray** in Birmingham; Radio HCJB Quito, Ecuador 21.470 (Cz, Ger, Eng, Sw, Norw, Da, Fr 1800-2130) - SIO 333 at 1831 by **Philip Rambaut** in Macclesfield.

Long distance paths have also been open in the **17MHz (16m)** band during some days. Some UK Dxers have been hearing the 100KW transmission from Radio New Zealand Int, Wellington on 17.680 (Eng to Eastern Pacific areas 0330-0600; 1700-1900). **Neil Wheatley** picked-up their broadcast in Newcastle-upon-Tyne at 0400 and noted a steady improvement in reception to SIO 344 at 0500. In Swanwick, **Jim Cash** rated their transmission as 44433 at 1842, but reception gradually deteriorated until close down. He has received their QSL and RNZI schedule. It details a General Service on 17.705 (Eng 2100-0000), which Alan Smith rated as SIO 333 at 2245.

Radio Australia's broadcasts to S.Asia via Carnarvon 17.715 (Eng 0100-0915) have also reached the UK during some mornings. Colin Shaddick rated them as SIO 423 at 0845. Their broadcast to E.Asia via Darwin 17.750 (Eng, Chin 0100-0600) was logged by Kenneth Reece as 22232 at 0552.

When propagation conditions permit, many of the broadcasts in this band can be heard well outside their intended target area. Those noted originated from KHBI Saipan, N.Mariana Islands 17.855 (Eng to E.Asia 0600-0800), heard at 0700 by Tim Shirley; Radio Beijing, China 17.710 (Eng to S.Pacific 0830-1000), rated as 44344 at 0833 by Robin Clark; Voice of Greece, Athens 17.550 (Eng to Australia 0800-0850) - 43443 at 0843 by David Wratten; Radio Moscow, USSR 17.565 (Eng to Middle East, Africa 1000-1300) - 53533 at 1000 by Ken Whayman; SRI via Schwarzenburg, Switzerland 17.670 (Eng to Australia, New Zealand 0745-1030) - SIO 444 at 1030 by Philip Rambaut; Radio Sweden, Stockholm 17.740 (Eng, Sw to S.Asia, Australia 1230-1330) - SIO 444 at 1230 by Kenneth Buck; Africa No.1, Gabon 17.630 (Fr to W.Africa 0800-1600), 44433 at 1300 by John Nash; Radio Sweden, Stockholm 17.880 (Sw, Eng, Fr to USA 1430-1600), 54434 at 1531 by Mark Selby; WSHB Cypress Creek, USA 17.555 (Eng to C.America 1400-1600), 35343 at 1507 by Eddie McKeown; BBC via Ascension Island 17.880 (Eng to S.Africa 1400-2115), 55555 at 1947 by Andy Cadier; RTM Tanger, Morocco 17.595 (Fr, Eng, to Middle East 1400-1700), 43433 at 1430 by Cliff Stapleton; RBI via Nauen, GDR 17.880 (Eng, Hi to Asia 1315-1630), SIO 222 at 1553 by Julian Wood; Radio Nederlands via Bonaire, Ned.Antilles 17.605 (Eng, Fr, Du to W.Africa 1830-2125), 43344 at 1856 by Ted Agombar; VOA via Bethany, USA 17.800 (Eng to Africa 1600-2200), 32332 at 2040 by **Tony Batchelor** in Truro; RCI via Sackville, Canada 17.820 (Eng, Fr to Africa 1800-2200), SIO 333 at 2140 by Alf Gray.

Many of the broadcasters beam their programmes towards Europe at some time during the day. They include Radio Japan via Moyabi, Gabon 17.890 (Jap, Eng 0500-0900), rated as 53233 at 0800 by Chris Shorten; Voice of Israel, Jerusalem 17.575 (Eng, Fr 1100-1200), SIO 444 at 1113 by John Coulter; Radio Pakistan, Islamabad 17.555 (Eng 1100-1120), SIO 545 at 1114 by Darren Beasley; Radio Bucharest, Romania 17.850 (Eng 1300-1356), 54344 at 1300 by Carl Yates; Radio de Nacional Espana 17.730 (Sp 1030-1900), 43433 at 1304 by Rhoderick Illman; RCI via Sackville, E.Canada 17.820 (Russ, Uk, Pol, Fr, Eng, Ger 1430-1800), SIO 333 at 1550 by Brian Hallett; Radio Suriname Int. via RNB Brazil 17.755 (Du, Eng 1700-1750), 44444 at 1720 by Sheila Hughes; Radio HCJB Quito, Ecuador 17.790 (Cz, Fr, Ger, Sw, Norw, Da, Eng, Sp 1800-2230), 44444 at 1954 by Darran Taplin.

