Short Wave Magazine

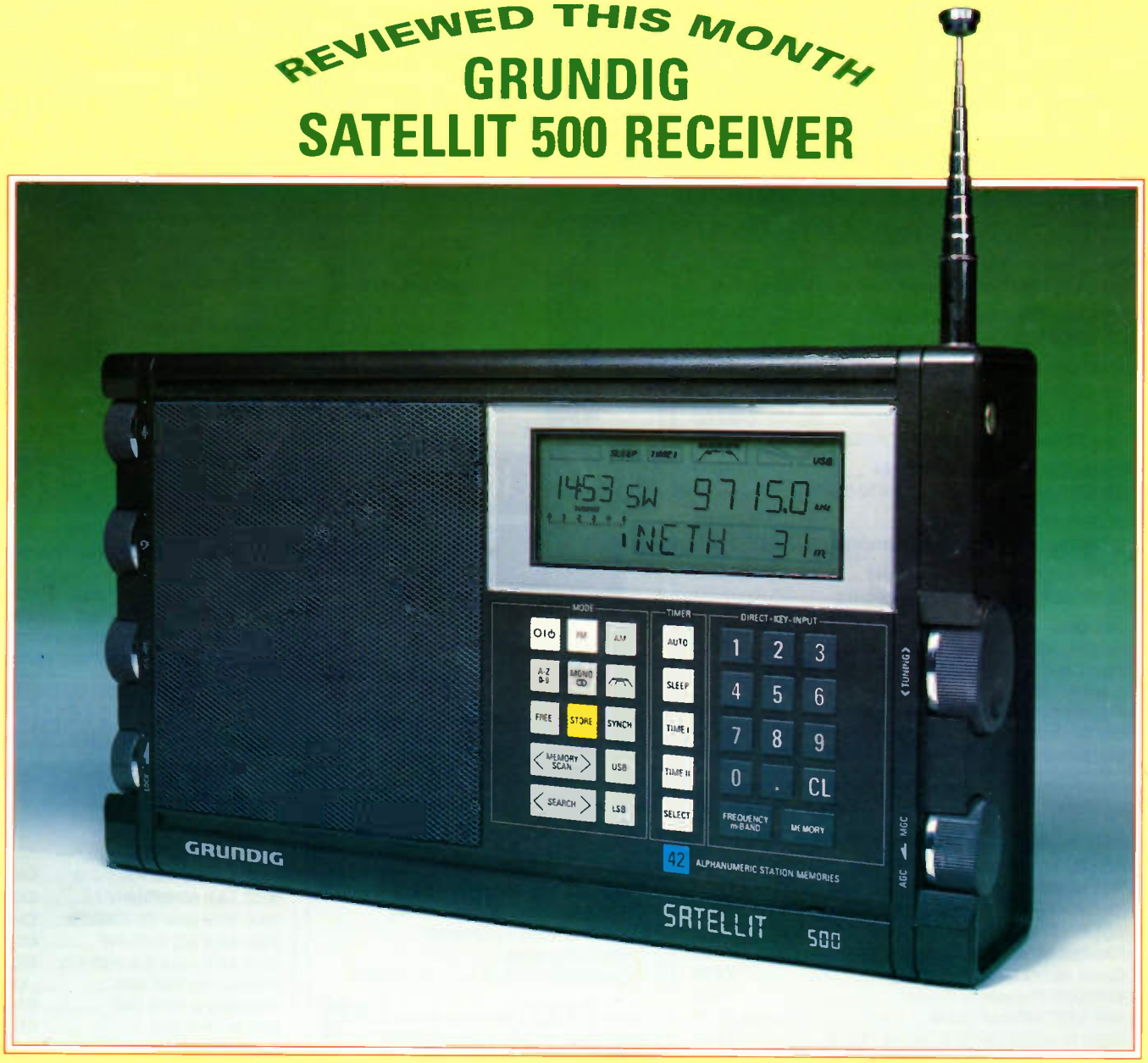
£1.60

MARCH 1990

SWM SWM SWM SWM SWM SWM

REVIEWED THIS MONTH

GRUNDIG SATELLIT 500 RECEIVER



PLUS

HOWES ACTIVE ANTENNA KIT

AND

Regular Features For Airband, Scanning and Broadcast Enthusiasts

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For The Radio Listener

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ON SALE FEBRUARY 22nd

APRIL ISSUE ON SALE
MARCH 22nd

|28| **Grundig Satellit 500 Receiver**

Cover The latest offering from Grundig is their Satellit 500 receiver offering a host of technically innovative ideas. Read what Peter Shore has to say about it.

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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

In response to Paul O'Connor's question "Am I at 25 the last of the s.w.l.s? I write, I have been generally interested in radio since 1984 and in December 1988, I decided to become a s.w.l.

Since then, with the aid of my four-band domestic radio and the WRTH, *I have logged 539 transmissions from mainly external plus a few domestic broadcasters and sent about 120 reports. In return, I have a file full of QSL cards, three files full of station literature and walls/windows/boxes full of souvenirs.*

I find this hobby most stimulating and rewarding, but am afraid to say that I know not anyone else my age who is interested. I am 19.

TOM READ
SPITAL TONGUES
NEWCASTLE-UPON-TYNE

Dear Sir

I was interested to read the letter from Paul O'Connor in the January '90 SWM. *I am a 16 year old A-level student and have been an s.w.l. for the past three years. I use an ICF-2001D, with an ex-army R210 as a backup receiver, and a long wire antenna. I have been interested in radio ever since my father got his 'B' licence, and bought a Yaesu FT480, which I used avidly for listening around the 2m band, and then bought the Sony, which I have used ever since for short wave/Band II DXing. I have recently bought (after saving long and hard!) an RX-4 decoder which I use to receive RTTY and c.w., as a result of which I often spend hours plotting meteorological data from Bracknell on charts. Finally, I have just taken the RAE, and (assuming I pass!) my Morse test is booked.*

I have also noticed the lack of interest in radio amongst young people. When I was in the Scouts, I organised a radio evening, and demonstrated short wave DXing, and nobody showed any real interest in what I was talking about. It seems that for my generation, f.m. radio is no longer a marvel of technology, as people just turn on a radio and expect high-fidelity stereo sound to come out. They aren't interested in how it gets to the receiver, that a signal on s.w. can be coming halfway round the world, or that news services such as TASS are available to everybody, bringing the latest news in as it happens. Then again, I know of one avid s.w.l. in my school, but that is only one in 1250!

Much more needs to be done to get young people interested in the delights of hearing Australia for the first time, or hearing the news from a totally different viewpoint, or finally receiving that elusive QSL after months of waiting.

MIKE KNELL
LEAMINGTON SPA
WARWICKSHIRE

Dear Sir

To follow up on what Mr O'Connor from Birmingham said, I do agree, that not many 'youngsters' today are interested in DX RX/TX. I started listening at 13 years old to BCB stations on short wave using a VEF 206 portable. I then wanted to started listening to amateur transmissions, so I built a b.f.o. I now have recently bought a Matsui MR-4099 and am very pleased by its results. I also wanted to get into TX as well as RX, so I bought a CEPT frequencies CB transceiver. I have had many copies from European stations only using the max 4 watts! I am now considering taking the Novice RAE if it comes about next year.

My friend started off my listening interests, as he has an AR88. I am glad he did because as one of the majority of s.w.l. youngsters, I really enjoy the hobby.

Many thanks for a great magazine, keep up the good work!

DANIEL PEAKE (Age 14)
BARNAGE
MANCHESTER

Dear Sir

In the January issue of SWM *Paul O'Connor claims that short wave listening and amateur radio is on the decline amongst today's youth, what a load of rubbish.*

I am only 16 years old and have enjoyed DXing the medium wave band for several years before I received a Saisho SW2000 short wave radio in 1988 as a gift. During 1989 I spent hours searching around the bands - particularly at night; I was even awake at 0200 listening to Kusw last March despite GCSE courses and a paper round at 0600 the following mornings. After delivering 6000 papers I had saved up £99 and promptly spent it on a Saisho SW5000 which is a superb radio.

Many friends at school are also interested in short wave, they all wanted me to provide taped news bulletins from Radio Pyong Yang and Radio Pakistan. Once they knew the frequencies, they also used their parent's short wave radios to listen to the stations.

Short wave listening is gaining popularity with today's youth - lowering prices for digital sets to allow us 16 year olds to save up for them!

ROBIN CLARK
WEMBURY
PLYMOUTH

Dear Sir

Regarding the letter from Paul O'Connor which appeared in the January issue of Short Wave Magazine, *I feel I must protest at the sweeping generalisations which he made.*

Firstly, in answer to his question asking whether or not he is the last s.w.l. at 25, I can confirm that he is not, because I am 16 and I am also a short wave listener. Also I would like to point out that I have been monitoring the short wave bands since I was 14.

Having said this, I do appreciate the point that Mr O'Connor is making. I share his opinion that young people prefer HiFi and stereo to long distance reception, but what he and your other readers must realise is that not all of us are the same. I freely admit that most of the other teenagers I have met are only interested in rock and pop music and local radio stations which play this kind of music, but I am sure that I am not the only remaining teenager who prefers scanning the short wave bands for far away stations.

DANIEL MASTERSON
STOKE-ON-TRENT
STAFFORDSHIRE

Dear Sir

I wonder if other readers are interested in my reactivation in the hobby after a 21 year lapse!

It started with a word or

A WORD IN EDGEWAYS

two to someone I understood to be a Ham. Just telling him of how keen I'd been. of my past successes as a DXer on the broadcast bands; of my abondoned construction project (it would have been my first, a nine-valve radio receiver from Practical Wireless 1957 designed by F. G. Rayer if I remember rightly) and going over other "almost" plans and possible future projects has really got me going again.

I bought Short Wave Magazine and after reading it from cover to cover, phoned up a local enthusiast who'd had a letter published. From talking to him, I'm completely fired up once more on the construction mode (amongst others). I'm sending away for component catalogues to several different places.

It's a pity I've been away from the hobby for so long, but partly with the help of Short Wave Magazine I'm really catching up time.

It looks like it's going to be a lot of fun!

EDMEAD KANGAI
EAST GRINSTEAD
WEST SUSSEX

Dear Sir

I was most interested to read Mr Gillman's letter in the January SWM on the subject of DX reception of airfield base stations. As he lists several RAF airfields I presume he is referring mainly to u.h.f. frequencies. I have only recently equipped myself with a u.h.f. receiver after some 15 years of v.h.f. airband listening and am still experimenting with u.h.f. base antennas.