Some of Radio Australia's **15MHz (19m)** broadcasts have also been reaching the UK. Their transmission to C.Pacific areas via Shepparton 15.160 (Eng 2100-0800) was rated as 44444 at 0755 by Ted Agombar; to Asia via Carnarvon 15.415 (Eng 0900-1100), 34333 at 0920 by Chris Shorten; to Asia via Darwin 15.245 (Eng 1530-1830), 44334 at 1738 by **Leo Barr** in Sunderland; to S.E.Asia via Carnarvon 15.140 (Eng 0000-0100), 24343 at 0000 by Peter Easton.

Many of the broadcasters in distant places use the 19m band to reach listeners in Europe. They include Radio Japan via Moyabi, Gabon 15.325 (Eng, Jap 0700-0900), noted as SIO 433 at 0718 by Alan Smith; UAE Radio Dubai 15.435 (Ar, Eng 0615-1645), SIO 544 at 1640 by Brian Hallett; WYFR via Okeechobee, Florida 15.440 (Eng, Ger, It 1600-1845), SIO 111 at 1745 by Philip Rambaut; WWCR Nashville, USA 15.690 (Eng 1700-0200), 45444 at 1830 by John Nash; RCI via Sackville, E.Canada 15.325 (Eng, Ger, Pol, Hung, Russ, Uk 1545-2130), SIO 444 at 2000 by **Francis Hearne** in Bristol; VOA via Tangier, Morocco 15.205 (Eng 1700-2200), SIO 555 at 2010 by Colin Shaddick; UAE Radio Dubai 15.300 (Ar, Eng 1400-2050), 43344 at 2020 by Cliff Stapleton; WINB Red Lion, USA 15.185 (Eng 2003-2245), 22222 at 2031 by Jim Cash; Radio Korea, Seoul 15.575 (Ar, It, Eng, Sp, Port, Ger 1645-2300), SIO 433 at 2119 by Darren Beasley; Radio HCJB Quito, Ecuador 15.270 (Cz, Ger, Eng, Sw, Norw, Da, Fr 1800-2200), 44444 at 2130 by Sheila Hughes; WRNO New Orleans, USA 15.420 (Eng 1600-0000), 54444 at 2207 by Tony Batchelor.

There are many broadcasts to other areas throughout the day and night. Those noted stemmed from Vatican Radio, Rome 15.190 (Am, Fr, Eng to E.Africa 0430-0515), rated as 34333 at 0505 by Rhoderick Illman; RFO Papeete, Tahiti 15.170 (Fr, Tah to Oceana 1600-0930), 34323 at 0556 by Kenneth Reece; SRI via Schwarzenburg, Switzerland 15.570 (Eng, Fr, Ger, It to S.E.Asia 1045-1300), SIO 444 at 1130 by Alf Gray; Radio DW via Julich, W.Germany 15.105 (Ger to Asia 1000-1200), SIO 444 at 1050 by John Coulter; RNI via Kvitsoy, Norway 15.165 (Eng to USA 1200-1300), 43454 at 1205 by Carl Yates; Radio Sweden, Stockholm 15.190 (Sw, Eng to E.Asia 1230-1330), 53533 at 1230 by Ken Whayman; Radio Bucharest, Romania 15.365 (Eng to ? ?-?), 54444 at 1320 by Darran Taplin; TWR Swaziland 15.210 (Eng to E.Africa 1600-1700), 22332 at 1557 by David Wratten; VOA via Greenville, USA 15.580 (Eng to Africa 1600-2200), SIO 344 at 1800 by Kenneth Buck; RNI via Kvitsoy, Norway 15.265 (Eng to Africa 1800-1900), 34222 at 1802 by Mark Selby; KUSW Salt Lake City, USA 15.650 (Eng to Canada 1500-2200), 44342 at 1900 by Robin Clark; Radio RSA Johannesburg, S.Africa 15.125 (Eng to Africa, Middle East 1900-2000), 33343 at 1934 by Andy Cadier; WINB Red Lion, USA 15.140 (Eng, Fr to N.Africa 2248-2345), 21121 at 2300 by Eddie Mckeown; Radio HCJB Quito, Ecuador 15.155 (Fr, Eng, Jap to USA 0000-0500), 35543 at 0030 by David Edwardson.

The conditions prevailing in the **13MHz (22m)** band have generally resulted in good reception of the broadcasts to Europe from Radio Korea, Seoul 13.670 (Eng 0800-0930), noted as 33233 at 0805 by Chris Shorten; Radio Jordan, Amman 13.655 (Eng 0500-1315), 44544 at 1205 by **John Parry** in Northwich; Radio Austria, Vienna 13.730 (Ger, Fr, Eng, Sp 0400-1700), 55444 at 1442 by Darran Taplin; RCI Montreal, Canada 13.650 (Uk, Fr, Eng, Pol, Russ, Ger 1500-1800), SIO 111 at 1550 by Brian Hallett; Radio Kuwait, Sulaibiyah 13.610 (Eng 1800-2100), 45444 at 1800 by **Roy Patrick** in Derby; ISBS Reykjavik, Iceland 13.855 (Ice 1855-1930), SIO 444 at 1900 by **Simon Hamer** in New Radnor; WCSN Scotts Corner, Maine 13.770 (Eng 2000-2200), SIO 545 at 2026 by Colin Shaddick; WHRI Noblesville, USA 13.760 (Eng 1700-0000), SIO 444 at 2205; Voice of the UAE in Abu Dhabi 13.605 (Eng 2200-0000), 22222 at 2220 by Robin Clark; Voice of Israel, Jerusalem 13.750 (Eng ?-?), 22222 at 2230 by Robin Harvey.

Some of the broadcasts to other areas have also reached the UK well. They originated from Radio DW via Julich, W.Germany 13.790 (Eng to W.Africa 0600-0650), 23422 at 0611 by Kenneth Reece; SRI via Sottens, Switzerland 13.635 (Eng, Fr, Ger to S.Asia 1315-1500), 45555 at 1340 by Andy Cadier; KSDA Agat, Guam 13.720 (Bur, Ta, Mal, Hi, Tel to Asia 1400-1700), SIO 333 at 1450 by Alan Smith; Radio Pakistan, Islamabad 13.665 (Eng to Middle East 1600-1630), 34444 at 1606 by David Wratten; Radio Pakistan, Islamabad 13.665 (Eng to Middle East 1600-1630), SIO 333 at 1630 by Kenneth Buck; Radio Nederlands via Flevo 13.700 (Eng to W.Africa 2030-2125), 44343 at 2034 by Jim Cash; WYFR via Okeechobee, Florida 13.695 (Eng to USA 1200-2245), 32243 at 2113 by Eddie McKeown.

The broadcasters using the **11MHz (25m)** band to reach listeners in Europe include Radio Australia via Shepparton 11.910 (Eng 0400-0630), rated as 23322 at 0608 by Kenneth Reece; Radio Cairo, Egypt 12.050 (Ar 0700-1530), SIO 455 at 1215 by Kenneth Buck; Radio Bucharest, Romania 11.940 (Eng 1300-1356), 55544 at 1300 by Carl Yates; Radio RSA Johannesburg, S.Africa 11.925 (Eng 1400-1600), SIO 111 at 1410 by Brian Hallett; Radio Pakistan, Islamabad 11.570 (Ur, Eng, Fr 1645-2015), 54344 at 1730 by Chris Shorten; RCI via Sackville, Canada 11.945 (Hung, Cz, Russ, Uk, Fr, Pol, Eng 1800-2300), 44344 at 2000 by Ted Agombar;