But with a car-roof whip cut to the centre of the u.h.f. airband I have received Brize Norton which is about 80 miles from my favourite location, a 100m a.s.l. hill overlooking the Bristol Channel east of Cardiff.

But this may not be such an achievement as might be thought. Lowe's Airband Guide contains a list of frequencies transmitted from the various CAA relay stations scattered around the UK. Cross checking this list against airfield frequencies in the RAF En Route Supplement reveals that a number of airfield frequencies appear to be relayed from these sites.

The Brize Radar frequency is shown against Clee Hill and Winstone. Both these sites are at a much higher altitude (500m and 300m) than Brize itself (90m). Winstone is only about 65 miles from Cardiff. I have not fully cross-checked Lowe's list but have discovered further cases, including a frequency from Davidstow which is the same as the u.h.f. frequency for Cardiff Airport.

Tuning to v.h.f. airfield base transmissions, the best DX reception we have logged is from Heathrow Approach and Tower with a 5λ/8 car-roof whip. This happened only once, on a day of exceptional lift conditions from the Gwent mountain top at about 500m a.s.l. The distance was 150 miles.

We do however, more often than not, receive base transmissions from Brest Control in north west France, at a cliff-top location near Cardiff, about 30m a.s.l., using the WIN-108 with its own telescopic antenna The distance is about 270 miles, mainly across water, with the heights of Dartmoor directly in the path.

ALAN JARVIS
CARDIFF

The January 'Spot The Difference' competition was won by **Mr. E. Bartlam** of Urmston, Manchester, who will now be getting his copy of *Short Wave Magazine* through his letterbox for the next year.

Dear Sir

I was interested to see the new Vintage Radio on the news-stand. Naturally, I was pleased to find the B MkII illustrated and mentioned, but surprised by the text referring to MWT as the makers of the B MkII and the MCR1. The correct information has been published in several articles, WW, Radcom, etc., but to repeat:

The A Mk1 was sub-contracted by SOE Supplies Division to Pye in Cambridge, while the A MkII went to Marconi at Writtle.

Later, Marconi made the A MkIII, which was a re-engineered MkII and this became the standard 'A' set for the rest of the war.

The B MkI was made in SOE workshops, and on completion of the MkII, a factory was set up in requisitioned premises in Stonebridge Park, N. London, staffed mainly by men and women in uniform, solely for the production of the B MkII.

In 1944, contracts were given to MWT and also to RGD (Bridgenorth) for production of the B MkIII, which started early in 1945.

The MCR1 (Miniature Communications Receiver 1) was designed by me in 1943, and all the production was made by Philco at Perivale.

There is of course, much more to tell, and this is to be subject of a book (or possibly a series of articles) most of which is in the Hard disk of my PC/XT.

You may have seen the most recent book on clandestine radio, published in 1988 and written by Melton and Ladd, Clandestine Warfare which covers both OSS and SOE equipment and activities.

You will certainly know the BVWS and NRHF, of which I am member and you may have heard of the Duxford Radio Society, formed under patronage of the Imperial War Museum, and operating GB2IWM, which has a main aim of documentation, restoration and in some cases, operation of historic military and clandestine radio.

I was responsible for the SOE series of h.f. sets, in Suitcase and other forms, including sundry items of an auxiliary kind, over the period mid-1941 to the end of 1945.

J. BROWN G3EUR
SOUTH OCKENDON
ESSEX

Dear Sir

My company was most concerned to see the published letter in February Short Wave Magazine from Mr James Finch of Solid State Electronics, Southampton. In his letter Mr Finch claims that the Jupiter II scanner receiver does not have a first i.f. of 705MHz and that in our advertising we are deliberately misleading the public. A serious accusation indeed!

Mr Finch, a self-confessed expert on scanners, is totally wrong. Quite how somebody who claims to be so closely connected with such products can make such a monumental blunder is beyond belief! The Jupiter II and its base station equivalent both have first i.f.s of 705MHz. Only above 800MHz does it revert to a lower i.f., and in this respect it is in good company with other well respected models. But where it matters, the Jupiter II has a 705MHz first i.f. for superb image rejection.

My company spends a great deal of money in the training of staff and in equipping ourselves with the latest test equipment. All this expertise and investment is done to provide customers with a before and after sales service which I think we can be justly proud of. Ill-informed and technically wrong accusations such as those made by Mr Finch do great harm to both product and company reputations, financially and otherwise.

May I, through your pages, suggest to Mr Finch that in future he confines his criticisms to matters which he either understands or has checked out for himself.

PETER WATERS
WATERS & STANTON ELECTRONICS

I have been assured that the Jupiter II does indeed have a first i.f. of 705MHz. This correspondence is now closed. Ed.

WHAT'S NEW

Arrow in Wigan

Arrow Electronics Ltd of Chelmsford have opened a new showroom in Wigan. Located on the first floor of the delightful Greensway Arcade in Gerrard Street, Ashton-in-Makerfield, the new shop is already proving popular with radio enthusiasts who are also finding that the Arcade's fashionable boutique, toyshop and excellent coffee shop are a hit with the rest of the family.

The new shop is managed by Jim Cook G6TYB with Glenys G4WDC and is open Monday to Saturday. For further information ring **(0942) 713405**.

Radio Carrying Case

Johnsons Shortwave Radio has sent us details of a smart carrying case to protect your radio. The Case Logic PSC30 is a durable black or red Nylon case backed with thick foam padding for maximum protection and an expandable shoulder strap. Smooth operating but tough zippers give easy access to both the radio compartment and an extra large pocket for accessories. The case will house a wide variety of radios such as the Matsui MR4099, Sony IFC2001D, Grundig Satellit 400 and 500 etc. and allows you to take your radio as hand-baggage on your travels.

More information from **Johnsons Shortwave Radio, 43 Friar Street, Worcester WR1 2NA. Tel: (0905) 25740**

Steerable Antenna

The one-of-a-kind steerable antenna has been in basic operation for several years now but it is only recently that it has been made fully steerable. For a long time it was operated in a fixed mode aimed at western Europe. The moveable power element was installed much later making the antenna manually steerable.

Now, engineers at Pifo in Ecuador have put the final touches to the mechanical aspects of the very efficient antenna. The control panel is in place allowing the antenna to move the beam, which is now 17° instead of the previous 40°, through the designed 150° arc. This gives a greatly enhanced signal into the target area.

As an example of this improved performance the signal from the steerable antenna to North America from a 50kW transmitter will be as powerful as that from HCJB's 100kW Harris transmitter working at 85kW.

Programmes of Interest from HCJB

Every Wednesday on HCJB's English Service, John Beck presents Ham Radio Today - a programme on amateur radio. John is planning to cover contesting, solar structure and resistance on 7 March, RTTY, solar flares and resistance on 14 March, amateur beacons, surface waves and magnetism on 21 March and r.f. ground, refraction and magnetism on 28 March.

Saludos Amigos is HCJB's international friendship programme hosted by Ken MacHarg. Each Tuesday Ken calls listeners from around the world who have written to him. You could join in the fun by writing to Ken. On 6 March Ken interviews Tom Meyer, the venerable host of Radio Netherlands' Happy Station, and also presents a light-hearted look at bus travel in Latin America.

Brent Aldred presents DX Partyline each week on Saturdays for listeners in Europe. In the 3 March edition he looks at the BBC's monitoring operation at Caversham Park. The 10 March edition examines some of Costa Rica's short wave broadcasters and Brent also presents more tips on successful QSLing. Radio communications in the Soviet Navy is the subject for 17 March while Arthur Cushen brings you up to date with the DX scene in the South Pacific.

North Pole 90

Two intrepid British explorers, Sir Ranulph Fiennes and Dr Mike Stroud, will be leaving London for Moscow on 22 February 1990 on the first leg of their attempt to reach the North Pole unsupported by animal or mechanical means.

While pulling their individual 175kg sledges and protected from the Arctic cold by their Damart thermal underwear, they will keep in contact with two base camps located towards the end of the expedition on the moving Arctic Ocean ice at approximately 86° N and another on Sredniy Island at the tip of the Soviet Union. British base personnel are Morag Howell GM0MUV and Laurence Howell GM4DMA who will be supported by three Soviet radio operators including Leonid Labutin UA3CR and Dmitry Shparo UA3AJH.

Morag will be conducting research into climatic change by looking at sea ice thickness and salinity levels from her floating ice camp on behalf of the UK's Scott Polar Research Institute. She will also act as Forward Communications Base for the two-man 'Ice Group' as they pull their sledges slowly towards the Pole.

Lawrence will be continuing the expedition's research into the effects of radio communications in the Arctic region and how the sun and closenenss to the North Magnetic Pole affects v.h.f. communications and signals via satellites.

It is hoped to be able to use British Special Event Callsigns suffixed by their Soviet Call Areas. Two such callsigns will be GB4MSS - Srdeniy Base Camp, with the callsign indicating that the expedition is fund raising for the Multiple Sclerosis Society and GB4ICE - the Forward Base Camp at 86° north.

GB4MSS/UA0? should be active in the first week of March and GB4ICE sometime in April. Both stations will be active on all m.f. and h.f. bands1.8 to 30MHz with GB4MSS working via OSCAR 10/13, RS10/11 on voice and c.w. and also possibly direct on 50MHz. Locator Square for the Base Camp, at 79°33'N 90°13'E, is NQ59CN and the time zone is UTC +6 hours.

In conjunction with the University of Surrey Satellite Engineering Department and AMSAT UK, up-to-date positional, weather and other data from the expedition will be heard via UoSAT2/ OSCAR11 using the onboard computer digitalker with a 500 word vocabulary. This satellite can be received world-wide on simple receiving aparatus and many schools and colleges around the world have dedicated receivers for UoSAT2.

Base Camp will also be uploading information on the Expedition's progress isong the Digital Communications Experiment on UoSAT2 with access to bulletin boards worldwide. Packet radio operation is also likely on h.f. into the UK via GB7LDI gateway and possibly also via satellite.

The Expedition has been provisionally assigned the following frequencies in the amateur bands: 144.300, 50.105, 50.110, 28.885, 21.285, 14.285, 7.085, 3.785 and 1.910MHz on s.s.b. and c.w. Satellite up-links: 435, 145 and 21MHz modes AX.25, s.s.b., c.w. and f.s.k.