Transatlantic DX Chart

Freq kHz	Station	Location	Time (UTC)	DXer
		USA		
710	WOR	New York, NY	0340	E
880	WCBS	New York, NY	0300	F
1010	WINS	New York, NY	0157	A,B,E,F
1130	WNEW	New York, NY	0215	E
1210	WCAU	Philadelphia, PA	0200	E,F
1410	WELM	Elmira NY	0235	E
1510	WKKU	Boston, MA	0230	E,F
		Canada		
550	CFNB	Fredericton, NB	0100	D
580	CFRA	Ottawa, ON	0430	F
590	VOCM	St.John's, NF	2259	A,B,E,F
610	CKYQ	Grand Bank, NF	0115	F
640	CBN	St.John's, NF	2339	E
820	CHAM	Hamilton, ON	0400	D
920	CJCH	Halifax, NS	0130	F
930	CJYQ	St.John's, NF	2330	A,B,C,E,F
1010	CFYQ	Gander, NF	0201	E
1220	CKCW	Moncton, NB	0215	A,B,E
1290	CHRM	Matane, PQ	0252	E
1510	CJRS	Sherbrooke, PQ	0230	E
		C. America & Caribbean		
1570	Atlantic Beacon	Turks & Caicos Ils	0230	F
1580	VOA	Antigua	0230	F
1610	Caribbean Beacon	The Valley,Anguilla	0025	B,E,F
		South America		
1220	R.Globo	Rio, Brazil	0010	E,F
1350	R.Buenos Aires	Argentina	0420	F

DXers:
A: Simon Hamer, New Radnor.
B: David Hunt, Brighton.
C: Roy Patrick, Derby.
D: Tim Shirley, Bristol.
E: Mark Thompson, Wakefield.
F: Jim Willett, Grimsby.

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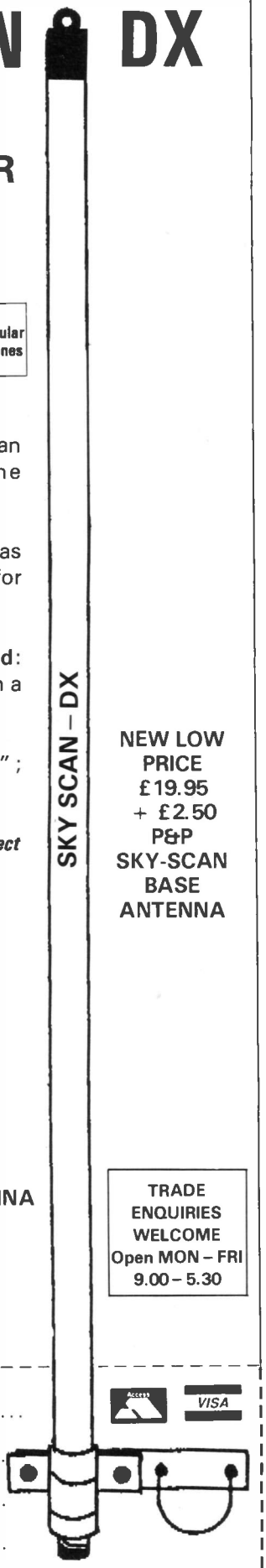

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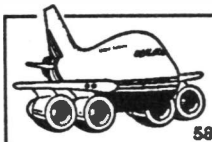

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SEEN & HEARD

Radio Damascus, Syria 12.085 (Ger, Fr, Eng 1800-2100), 44444 at 2015 by Sheila Hughes; Voice of Vietnam, Hanoi 12.020 (Russ, Viet, Fr, Sp, Eng 1600-0000), SIO 444 at 2055 by Darren Beasley; AIR via Aligarh, India 11.620 (Eng, Hi 1845-2230), SIO 333 at 2100 by **Ron Pearce** using a one valver in Bungay; Radio Nacional de Espana 11.790 (Fr, Eng 1800-2200), SIO 433 at 2130 by Alf Gray; Radio Finland via Pori 11.755 (Fin, Ger, Sw, Eng 0515-2230), 31232 at 2200 by Robin Harvey; VOFC Taipei via Okeechobee, Florida 11.805 (Fr, Ger, Eng 2000-2300), SIO 333 at 2259 by Mark Thompson; Voice of Israel, Jerusalem 11.605 (Fr, Eng, Yi 2200-2325), SIO 444 at 2240 by **David Middlemiss** in Eyemouth; Radio Japan via Moyabi, Gabon 11.835 (Eng, Jap 2200-0000), SIO 322 at 2315 by Francis Hearne.

Some of the broadcasts to other areas stem from Radio Prague, Czechoslovakia 11.685 (Eng, Cz to Australia, Pacific 0730-0930), noted as 54333 at 0740 by Mark Selby; RFI Paris 11.670 (Fr to Africa, Middle East 0600-1400), 44344 at 1240 by Eddie McKeown; Voice of Greece, Athens 11.645 (Eng, Gr to USA 1200-1250), 45444 at 1242 by Jim Cash; Voice of Mediterranean via Cyclops, Malta 11.925 (Eng, Ar to N.Africa 1400-1600), 44454 at 1410 by Robin Clark; BBC via Kranji, Singapore 11.750 (Eng to S.E.Asia 0900-1615), 44433 at 1419 by Rhoderick Illman; Radio Tirana, Albania 11.985 (Ind to S.E.Asia 1430-1500), 43543 at 1430 by John Nash; AWR Agat, Guam 11.980 (Eng to S.Asia 1600-1700), 24333 at 1601 by David Wratten; RTM Tanger, Morocco 11.920 (Fr, Eng to W.Africa, S.Europe 1900-0100), 55544 at 1905 by Andy Cadier; FEBA Radio, Mahe, Seychelles 11.915 (Ar to Middle East 1900-2003), SIO 433 at 1955 by Alan Smith.

Some of the broadcasts to Europe in the **9MHz (31m)** band stem from Radio HCJB Quito, Ecuador 9.610 (Eng 0700-0900), rated as 44343 at 0830 by Mark Selby; Radio New Zealand Int, Wellington 9.850 (Eng to Pacific areas 0630-0930), SIO 454 at 0800 by Simon Hamer; Radio Australia via Shepparton 9.655 (Eng 0700-1030), 44554 at 0835 by John Parry; WCSN Scotts Corner, Maine 9.840 (Eng 0800-1000), SIO 444 at 0928 by Philip Rambaut; Radio Nederlands via Flevo 9.715 (Du, Eng 1030-1225), 55555 at 1130 by Ken Whayman; Radio Budapest, Hungary 9.835 (Ger, Eng, Hung, It, Sp 1100-2230), SIO 433 at 1145 by David Middlemiss; SRI via Lenk, Switzerland 9.535 (Fr, Ger, Eng, It, Sp 0600-2045), SIO 544 at 1400 by Brian Hallett; BBC via Limassol, Cyprus 9.660 (Eng 080-1515), SIO 433 at 1430 by Alan Smith; Voice of Vietnam, Hanoi 9.840 (Eng 1600-1630), 22322 at 1612 by Robin Harvey; VOIRI Tehran, Iran 9.022 (Eng 1930-2030), SIO 444 at 2008 by Ron Pearce; Radio Jordan, Amman 9.560 (Eng 1420-2200), 43433 at 2038 by Darran Taplin; Radio Pyongyang, N.Korea 9.325 (Eng, Fr, Russ, Kor, Sp, Ger 1300-2150), 42333 at 2046 by Jim Cash; VOA via Tangier, Morocco 9.760 (Eng 1830-2200), 33333 at 2051 by Tony Batchelor.

Some of the broadcasts from distant places were logged in the **7MHz (41m)** band: Voice of Nigeria, Lagos 7.255 (Eng, Fr, Ha to W.Africa 0500-2200), 32422 at 0547 by Kenneth Reece; Radio Australia via Shepparton 7.215 (Eng to New Zealand 1100-1300, 1500-2030), 23442 at 1100 by David Edwardson; via Carnarvon 7.205 (Eng to Europe, S.Asia 1430-2030), SIO 322 at 1542 by Brian Hallett; BBC via Tsang Tsui, Hong Kong 7.180 (Eng to E.Asia 1500-1615), SIO 333 at 1610 by Alan Smith; Radio Beijing, China 7.800 (Chin, Fr to Europe, N.Africa 1730-2225), 55444 at 2008 by John Nash; Radio Korea,

DXers:-

(A) Ted Agombar, Norwich.
(B) Leo Barr, Sunderland.
(C) Darren Beasley, Bridgwater.
(D) Jim Cash, Swanwick.
(E) David Edwardson, Wallsend.
(F) Simon Hamer, New Radnor.
(G) Rhoderick Illman, Thumrait, Oman.
(H) Eddie McKeown, Co.Down.
(I) David Middlemiss, Eyemouth.
(J) John Nash, Brighton.
(K) Fred Pallant, Storrington.
(L) John Parry, Northwich.
(M) Roy Patrick, Derby.
(N) Tim Shirley, Bristol.
(O) Chris Shorten, Norwich.
(P) Alan Smith, Northampton.
(Q) Phil Townsend, London.
(R) Jim Willett, Grimsby.
(S) Julian Wood, Elgin.