Special QSL cards will be available from Ian Crockford GM1AUZ who is acting as QSL Manager. The card contains information on the expedition and how amateur radio is helping to sponsor a research chair to find a cure for multiple sclerosis at a UK university.

Information and sponsorship/donation forms can be obtained from **The Multiple Sclerosis Society Research Chair Appeal, The Multiple Sclerosis Society, 25 Effie Road, London SW6 1EE Tel: 01-487 5734.**

Quotations of Technical Interest - QTI

Produced for the visually handicapped radio enthusiast by QTI Talking Newspaper Association, QTI tape magazine is a compilation of articles selected from current radio magazines and recorded on tape by a team of readers from all parts of the UK.

The magazine, recorded on two C90 cassettes, is sent out to more than a hundred members at about three-weekly intervals. Although most of these are in the UK there are some in Norway, West Germany, Eire, India, Canada and California while one copy is sent out to Australia where it is copied and distributed to listeners down under.

The service is available to all handicaped radio amateurs and short wave listeners for a voluntary subscription of just £3.50. Under a special Post Office arrangement blind subscribers get it post free but in other cases postage has to be paid.

Of course something like this always needs funds to cover running costs and purchase new equipment and, while material and financial support has been given by the electronics industry, amateur radio dealers and the radio press, donations, large or small, are always gratefully received. As QTI is a registered charity, covenanted donations are worth one third as much again as QTI can recover the income tax already paid by the donor. There is also a 'Sponsor a Member' scheme which is designed to help those members who are on small incomes by paying their subscriptions and volunteer helpers are also needed. For further information on QTI contact **Harry Longley, QTI Talking Newspaper Association, 7 Anderson Close, Lancaster, LA1 3JE. Tel: (0524) 33207.**

TRADING POST

FOR SALE AOR AR-2001 Communications receiver, 25-550MHz, £210. Tel: Great Yarmouth 664974.

FOR SALE Trio/Kenwood R600 communications receiver, 150kHz-30MHz, boxed, £200. Matsui MR-4099 portable receiver, 150kHz-30MHz, 87MHz-108MHz, £70 o.n.o. Both rigs as new. Log periodic beam, v.h.f./u.h.f. (Sandpiper), £35. Datong AD270 active antenna, 0.2-100MHz, £20. Mick. Tel: Dunstable 668648.

FOR SALE Kenwood R2000 with v.h.f. + whip, £300. Sony Air7, £100. Both perfect with manuals. D. Woods. Tel: Swindon 485826 anytime.

FOR SALE Realistic DX-400 receiver and a.t.u., excellent condition, £120. Sony ICF-SW20 receiver, SW1 size but analogue tuning, as new, £45. John Fryatt. Tel: 01-550 8800 Ext. 214 daytime.

WANTED Top prices paid for your German gear of WWII vintage. Looking for receivers, transmitters, accessories. Will collect. Lissok, Rue M. Poedts 9, B-1160 Brussels, Belgium. Tel: 010-322-6737115.

FOR SALE AR-3000 mint, £700. Signal R535 airband Rx. NiCads, Case etc, v.g.c., £250. Lockwood G3XLL QTHR. Tel: Mellis 83596.

FOR SALE Immaculate Icom IC-R71E comm Rx with remote control, manual, circuits, orig packing, £500 carr paid. Bradley, 2 Tenterden Close, Dorchester Rd, Bransholme, Hull HU7 6BH. Tel: Hull 838097.

FOR SALE Pye Europa, 2m, 4m, 70cm, commercial quality and standard components, fully synthesised, frequency readout, £155. M. Rieder. Tel: 01-953 7984 (24hrs).

WANTED ERA MkII Microreader. C. Kellam. Tel: Sheffield 312488.

FOR SALE Sony ICF-2001D world-band receiver, mains adaptor, used a few times. New Oct '89. Absolute mint, £230. H. Beard. Tel: Wellingborough 664737.

FOR SALE Win-108 airband receiver 108-143MHz, purchased new Dec 1989, still boxed and unused. Cost £175 will accept £140. Mr R. Grindrod. Tel: Rochdale 46023.

FOR SALE Marconi marine receiver type NS702, 15kHz-28MHz with full technical handbook, v.g.c., £70. Also Realistic DX440, mint condition, £50. G. Chadwick. Tel: 051-644 0815, Wirral, Merseyside.

FOR SALE AOR AR-900 hand-held scanner, seven months old, immaculate, under guarantee, boxed with instructions, leather case, v.h.f./u.h.f. antennas, mains charger all included, £150 for quick sale. Peter Arkless. Tel: Bathgate 630548.

FOR SALE Trio 95-59DS communications receiver with Trio speaker and manual, good condition, £70 o.n.o. Tel: 01-943 0710 Teddington, Middlesex.

FOR SALE Panasonic RF-3100L s.w. receiver, covers 1.6-30MHz, without gaps, u.s.b.-l.s.b., also f.m. broadcast, m.w.-l.w, mint condition. Also ERA MkII decoder, one month old, as new, a bargain at only £250 for both, no offers. T. Binns. Tel: Halifax 361635.

FOR SALE Yaesu FRG-8800 with v.h.f. converter, £425 with manual. Mint condition Datong active antenna AD-307, £40. Many books, magazines and frequency lists included. Commodore 64 data cassette, p.s.u., joy stick, games, all new condition, hardly used, boxed, £100. Technical Software TIF.1. RX4 receive for Commodore 64 interface leads plus tape, £35. A. Greathead. Tel: Garstang 22450.

FOR SALE NRD-515 receiver with matching speaker and memory unit and Microwave Modules RTTY/ASCLL decoder, also 12in monitor (green) and Yaesu FRT-7700 a.t.u. All in mint working condition, buyer collects, £940 o.n.o. Mr Powell. Tel: (0691) 622368.

FOR SALE Yaesu FRG-7700 communication receiver, good condition, £225 o.n.o. Three Microwave Modules convertors covering 50, 144 and 432MHz bands, £30 each. Datong wide band pre-amp with p.s.u., £32. F. Moore, write to 76 High St., Ide, Exeter, Devon EX2 9RW.

FOR SALE Realistic PRO-2021, a.m./f.m. 200 channel scanner, boxed as new with antenna input modified to PL259, 120. Mr J. Ferguson. Tel: Taunton 257464 evenings.

FOR SALE Realistic PRO-32 200 channel hand-held scanner plus discone antenna, £150 o.n.o. Or will swap for short wave receiver. J. Harrison. Tel: Crewe 662772 evenings.

FOR SALE Racal RA17, 0.5-30MHz, 30 1MHz bands on film scale, 6 band widths, 100Hz to 8.5kHz, b.f.o., xtal cal, tuning meter and manual. Reg, 54 Covertside, West Kirkby, Wirral. Tel: 051-625 9006.

FOR SALE AR-900UK Scanner, includes military airband frequency band, superb performance, boxed and still under guarantee. Recent purchase of R535 reason for sale. Includes RAF *En Rout Supplement*. Bargain at £165. P. C. Mitchell. Tel: Newbury 48633.

FOR SALE Military receiver R210, power supply, speaker, service and operating manuals, £45 carr extra, v.g.c. TEAC 3.5in 1M drive + 5.25in adaptor IBM, £45 carr extra, unused. Seon Smyth, 'De Porres', 67 East Princes St, Helensburgh, Strathclyde G84 7DG.

FOR SALE Realistic PRO-31 hand-held scanner, 68-88, 134-174 and 380-512MHz. Used but in good working order, £50. J. A. Marchington, 134 High Street, Guildford, Surrey GU1 3HJ. Tel: Guildford 505055 daytime.

FOR SALE Sony Air-7 a.m./f.m./air/p.s.b. scanner, with mains adaptor, 5 months old, £140. J. Smith. Tel: Bristol 611722.

FOR SALE Signal R535 v.h.f./u.h.f. airband receiver, £195 o.n.o. Jupiter MVT-6000 base scanner, 25-1300MHz, £320 o.n.o. Realistic PRO-2021 scanner, 200 channels, £140 o.n.o. All mint condition. J. House, 4 Elizabeth Way, Kemilworth, Warwicks CV8 1QP. Tel: Leamington Spa 54556.

FOR SALE RT88 Sets (2) inc power supply, l.f. amp, handsets, 4 channel 40-43MHz were working recently, manual inc. Offers. Shaw, Springwood Cottage, Godalming GU7 1NS.

FOR SALE Realistic PRO-2004 scanner, 25-520MHz, 760-1300MHz, modified to 400 memories, 20 ch/sec speed, 10 search bands, as new, boxed, manual, etc, £275 o.n.o. Alan Burge. Tel: Belfast 681962.

WANTED Old closed-circuit TV cameras of the valve era, literature on same, v.h.f. TV set-top antenna, the type with a large loop and a walnut Bakelite base. Odhams Television Annuals of the 50s and 60s. TV station 2 x 2in slides of test cards and captions. Amateur TV callsign generator or similar using real diodes in a matrix. Andy Emmerson, 71 Falcutt Way, Northampton NN2 8PH. Tel: Northampton 844130.

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 Philips world receiver D2935 new, £110. Microreader new, £100. Icom 2m f.m. mobile with mag-mount, £100. Yaesu FT-101Z with fan, £390. Slim Jim antenna, £10. F. Steele. Tel: Little Cherington, Oxfordshire 202.

FOR SALE Yaesu FRG-7700M communications receiver, 150kHz - 30MHz, plus Yaesu FRV-7700 v.h.f. convertor, 140 - 170MHz, plus Yaesu FRV-7700 active antenna, all boxed with manuals, £295. Frank Chilton. Tel: Harlow, Essex 20755.

FOR SALE or SWAP Low band f.m. Pye M290, Europa and Motorola MC80, low band a.m. Pye Westminster, Burndept and Pye u.h.f. hand-helds manuals, chargers, complete shack clearance. Tony G4KZX. Tel: Newhaven 516033.

FOR SALE Sony ICF PRO-80, seven months old, boxed, mint, a.m. wide/narrow, s.s.b. and narrow f.m., s.w., air and p.s.b., 150kHz-108MHz and 115-223MHz, £215. K. R. Hayter. Tel: Brighton 302307.

FOR SALE AR-2002 scanner, mint condition and boxed, specification as in adverts in this magazine, £375. Also brand new Revcone discone antenna to match, £20. John Gaskell. Tel: Doncaster 344829 or 367975 evenings.

FOR SALE Regency MX7000 scanner RX, AOR-2002 look-alike but with membrane keyboard, 4-years old, excellent condition, £300 o.n.o. Sony ICF-2001D Rx, 2-years old, excellent condition, £270 o.n.o. Or £550 for the two. Mr P. Galton on 01-699 7997 after 7pm.

FOR SALE Marconi 'Atalanta' GP receiver (type 2207C) instruction manual, brand new, £15. Also Service/Instruction manual for Plessey PR1553 communications receiver - as new, £15. James Sainsbury. Tel: 04868 7088.

FOR SALE Kenwood R-5000, excellent condition, boxed with manual, 10 months old, £650 o.n.o. D. Chatterton. Tel: Kendal 725914.

WANTED Icom IC R-70 comms receiver, late model if possible and in good condition with no alterations, with manual. F. Upstone. Tel: Tewkesbury 73366.

WANTED Eddystone receiver 940, 480kHz to 30MHz, must be in good very good condition with service manuals. Bill Maxted. Tel: Southend-on-Sea, Essex 614938.

WANTED R1155, T1154, of good appearance with minimum modifications. Also Eddystone 940 receiver. John Gibson. 1075 Sterling Ave, Berkeley, California 94708, USA.

FOR SALE Rees-Mace communications receiver, 60kHz - 30MHz, 8 ranges, 44lbs, £30. SEM QRM Eliminator, new unused, £40. Cambridge tunable audio notch filter, £10. J. Cox, 100 Gwendoline Street, Treherbert, Rhondda. Tel: (0443) 774053.

FOR SALE Signal generator CT433A (15Hz - 50kHz). Any reasonable offer accepted. J. Peckett, 30a Finchley Rd, Westcliffe-On-Sea, Essex SS0 8AF. Tel: Southend-On-Sea 332667.

FOR SALE Drae SSTV transceiver with memories, £125. Or part exchange for Pk232 Mbx or ICS Fax-1. Fred. Tel: 01-317 8296 anytime.

FOR SALE Realistic PRO-34, 200 channel hand-held scanner, 66-88, 108-174, 380-512, 806-960MHz, immaculate condition and boxed, £120. N. Dixon. Tel: Cwmbran 366206.

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SWM MAR 90 TP

GRASSROOTS

Derby & District ARS have North American Travels - an illustrated talk by G4WBK on February 28, a Junk Sale on March 7, Early Radio Pioneers - illustrated talks on the 14th and their AGM on the 21st. Wednesdays, 7.30pm at 119 Green Lane, Derby. Kevin Jones G4FPY on Derby 669157.

Verulam ARC meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association HQ, New Kent Rd, off Malborough Rd, St. Albans. March 13 is an Activity Evening. Mr A. Ince G0BZS at Cottage No. 1, Rounton, 28 Nascot Wood Rd, Watford WD1 3SD.

South Bristol ARC have a CW Activity Evening on February 28, Severnside TV Repeater Group Presentation G0AWX/Committe Meeting G4WUB on March 7, HF Activity Evening on the 14th and Bring & Buy Sale G4YZR on the 21st. Wednesdays at the Whitchurch Folkhouse, Bridge Farm House, East Dundry Rd, Whitchurch. Len Baker G4RZY on Whitchurch 832222.

Coventry ARS have the Indoor Direction Finding Contest on February 23, Night on the Air and Morse Tuition on March 2/16 and an HF Communication System For Africa by Dr Chandler on the 9th. Fridays, 8pm at Baden Powell House, 121 St. Nicholas St., Radford. Neil Blair G7ASZ on Coventry 523629 (Home) or 523523 Ext. 2541 (Office).

Acton, Brentford & Chiswick ARC meet 3rd Tuesdays, 7.30pm at the Chiswick Town Hall, High Rd, Chiswick. March 20 is a talk on In-flight Telephones G4GD. W. G. Dyer G3GEH at 188 Gunnersbury Ave, Acton, London W3 8LB.

Biggin Hill ARC have their next meeting on March 30. 3rd Tuesdays, 7.30pm at the Victory Social Club, Kechill Gdns, Hayes. Geoff Milne G3UMI on 01-462 2689.

Atherstone ARC meet 1st Wednesdays, 8pm in The Bull Inn, Watling St., Witherley. J. Arrowsmith on Atherstone 713670 weekends or after 6.30pm weekdays.

Keighley ARS have Home Construction G3TDZ on February 27, Natter Nights on March 6/20 and Modifying PMR Gear G4FSQ on the 13th. Clubroom, rear of Victoria Hall, 8pm. Kathy on Bradford 496222.

Thornbury & District ARC have a film "EMI 2000" G3GC and also Constructors Contest Entries on March 8, Aerial Radiation & Patterns G3GC on the 15th and Constructors Contest on the 22nd. Thursdays, 7.30pm at The Recreation Centre, Chilton Grove, Yeovil. David Bailey G1MNM at 7 Thatchem Close, Yeovil BA21 3BS.

Hasting Electronics & RC have their AGM in March. 3rd Wednesdays, 7.45pm at West Hill Community Centre, Croft Rd. Fridays, 7.30pm in the Clubroom at Ashdwon Farm Community Centre, Downey Close. Reg Kemp G3YFF at 7 Forewood Rise, Crowhurst, East Sussex TN33 9AH.

Cheshunt & District ARC have a Natter Night on February 28. Wednesdays, 8pm in the Church Room, Church Lane, Wormley. Roger Frisby G4OAA on Hoddesdon 464795.

South East Kent (YMCA) ARC have a Winter Project Update G0BPS on February 28, a Natter Night on March 7, Publicity Material for 1990 events G8ZYZ/G1PJJ on the 14th and a Natter Night and Committee meeting on the 21st. Wednesdays at the YMCA, Leyburne Rd, Dover. G8ZYZ on Dover 852533.

Lothians RS have an Open Night on March 14. 2nd & 4th Wednesdays, 7.30pm at the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. P. J. Dick GM4DTH at 21 West Maitland St., Edinburgh EH12 5EA.

Bromsgrove & District ARC have their AGM on March 9. 2nd Fridays at Avencroft Art Centre. Trevor Harper G0KIN on Bromsgrove 33173.

DERBY AND DISTRICT AMATEUR RADIO SOCIETY

(Incorporating Derby Wireless Club 1911: affiliated to the R.S.G.B.)

CALL-SIGNS: G3ERD, G2DJ, G8DBY

The oldest wireless club in Great Britain

Horndean & District ARC meet 1st Thursdays, 7.30pm at Merchistoun Hall, London Rd. March 1 is Pathfinders (part 2) G3VPO. Stuart Swain G0FYX on Havant 472846.

Stevenage & District ARS have a Committee meeting at 81 Whomerly Rd, 8pm on February 27, their AGM 7.30pm on March 6 and Which Aerial Is Best G0GTE, 7.30pm on the 20th. Ground Floor Lecture Room, "D" Block, Ridgemond Training Enterprise, Ridgemond Park. Pete G0GTE on Stevenage 724991.

Loughton & District ARS have Any Radio Questions? on February 23 and The Versatile Diode G8DZH on March 9. Room 14 os Loughton Hall, Rectory Lane, Loughton. John Ray G8DZH on 01-508 3434 (after 7pm).

Farnborough & District RS have Amateur Radio in the USA, lecture by G0/KI400 on March 14. 2nd & 4th Wednesdays, 7.30pm at the Railway Enthusiasts Club Premises, off Hawley Lane (by M3 bridge). Tim FitzGerald G4UQE on Camberley 29231.

Southgate ARC have their Preparations for the London AR Show on March 8 and normal club meeting night on the 22nd. 2nd & 4th Thursdays, 7.45pm in Holy Trinity Church Hall (Upper), Winchmore Hill, London N21. Brian Shelton on 01-360 1989.

Wimbledon & District ARS meet 2nd & last Fridays, 7.30pm in St. Andrews Church Hall, Herbert Rd, London SW19. February 23 is EGM followed by a selection of Videos and a Surplus Equipment Sale on March 9. Nick Lawlor G6AJY on 01-330 2703.

Halifax & District ARS have Birketts Component Sale on March 20. 1st & 3rd Tuesdays are Informal Noggin and Natter nights in the Running Man Public House, Pellon Lane, 7.30pm. David Moss G0DLM on Halifax 202306.

Hornsea ARC have Open Forum on February 28, Home Construction on March 7, a committee meeting on the 14th and YTV Videos G4YTV on the 21st. Wednesdays, 8pm at The Mill, Atwick Rd. Jeff G4IGY on (0964) 533331.

Torbay ARS meet Fridays, 7.30pm at the ECC Social Club, Highweek, Newton Abbott. February 23/ March2/9/16 are club nights and March 10 is their Annual Dinner, Templestowe Hotel. Walt G3HTX on Paighton 526762.

Sutton & Cheam RS have GB2TOA Special Event Station on February 24, a committee meeting at 20 West Farm Ave, Ashtead on the 28th, a natter night in the Downs Bar on March 5 and a Constructional Contest on the 16th. Downs Lawn Tennis Club, Holland Ave, Cheam, 7.30pm. 1st Mondays are natter nights in Downs Bar. John Puttock G0BWV at 53 Alexandra Ave, Sutton, Cheam SM1 2RA.

Stourbridge & District ARS have on air/natter night on March 5 and their AGM on the 19th. 1st & 3rd Mondays, 7.45pm at Robin Woods Centre, Scotts Rd. Clive Williamson G4IEB on Stourbridge 392006.

Norfolk ARC have Emergency Communications, Dr Tim Hurst G4CTT on February 28. Wednesdays, 7.30pm in The Norfolk Dumpling, The Livestock Market, Harford, Norwich. Steve Sewell G4VCE on Mulbarton 78258.

Mansfield ARS meet at The Polish Catholic Club, Windmill Lane, off Woodhouse Rd. March 1 is a Junk Sale and the 15th is Linears V Processors V Antennas. Keith Lawson G4AAH on Mansfield 642719.

Trowbridge & District ARC meet 1st & 3rd Wednesdays, 8pm at TA Club, Bythesea Rd. March 7 is Sale of Surplus Equipment and the 21st is a social evening. Ian Carter G0GRI on Bath 461161.

AIRBAND

Godfrey Manning G4GLM

Read the latest developments in aeronautical radio. Godfrey also presents another book review.