Tropical Band Chart

Freq kHz	Station	Country	Time (UTC)	DXer
2.560	Xinjiang	China	0205	E
3.200	TWR	Swaziland	0445	N
3.210	R.Mozambique	Mozambique	0536	N
3.215	R.Orange	S.Africa	0200	N,R
3.230	ELWA Monrovia	Liberia	2150	D,R
3.255	BBC via Maseru	Lesotho	1805	F
3.260	ORTN Niamey	Niger	2230	R
3.270	SWABC 1, Namibia	S.W.Africa	1840	D,F
3.365	GBC Radio 2	Ghana	1920	D,R
3.380	R.Malawi	Malawi	2145	I
3.400	Reykjavik	Iceland	1830	R
3.905	AIR Delhi	India	0000	N
3.915	BBC Kranji	Singapore	1830	D,E,F,H,N,O,P,Q
3.955	BBC Daventry	England	2110	A,O,H,Q
3.955	R.Orion	S.Africa	2200	R
3.960	R.L. Munich	W.Germany	2043	D
3.965	RFI Paris	France	1855	D,H,O,Q
3.970	RFE Munich	W.Germany	2110	D
3.975	BBC Skelton	England	2030	D,G,Q
3.980	VOA Munich	W.Germany	0637	O,P
3.985	R.Beijing, China	via SRI Berne	2200	C,D,J,S
3.985	SRI Berne	Switzerland	1851	B,C,D,E,H,D,Q
3.990	RFE Munich	W.Germany	1908	D,H
3.995	DW Cologne (Julich)	W.Germany	2033	D,H,O,Q
4.055	R.Moskva 1 (Kalinin)	USSR	1942	J
4.060	R.Moscow (Kharkov)	USSR	1840	D,H
4.080	R.Ulan Bator	Mongolia	2200	N,R
4.220	PBS Xinjiang	China	2345	E,M
4.330	PBS Xinjiang	China	1550	P
4.500	Xinjiang	China	2330	B,E,M
4.735	Xinjiang	China	0156	E
4.740	R.Afghanistan	via USSR	1900	D,H,M
4.755	Caracol Neiva	Columbia	0320	R
4.760	ELWA Monrovia	Liberia	1933	C,D,E,K
4.765	R.Moscow (Habana)	via Cuba	0606	D
4.770	FRCN Kaduna	Nigeria	1955	D,K,R
4.775	R.Gabon, Libreville	Gabon	1920	A
4.785	PBS Zhejiang 1	China	2123	P
4.785	RTM Bamako	Mali	0620	D
4.785	R.Baku	USSR	1845	J,M
4.790	TWR Manzini	Swaziland	1844	H
4.795	R.Moscow (Kharkov)	USSR	2210	D,H,K,Q
4.795	R.Peace & Progress	USSR	2215	D,J
4.800	AIR Hyderabad	India	0025	E
4.800	LNBS Lesotho	Maseru	1801	D,F
4.805	R.Nac.Amazonas	Brazil	0055	R
4.810	R.Orion, Jo'burg	S.Africa	1825	F
4.810	R.Yerevan	USSR	2137	D
4.815	R.Beijing	China	1315	E
4.815	R.diff TV Burkina	Ouagadougou	2100	D,K
4.820	R.Botswana	Botswana	1900	R
4.820	Khanty-Mansiysk	USSR	1953	J
4.825	R.Moskva 2 (Yakutsk)	USSR	2102	D
4.830	Gaborone	Botswana	2000	D,F,K
4.830	R.Tachira	Venezuela	0002	D,E,R
4.832	R.Reloj	Costa Rica	0100	E,R
4.835	R.Atalaia	Brazil	0647	P
4.835	R.Tezulutlan, Coban	Guatemala	0201	E
4.835	RTM Bamako	Mali	2158	B,D,E,F,H,J,M,P