One of the fascinations of aeronautics is that it is always developing. In *Aeronautical Information Circular* 121/1989 from the Civil Aviation Authority (CAA) the next development in secondary surveillance radar (s.s.r.) is described. As usual with any of the technical aspects I will assume that readers know about s.s.r. unless someone writes in to tell me otherwise - in which case I shall devote part of a future issue to describing it. Mode S, which is implemented in each aircraft at one of four levels from basic to full capability, will enable the exchange of far more data between aircraft and ground than is currently possible with modes A and C. As well as improved aircraft identification, two-way data exchange is possible and there will be a reduction in the various forms of interference and scrambling to which present modes of s.s.r. are prone.

More Callsigns

I have a list of callsigns for identification from **P.J. Salisse** (Highgate, London). Please also see December 1989, page 24. AIR BRIDGE = Air Bridge Carriers (freight); ASPRO = Inter European Airways; BEATOURS = Caledonian Airways (was British Airtours); BROADWAY = Fleet Requirements Unit; CALJET = Novair's old callsign; CONAIR = Conair Air Services; CONDOR = Condor Flugdienst, German charter airline; CSA = Ceskoslovenske Aerolinie; EVERGREEN = Evergreen International Airlines; FAIRFLIGHT = Fairflight Ltd; KITTY = Royal flight but Queen not on board; NATION AIR = National Airlines; NOVAIR = Novair (formed on the break-up of British Caledonian); PEREGRINE = Peregrine Air Services; SANTA = Linea Aerea Aerosanta; STERLING = Sterling Airways Ltd; THURSTON = Thurston Aviation.

Now over to the readers for help with the ones I can't find: BOLAIR, CHALLENGER, MARITIN, ROOK.

Help!

P.J. Salisse further asks about the way in which s.s.r. works. The squawk codes are not transmitted on the v.h.f. aircraft band but are a reply, on 1090MHz, triggered by a ground-originated 1030MHz radar signal.

Shanwick is the controlling authority for "our half" of the North Atlantic Track System. The controllers are at Prestwick but the radio station is at Shannon, hence the name. Over the Atlantic, aircraft transmit on h.f. The routes (tracks) flown vary daily depending on weather conditions. On 133.8MHz, from 1130-1900GMT, Shanwick transmits the current day's tracks. The main transmitter for the track broadcast appears to be Davidstow Moor, in south-west England.

Frequency and Operational News

The *General Aviation Safety Information Leaflet* 12/89 from the CAA introduces a new n.d.b. at Manchester (BAE: dah-di-di-dit, di-dah, dit, 325kHz); it's said to be at Berton, but is this a misprint for Barton? Also mentioned are the new restricted areas in England and Scotland surrounding six high-security prisons. Helicopters are prohibited - presumably they are too convenient for use in getaway attempts by prisoners! Such areas already exist in Northern Ireland, where infringement by helicopters will result in some unpleasant form of defensive action.

The December 1989 issue of *General Aviation Airmisses* from the Joint Airmiss Working Group emphasises the need to speak to a controller when in the Upper Heyford Mandatory Radio Area. Outside normal operating hours contact must still be made, but it has only just been made clear by *NOTAM A300* that the frequency changes to 122.1MHz at such times.

Information Sources

You've probably read about *Radioline, SWM*'s telephone information service on 0898 654676. If any last-minute aeronautical news does come up I will endeavour to have it included on the recorded message.

Previously I've mentioned the *From the Flightdeck* series (Ian Allan). No. 2 has so far eluded me; **Anne Reed RS87871** (Cheltenham, Gloucestershire), who I'm sure has read the lot, tells me that it's about the Space Shuttle "...and well worth getting." Too late for Christmas - unless you can bear the wait till the end of this year! Anne has a very understanding husband who tolerates her enthusiasm for matters radio to the extent of having bought her *Aeronautical Communications HF Edition* by Evans - not cheap! Anne wasn't allowed to see it until Christmas Day, but perhaps now we could be given the verdict as to whether it's good value for money?

Book Review

Thanks to a couple of fellow authors who have sent me review copies of books they've written. I'm fitting in reading these between other tasks - such as running the Museum! This month, I'll report on *Scanners, a VHF/UHF Listener's Guide* by **Peter Rouse GU1DKD** (Guernsey). The third edition, published by Argus, is available from the *SWM* Book Service.

As with anything you might buy, it will only be of use rather than a disappointment if its intended purpose is known. *Scanners* is not an aeronautical book, but rather a general discourse on the functions and applications of v.h.f./u.h.f. scanning receivers. It devotes attention to a various number of the services to be found in this part of the spectrum. You'll find descriptions, for example, of amateur radio, Citizen's Band and marine communications.

There is a section on aeronautical communications (although practically nothing on navigation) which provides a general introduction for the beginner but may fail to satisfy those readers who already have some experience in the subject. The description of approach and landing is a synopsis for which the book doesn't provide enough space to distinguish between radar vectoring at large airports and circuit flying at smaller ones. There are a few annoying factual errors but then this is not a specialist book. Readers of this column will know that I do put emphasis on navigation; without knowledge of this subject, I feel it is not possible to understand communications made by i.f.r. traffic. Hence I think it a pity that *Scanners* dismisses beacons as "...not of interest to scanner users" (page 138).

Scanners is a useful reference source; frequencies are listed and there is a map of the flight information regions of the UK. In the companion work *Scanners 2* (which was not submitted for review) there is a list of callsigns - regrettably I have only been shown this list ordered by operator, not callsign, so it apparently isn't possible to discover to which operator any particular callsign belongs. One section will answer queries that I often get from readers: it lists the specifications of most of the receivers on the market. One problem that might arise is that all this information can get out of date quite quickly.

This book would be a good purchase if, instead of a specialist reference book on one aspect of v.h.f./u.h.f. radio, the reader wants a generalised treatment of receiving techniques, major applications, etc.

Follow-Ups

Back in the November '89 issue **Bob Parkes G3REP** (Steyning, W. Sussex) reported on an accident at Gatwick. The *AAIB Bulletin* of 12/89 describes how Boeing 747-136 G-AWNB suffered a

☞20

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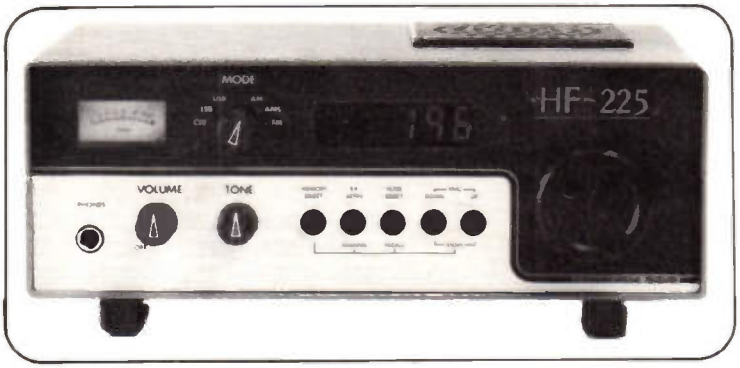

		Price	Carr
HF-225	HF general coverage receiver, 30kHz to 30MHz	**£395.00**	**£8.00**

(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**
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Modes of reception include not only the essential AM and narrow (communications) FM, but also wide FM for listening to broadcast stations and TV sound.
The price of £249 includes the radio, aerial, rechargeable batteries, and the mains charger. Quite amazing when compared with other handheld scanners offering much less for much more money.
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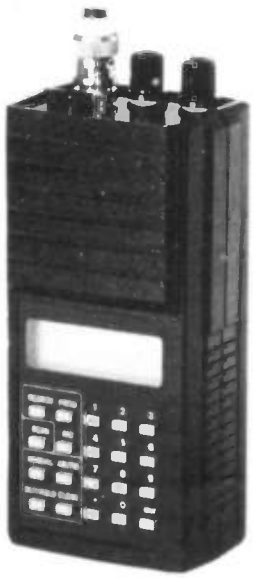
AR-900UK ~~£235~~ NOW £199



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RIGHT THE FIRST TIME

Rev. George Dobbs G3RJV

Part 6

A selective crystal radio forms the subject of this month's part, helping you to understand the subject of selectivity in a radio.

A couple of terms often used in descriptions of radio receivers are **sensitivity** and **selectivity**. The words almost explain themselves. **Sensitivity** simply means how sensitive the radio is to radio signals, or its ability to pick up weak signals. **Selectivity** simply means how well the radio selects the required signal without the listener being able to hear other signals.

The crystal set is a very basic radio receiver and lacks both sensitivity and selectivity. It only picks up strong signals and sometimes more than one station can be heard at once. Adding the audio amplifier improved the radio by making the received signals louder in the headphones but it is annoying to be able to hear other signals at the same time. Since it is the tuned circuit (the variable capacitor and the coil) which selects the required signal, improving the tuned circuit should help to eliminate unwanted signals.

More sophisticated receivers may have several sets of tuned circuits, both at the input and later in the receiving process. We are not going to add extra tuned stages, but quite an advantage may be had from improving the existing single tuned circuit.

In our crystal set circuit, the diodes have been connected directly to the tuned circuit. The circuit has used a tapping point on the coil to give a better matching to the detector circuit but even with this arrangement, the tuned circuit is damped by the detector diode circuit. The tuned circuit and the detector circuit are **directly coupled**. An alternative method of joining the circuits, which can improve selectivity, is called **inductive coupling**. Earlier in this series, I described how two inductors with windings placed close to each other could pass alternating currents: this is the principle of the transformer. It is possible to use this method at radio frequencies to inductively couple from the tuned circuit to the detector circuit.

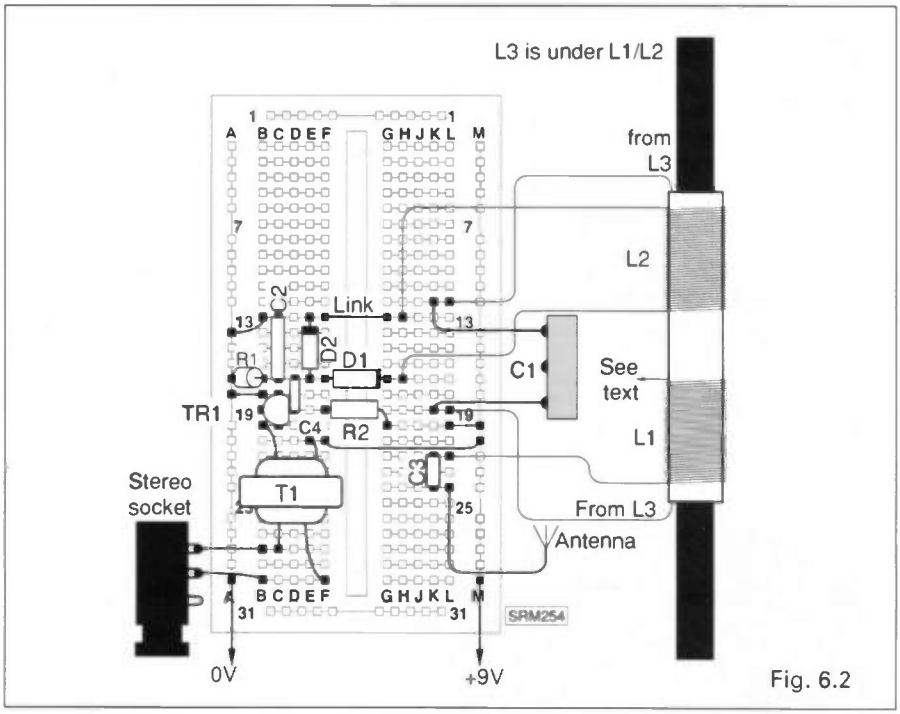


Fig. 6.2

The circuit of an inductively coupled crystal set with the added audio amplifier stage is shown in Fig. 6.1. The circuit shows three windings in the input circuit: L1, L2 and L3. Inductor L3 forms the tuned circuit with C1, the variable capacitor, and inductor L2 couples the tuned circuit to the detector diodes. In this circuit we also inductively couple the antenna to the tuned winding using L1.

The rest of the circuit remains the same as that of the amplified crystal set. The only change is the input section with the three windings. The advantage here is that the damping on the tuned circuit from both the detector diodes and the antenna is reduced.

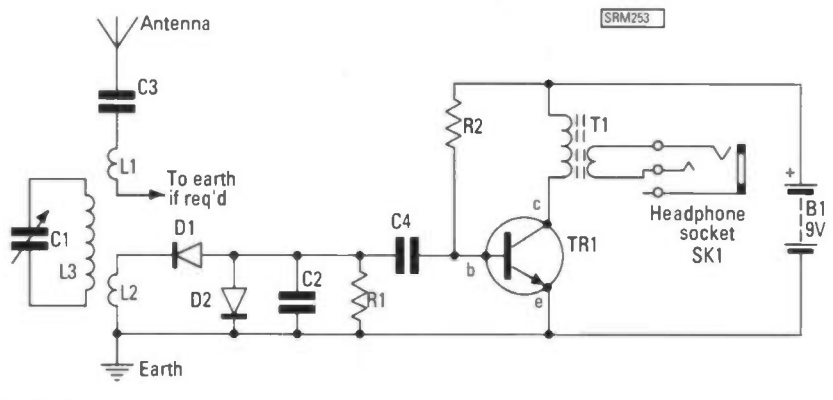


Fig. 6.1.

The layout of the circuit is shown in Fig. 6.2. The layout is the same as the last project from the diodes to the output, but the arrangement of the inductors and C1 is a little more complex. The connections must be made exactly as shown. Inductors L1 and L2 are wound on a paper sleeve which covers L3.

You can see how the inductors are constructed in Fig. 6.3. Inductor L3 is wound on a paper sleeve in exactly the same way as the original crystal set. A piece of paper 40mm wide and 40 to 60mm long is wound around the ferrite rod. The overlapping portions of the paper are glued in place. The sleeve should be a tight fit but capable of a little sliding motion along the rod. The 60 turns of 26s.w.g. enamelled copper wire are close wound (side by side turns) in the centre of the sleeve. Secure the first turn of the coil with a piece of adhesive tape before beginning the winding and then secure the final turn with tape. The total winding can be secured by applying a film of polystyrene cement. Leave about 100mm of wire at each end of the coil, the excess can be trimmed off when mounted on the board.

The two coupling windings are wound on a 50mm wide paper sleeve made in the same manner as the L3 sleeve, but wound over a slightly larger former. I used a battery cell of the AA size (HP7 or UM3). The sleeve must be made loose enough to slide off the end of the battery. Two windings, each of 30 turns of

26s.w.g. enamelled copper wire, are placed on the former. It is easier to make the windings with the sleeve still on the battery former. The windings should be close wound and be separated by a gap of about 10mm. Again leave about 100mm of wire on the ends of each coil.

The sleeve holding L1 and L2 has to be placed over L3. Flatten the wire from one end of L3 against the ferrite rod. This wire is passed through the centre of the L1/L2 sleeve as it slides onto the ferrite rod and over L3.

The final arrangement is shown in the layout of Fig.6.1(b). The two windings of L1 and L2 are over L3. The wires for L3 emerge from inside the ends of the L1/L2 sleeve. The wires may be cut to size to reach the required holes in the board. The wires are enamelled and must be scraped with a knife to expose the bare copper to make contact in the Veroblock.

The antenna is connected to L1 via the capacitor C3. The other end of L1 may be connected to an earth. In my prototype the radio worked somewhat better without the earth connection. Experiment to determine the best method, which will depend upon the antenna in use. If an earth connection is required it can be added to the Veroblock board by using the spare row of contacts in row 18.

This new circuit should be significantly better than the former arrangement. The tuning will appear sharper and adjacent stations should not be present on the received signals. The signals may also sound less distorted. My version of this circuit sounded very well tuned to the music of Radio 3.

An Additional Experimental

In the inductively coupled circuit the signal is passed from the field of one inductor to another without direct coupling. The less closely coupled the tuned circuit is to other circuits, the better it works. This is called **loose coupling**. The further away the inductors are from each other, the looser the coupling, but the further they are from each other, the greater the loss of signal. The looser the coupling the better the selectivity but the greater the loss of signal. Bearing in mind this trade-off, the coils may be moved further apart to improve reception.

Remove the sleeve with L1/L2 and replace this with two smaller sleeves, one for L1 and one for L3. The sleeve for L1/L2 could be cut in half if not required again. These two sleeves can be placed on the ferrite rod either side of L3. Connected up in the same way, the coils L1 and L2 may be moved away from L3 to obtain the best results.

Components

All components are as for the Amplified Crystal Set described in Part 5.

26s.w.g. (0.45mm) enamelled copper wire is available from Electrovalue or Marco Trading (CBL/ECW/26) in 2oz reels. □

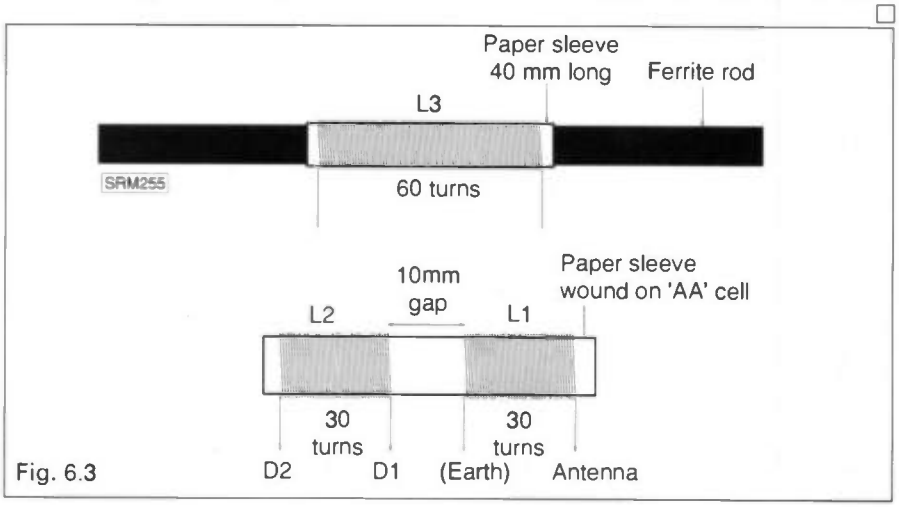


Fig. 6.3

BANDSCAN

Peter Laughton

Romania.....A New Voice

The country still gets back into the headlines as new evidence of the Ceaucescu era comes to light. Although the TV gave a lot of coverage, there is an interesting radio story too that is not so well documented. So let's examine what's happened. Up until December 21 1989, Radio Bucharest had little to report. Each day was just another broadcast full of statistics about the ever increasing yield of Romania's agriculture production. On Thursday 21 December at 1600UTC, Radio Bucharest mentioned a huge public rally in Bucharest, but pointed out that it was in support of Nicolae Ceaucescu. In fact, during the rally anti-Ceaucescu chanting began forcing the state controlled television to cut away from the coverage and hastily play some music. Twenty four hours later, at 1130UTC on December 22 Radio Bucharest was playing nothing but its interval signal as the revolution reached the Romanian capital.

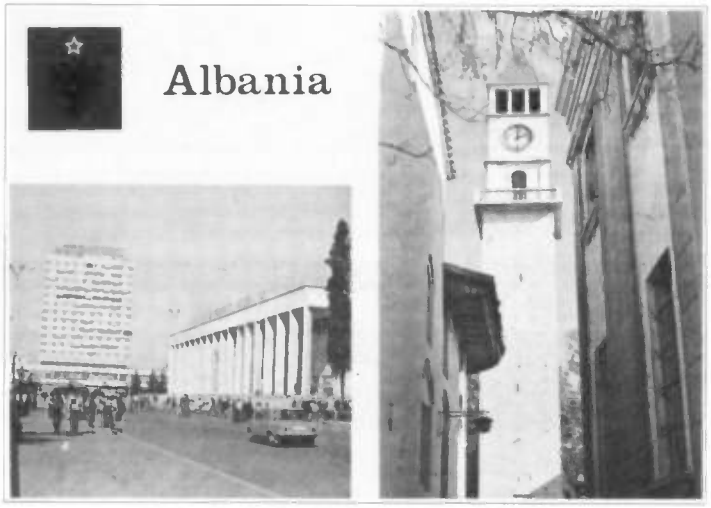
At 1200UTC modulation from Radio Bucharest's external service was suspended. But there was plenty of Romanian to be heard on the dial. BBC and VOA increased their hours of Romanian broadcasting, and Munich based Radio Free Europe had already been running 24 hours in Romanian since Sunday 17 December.

Later on the Friday 22 December, Radio Bucharest external resumed transmission. It was now in the hands of the people it said. Normal language broadcasts were replaced by a statement in several languages, asking listeners to stay tuned for further information. At 0000UTC, Saturday morning the tape was changed to include the statement by the Council of National Salvation to the Romanian people. These announcers were no longer trying to hide their emotions, and hurriedly spoke of the new plans for the country, including a point about freedom of the press.