Freq kHz	Station	Country	Time (UTC)	DXer
4.840	AIR Bombay	India	1830	F
4.845	ORTM Nouakchott	Mauritania	2100	D,F,J,K,R
4.850	R.Yaounde	Cameroon	2130	D,K
4.850	R.Tashkent	USSR	1815	F,N
4.860	AIR New Delhi	India	0203	E
4.860	R.Moskva 2 (Chita)	USSR	2003	J
4.860	R.Moscow (Kalinin)	USSR	1654	H,P,Q
4.865	PBS Lanzhou	China	2216	D,E
4.865	Caracol	Colombia	0601	D
4.865	V of Cinaruco	Colombia	0734	D,E,J
4.870	R.Cotonou	Benin	2100	D,J,K,R
4.870	SLBC Colombo	Sri Lanka	0052	E
4.875	R.Tbilisi	USSR	1840	D,F
4.880	SABC Radio 5	S.Africa	1940	D,F,K
4.885	R.Beijing	China	1322	E
4.885	Voice of Kenya	Kenya	1915	F,H,K
4.895	R.Moscow (Kalinin)	USSR	1922	B,H
4.895	R.Moskva 4 (Tyumen)	USSR	1950	D
4.900	SLBC Colombo	Sri Lanka	0052	E
4.905	R.Nat.N'djamena	Chad	2155	D,E,H,J,K
4.910	V. de la Mosquitia	Honduras	0200	R
4.910	R.Zambia, Lusaka	Zambia	2200	F,K
4.915	R.Ghana, Accra	Ghana	2205	D,E,K
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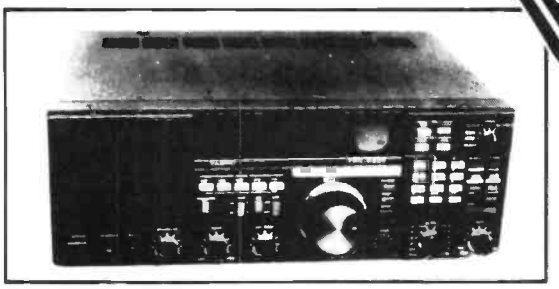

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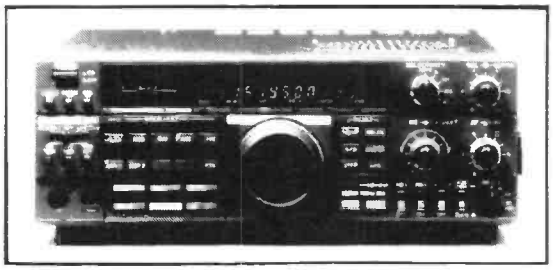

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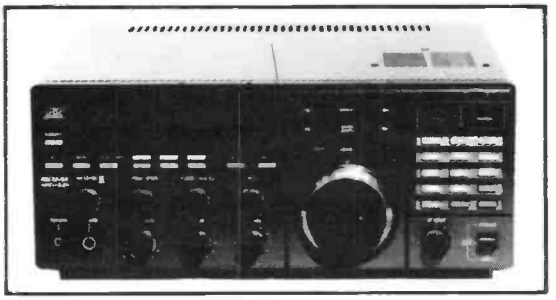

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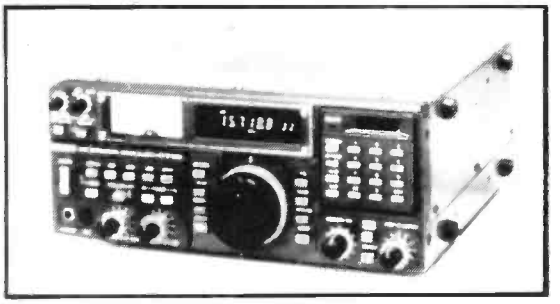

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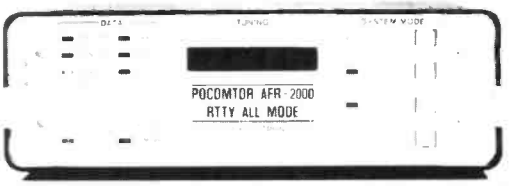

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Seoul 7.550 (It, Fr, Kor, Ar, Ger, Eng, Sp to Middle East, E.Africa 1545-2345), 53333 at 2050 by Chris Shorten; AIR via Delhi 7.412 (Eng to Europe 1845-2230), SIO 544 at 2148 by Darren Beasley.

Radio Australia's **6MHz (49m)** broadcast to S.Asia via Carnarvon 6.035 (Eng 1500-2030) was rated as SIO 343 at 1645 by Kenneth Buck.