The state television centre in the Romanian capital, which is in a different building to Radio Bucharest, was the scene of some of the heaviest fighting during the revolution. It came under fire by the Securitate police still loyal to the deposed Ceaucescu. Although heavily guarded, one member of the secret police managed to slip into the TV building on Saturday night and knife seven people. For Saturday and Sunday Radio Bucharest stuck to its regular frequencies but continued with short announcements instead of full broadcasts.

Since my last column, the events in Eastern Europe and Romania in particular, have come and gone. Albania also comes under the Laughton eye with some interesting listener statistics.

Audibility of Radio Bucharest outside Europe during the revolution remained only fair. The audio quality has never been the best from Romania, and the transmitters really showed their poor state of repair during some broadcasts. Elsewhere on the radio dial, amateur radio operators were busy setting up emergency communications, especially as for parts of the weekend the Securitatae secret police succeeded in cutting off the telephones in parts of the country. By Sunday morning, December 24, three main nets were running. Hungarian amateurs had a net on 3631kHz. Romanian amateurs, many operating on emergency power were operating on 3650 and 7050kHz, whilst a medical net was running on 14332kHz. Some of the work was complicated by the fact that the Securitatae might have been listening in.



QSL card from Radio Tirana, Albania.

On Christmas Eve, Radio Bucharest broadcast Christmas carols, and music by Wagner, a composer Ceaucescu had banned from state radio and TV, as well as a Christmas message. During the evening of Christmas Day came the news of the execution.

But as a listener, one of the most interesting broadcasts was at 1300UTC on Tuesday 26 December when the staff of Radio Bucharest's English department had obviously had time to prepare some of their own programmes. They talked about the religious significance of Christmas, drawing a parallel between Nicolae Ceaucescu and King Herod! They interviewed staff at the American embassy, which until the previous Friday had been forbidden territory. And while the BBC's correspondent Mark Brayne ran an interview with a colleage at Radio Bucharest on the BBC World Service, Radio Bucharest was interviewing the BBC reporter.

Best reception of Radio Bucharest in Europe is at 1300UTC on 11940kHz. If you missed all the developments note that the station has a new interval signal. The new melody was composed by Ion Bratianu, the liberal leader of Romania back in the 19th century. He was involved in the independence war against Turkey in May of 1877. With help from Russian troops, Romania won the conflict. The melody used for the identification signal is called 'Lion Cubs', and it is a traditional Romanian patriotic song of the period. There's a useful fact for a discussion. Their address is Box 111, Bucharest, Romania. Letters take at least five weeks to reach the station.

Albania

It has been interesting to note the passing references to Romania in the transmissions of Radio Tirana, Albania. Radio Tirana has long been a standing joke in short wave listener circles. You would be hard pressed to find a more lifeless presentation and a programme so full of political news that you wonder whether the announcer really knows what he or she is reading.

There are some noticeable changes however. Interview clips have been introduced. They consist of short pieces of Albanian followed by the same announcer reading a translation! There are also more pieces of music between items. On Fridays, Radio Tirana runs a listener mailbag programme in its 2230UTC broadcast on 1395kHz. The answers paint a rosy picture of life in the country, but occasionally some interesting data slips out. In late January we learned that most of the Radio Tirana staff are 'young', aged between 30 and 40.

Reaching the population of Albania is a problem for international broadcasters it seems. Recently, Radio Vilnius's media programme reported that Radio Moscow's Albanian Service has never received any listener letters. And yet it has been on the air since 1945!

The only major Western broadcaster with an Albanian service is the Voice of

America. *Short Wave Magazine* asked VOA for their statistics and this is what they faxed to us: in 1981 they had four letters, rising to 82 in 1987, and that went up again to 118 in 1988. But the letters to the section mainly came from Yugoslavia and other parts of Europe. Only a couple of letters have ever come from listeners inside Albania!

At the start of January the uncrowned king of Albania made an announcement to the world from his heavily guarded home hidden in the South African bush. He's Mr Leka, the son of Albania's former monarch, King Zog. He has announced plans to overthrow the Stalinists in Albania, and says his government-in-exile plans to start short wave radio broadcasts to the three million people in Albania to prepare for an uprising. The 50 year -old uncrowned king, says that short wave radios are banned in Albania, though people living near the border can smuggle in sets or pick up m.w. transmissions from Greece and Italy. That may be true. But it does not explain why the domestic service of Radio Tirana bothers to put out the national programme on 5057kHz....the mystery deepens.

Panama....Following It By Short Wave

The coverage of the events in Panama were quite good on TV, but if you had a short wave radio you were able to follow events long before many of the European TV stations had any pictures. At 0600UTC on Wednesday December 20, President George Bush directed US forces to intervene in Panama and apprehend Manuel Noreiga. Voice of America's Spanish service came on the air several hours earlier than normal, starting its morning show at 0730UTC. The programmes contained news and current affairs, but editorials explaining the US government position followed much later.

The American forces radio station serving the troops stationed on the Panama canal switched to announcements warning American civilians that a military operation was about to take place. On the aeronautical frequency of 8993kHz u.s.b., it was easy to monitor a message in Europe being sent out to aircraft in the area as follows:

"Attention all aircraft. Combat operations have commenced in the Republic of Panama. All aircraft should return to their point of origin. Any aircraft entering the Republic of Panama will do so at great risk to themselves and their property. This is Albrook out."

Albrook AFB is in the Canal Zone.

Radio Impacto is not just any old commercial station in Costa Rica. It clearly gets backing from groups in the United States. Some of its output is beamed north to Nicaragua, the rest south to Panama. In the days before the intervention it stepped up its attack against the Noriega government. Radio Impacto also used extracts from VOA's Spanish service which probably explained some reports that VOA had stepped up the number of m.w. outlets in the region to co-incide with the operation. In fact VOA say that apart from increasing their schedule, they didn't add extra transmitters. VOA also denied some early reports on NBC television that it tried to jam Panama's Radio Nacional station. If this was the case, a VOA spokesman told *Short Wave Magazine*, that it was a military operation. Correspondents in Panama city report that the US military definately jammed the Panamanian government controlled TV channel 2, by broadcasting a picture of the US Defence department's emblem. This caption was accompanied by a voice speaking Spanish, but not with a Panamanian accent, explained that US forces were trying to re-establish democracy.

Denmark Off The Air

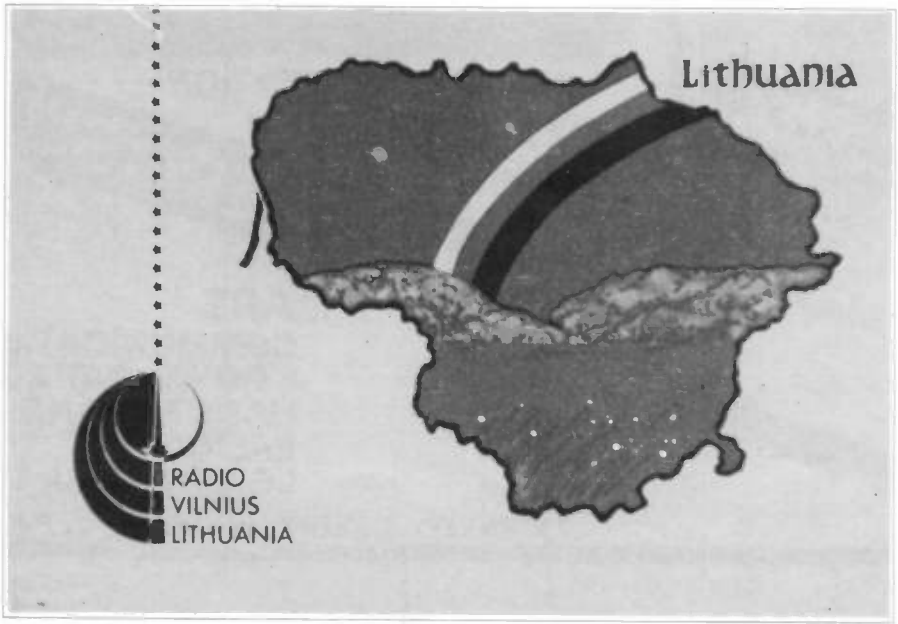
Not quite! Back on February 12 Radio Denmark finally started putting its signal on a landline to neighbouring Norway for re-broadcast by Radio Norway International. The old 100kW transmitter just outside Copenhagen should have gone off by now (it was kept on for a few days during the changeover period). So you can no longer hear Radio Denmark via transmitters on Danish soil. Radio Norway has adjusted its schedule to accommodate the Danish broadcasts. The delay in getting the relay agreement going was due to the Danish government's indecision as to who was going to pay for the external service. Radio Denmark has now managed to get the Danish government to fund the operation instead of the licence-fee paying public.

Greenland Off The Air

This one is now silent. The old 10kW transmitter used to serve the Greenlandic fishing fleet is now silent. We telexed the radio station to ask them whether the fleet will get a form of radio service via other means (INMARSAT perhaps?) but so far no reply. Watch this space.

Radio Vilnius

Radio Vilnius continues to be in the news, especially in light of the Lithuanian calls for independence. Reception of the European service is awful. But the North American service is audible in Europe, albeit with slight intereference from a weak Russian home service transmitter. Check 7400kHz at 2300UTC. Frequency 666kHz m.w. is also audible in the northern parts of the UK. The DX programme used to be on Saturdays. Now it is broadcast on alternate Thursdays during the 2300hrs broadcast. The Lithuanian DX Club seem to be doing an excellent job in providing short wave news from inside the Soviet Union. □



QSL card from Radio Vilnius, Lithuania.

Abbreviations	
hrs	hours
kHz	kilohertz
kW	kilowatt
m.w.	medium wave
u.s.b.	upper sideband
UTC	Co-ordinated Universal Time

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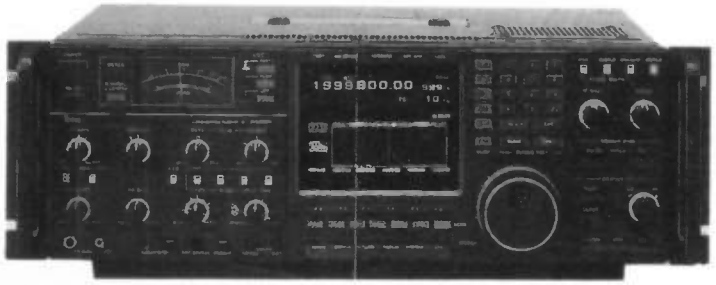

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UBJECT TO STATUS

SCANNING

Alan Gardener

This month Alan takes a look at an interesting new hand-held scanner, describes a mod to remove the bleep from the base station version of the Jupiter scanner and pursues the radio spectrum into the lower microwave area.