Station Addresses

BBC Radio Norfolk, Norfolk Tower, Surrey Street, Norwich NR1 3PA.
Sunrise Radio, Banklabs House, Cross Lances Road, Hounslow TW3 2DA.
Radio Baghdad, Box 8145, Baghdad, Iraq.
BRT International, P.O.Box 26, B-1000 Brussels, Belgium.
Radio TV Algerienne, 21 Boulevard des Martyrs, Alger, Algeria.
Radio TV du Benin, Boite Postale 366, Cotonou, Benin.

Abbreviations							
Am	Amharic	Eng	English	Ind	Indonesian	Sp	Spanish
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Cz	Czechoslovakian	Gr	Greek	Mal	Malay	Tel	Telugu
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Du	Dutch	Hi	Hindi	Pol	Polish	Ur	Urdu
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		Ice	Icelandic	Russ	Russian	Yi	Yiddish

Equipment Used

Ted Agombar: Grundig Yacht Boy 700 + 20m random wire.
Leo Barr: Matsui MR-4099 + internal antenna.
Tony Batchelor: Sony ICF-2001D + Maplin a.t.u. + 30m random wire.
Darren Beasley: Philips D-2935 + Hexagon loop or a.t.u. + 10m random wire.
Kenneth Buck: Lowe HF-225 + random wire.
Andy Cadier: Saisho SW-500 + Datong active antenna.
Jim Cash: Sony ICF-2001D + AN-1 active antenna.
Robin Clarke: Saisho SW-5000.
John Coulter: Yaesu FRG-7 + random wire.
Peter Easton: Kenwood R-5000 + ERA BP34 audio filter + trap dipole.
David Edwardson: Trio R-600 + trap dipole 22m long.
Alf Gray: Codar CR-70 + Codar a.t.u. + Ex-Army rod antenna.
Brian Hallett: Trio R-2000 + 10m random wire.
Simon Hamer: Lafayette HE-30 + 'Sooper Loop' or Grundig S-1400 + 19m wire.
Robin Harvey: Matsui MR-4099 + SW loop.
Francis Hearne: Sharp GFA3 cassette radio + random wire.
Sheila Hughes: Panasonic DR-48 + 15m inverted L or Vega 206 portable.
David Hunt: Yaesu FRG-7700M + 13m random wire.
Rhoderick Illman: Sony ICF-7600DS + 23m random wire.
Eddie McKeown: Tatung TMR-7602 portable.
David Middlemiss: Yaesu FRG-7 + random wire.
George Millmore: Tatung TMR-7602 portable or Racal RA17L + loop.
John Nash: Kenwood R-5000 + random wire.
Ike Odoom: Philips D-2935 portable.
Fred Pallant: Trio R-2000 + random wire in loft.
John Parry: Realistic DX-400 + 33m random wire.
Roy Patrick: Lowe HF-125 + 20m wire.
Ron Pearce: Home-built one valve (955) straight RX.
Philip Rambaut: Int.Marine Radio R-700M + random wire.
Kenneth Reece: Icom R-9000 or Kenwood R-5000 + delta loop.
Alan Roberts: Home-built 'Epsom' superhet + 19m or 31m dipole.
John Sadler: DX-400 + SW loop.
Mark Selby: Realistic DX-440 or Panasonic RFB-40 + a.t.u. + 60m random wire.
Colin Shaddick: Lowe HF-225 + 40m random wire in loft.
Tim Shirley: Trio R-600 + random wire.
Chris Shorten: Matsui MR 4099 portable.
Alan Smith: Matsui MR-4099 + Mizuho KX-3 a.t.u. + dipole.
Cliff Stapleton: Trio R-1000 + dipole or 25m random wire.
Darran Taplin: Eddystone 680X + Global a.t.u. + 30m random wire.
Mark Thompson: JRC NRD-525 + 1.4m spiral loop or 20m random wire.
Phil Townsend: Panasonic RF-1680L portable or Lowe SRX-30 + random wire.
Steven Verhaegen: Trio 9R-59DS + Fritzel GPA3 groundplane.
Ken Whayman: Realistic DX-440 - 'T' antenna or Vega 206 + whip.
Neil Wheatley: Sangean ATS-803 + built-in antenna.
Jim Willett: RCA AR-77 + X dipole in loft.
Julian Wood: Trio R-2000 + random wire.
David Wratten: Philips D-2999 + loop or Trio R-2000 + a.t.u. + 30m random wire.
Carl Yates: Realistic DX-440 + 15m random wire.

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