New Products

I didn't quite manage to get my hands on one of the new Fairmate HP100E hand-held scanners reviewed in last months *SWM* in time for it to be included in the column, so by now I would guess that many of you already know most of it's specifications. However, if want to know a little more about it - read on!

The unit measures approximately 150 x 50 x 25mm making it slightly smaller than its main competitor the Jupiter II. The receiver covers the frequency ranges 25-550MHz and 830-1300MHz which are tunable in any selectable step size ranging from 5kHz to 995kHz. It features manually selectable a.m., n.b.f.m. and w.b.f.m.; 1000 memory channels in ten banks of 100; 10 programmable search bands; a switchable attenuator for use under strong signal conditions and is supplied with a comprehensive set of accessories including rechargeable NiCad batteries, mains charger, two flexible antennas, carrying case and strap, earphone, beltclip and d.c. power lead.

Permutations

In operation the receiver works well scanning or searching at a rate of around 20 channels per second. Sensitivity is good with the choice of two antennas, one for v.h.f. and one for u.h.f. making it possible to select the best for any particular frequency range. By selecting various permutations of the lockout function it is possible to search individual frequency bands, link two together, or search all ten banks sequentially. In addition you are also able to lockout individual frequencies in the search mode making it possible to ignore continuous or internally generated spurious signals. In the scan mode it is also possible to scan just one or a combination of several memory banks. Individual memories can also be locked out from the scan sequence.

Other interesting features include a small rotary knob on the top of the unit which can be used to manually tune the receiver or step through the memory channels making it possible to quickly locate a wanted frequency.

In order to conserve battery life the l.c.d. display is backlit for a few seconds by pressing the 'light' button on the front panel giving you long enough time to read the clear display. Although the lower frequency limit is quoted as being 25MHz the unit I tried would permit frequencies as low as 15MHz to be entered allowing me to listen to short wave broadcast stations from many parts of the world on just the supplied v.h.f. helical antenna.

Every scanner has one or two bad points and the HP100E is no exception. I experienced breakthrough from u.h.f TV transmissions on one or two frequency bands. This was almost certainly due to mixing between the u.h.f. TV signals and harmonics of a conversion oscillator inside the receiver operating at around 154MHz. This tended to stop the search fairly regularly and was only resolved by locking out the offending frequencies. A similar problem noticeable on a few spot frequencies was found to be due to switching transients emanating from the receivers control circuit which could have been better screened. This was also resolved by use of the lockout function.

I found that during use of the 'search' function the receiver tended to stop one channel below the intended frequency when strong signals were present. This may be due to a combination of a slightly too wide i.f. filter response and phase noise on the local oscillator signal.

My other main criticisms must be the loud keyboard confirmation 'beep' each time a key is pressed and the method of programming certain functions such as the 'lockout' facility. I found this fairly easy to set but very difficult to reset. The method of programming banks also varied between the 'search' and 'scan' functions making it difficult to remember the correct combination of button presses.

One other strange thing is the additional front panel button for the selection of w.b.f.m. All the modes could easily be selected with just one button by toggling through the choices with each press.

From the above comments you may believe that I was not happy with the HP100E - that is not so. The receiver works well and all of the bad points must be weighed up against its overall performance and price which at £299 is obviously aimed at the same market as the Jupiter II.

The performance is generally good with the 1000 memory channels, ability to link 'search' bands and lockout individual frequencies being particularly appealing to airband enthusiasts. In short, the HP100E is well worth considering. Contact Nevada, 189, London Road, North End, Portsmouth PO2 9AE for further information or telephone Portsmouth 662145.

All of this must make you wonder what other manufacturers have got up their sleeves - well apart from the Icom IC-R1 hand-held which I know many of you are waiting for, I have also heard that there may be an AOR version of the HP100E. This will be called the AR1000 and could be slightly cheaper than the Fairmate. Other changes being considered include a revised front panel layout and software modifications to make programming easier. The lower frequency limit may also be reduced to around 8MHz. These details are still speculative at the time of writing and it is not clear when the model may be available - so don't let anyone know I told you about it!

MVT 6000 Modifications

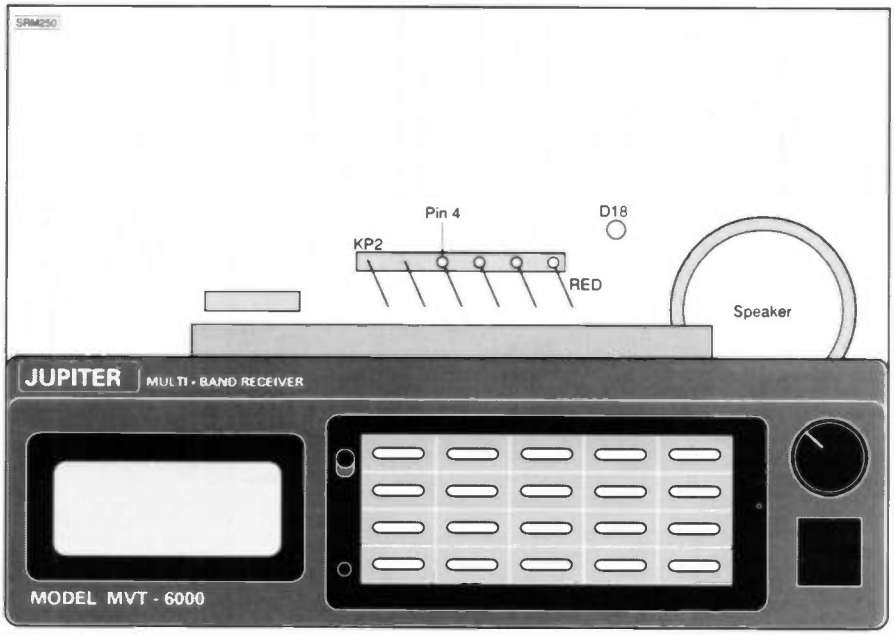
After the popular modification to remove the keyboard confirmation 'beep' present on the Jupiter II hand-held scanner, which was featured in the January column *SWM*, I now bring you details relating to the mobile version - the MVT 6000.

This modification was sent to me by reader **A.G. Ross** of Birmingham who was slowly going mad as a result of 'the beep'. As fortune had it no sooner had he decided to remove the cover from the receiver in order to investigate a way of removing 'the beep' than the paper boy delivered his copy of *SWM*. Naturally he dropped everything and turned to this column! - only to see the modification details. Newly inspired he set about locating the offending components and soon had a house-trained scanner - much to the relief of the rest of his family.

In actual fact the modification is even simpler to perform on this model than on the hand-held mainly due to the extra space inside the receiver casing making access much easier.

As with all modifications please be aware of your own limitations and be warned that any guarantees on the equipment may be invalidated.

Ready? - OK disconnect the power and unscrew the two screws holding the top cover in place. Remove the cover and examine the main circuit board. With the front panel facing towards you locate multiway connector KP2. This is almost in the middle of the board. Count along from the right hand side of the connector - the end with the red lead - until you reach pin 4. This has to be removed by lifting the small plastic retaining clip on the side of the connector and pulling out the pin. If you do this carefully you can always restore the 'beep' at a later date. Once you have pulled out the pin insulate it, and tuck it neatly out of the way of other components. You can stick it to some of the black insulating tape used to retain the cable loom if you wish to. Repower the receiver and check for



correct operation before replacing the top cover.

If you don't want to completely remove the 'beep' but just wish to quieten it a little then leave pin 4 in place. Cut the lead going to pin 4 near the connector and insert a resistor in series with the lead. It will need to be quite a high value, 1MΩ being a good starting point.

My thanks to Mr Ross for these details. If you have a similar modification you have implemented why not share it with the rest of us. What about a method of providing manually switchable a.m. on all those Tandy and Uniden scanners out there? Just a thought.

What Can I Hear? Part 12

We are now rapidly reaching the upper frequency limit for many scanning receivers in our regular examination of the frequency spectrum. Even if you have a receiver that will receive signals above 960MHz it is very unlikely that you will hear very much. The propagation characteristics rarely change with transmissions generally limited to line-of-sight paths. This makes it suitable for very short range communications or point to point links.

One of the other main uses of the 960-1215MHz segment of the spectrum is Radio Navigation Equipment for aircraft.

DME, (Distance Measuring Equipment) TACANS, (Military d.m.e.) and IFF (Identification Friend/Foe) systems all use this band as well as a new system called JTIDS (Joint Tactical Information Distribution System) which is intended to be a high capacity data link for tactical aircraft. This is only just being implemented and will use spread spectrum and frequency hopping techniques in order to prevent interference to existing services. In addition it will provide a high degree of resistance to enemy electronic countermeasures - jamming to you and me.

If you live close to an Airport with a d.m.e. or TACAN beacon why not have a go at receiving it. The channels are spaced at 1MHz intervals and use a broadband type of modulation so select w.b.f.m. if you can. When you first hear a d.m.e. transmission it will just sound like a loud hissing noise but every 30 seconds or so the beacon callsign is transmitted in Morse code so you should be able to positively identify it. DME beacons give distance information to aircraft who interrogate the ground station on another frequency. The ground stations transmit in one of two bands lying between 962-1025MHz or 1150-1213MHz. Aircraft reply on a paired frequency 63MHz away in the band 1025-1150MHz.

IFF is a similar system which was developed during the war in order to identify friendly aircraft. These days the system usually referred to as SSR (Secondary Surveillance Radar) is put to civil use in order to identify aircraft displayed on air traffic control radars . The system works by a beacon - usually co-sited with a radar system - transmitting an interrogation code to the aircraft on 1030MHz. The aircraft then receives the signal and transmits a specially selected code back to the ground station on 1090MHz. The signal is decoded and is used to update the display on the radar screen. This contains the aircraft identification code and current altitude, as well as a few specially reserved emergency codes. If you listen to the

FREQUENCY ALLOCATIONS 960-1450MHz

Frequency (MHZ)	Service	
960.0		1025.0
	Aeronautical Radionavigation DME Y Channels ground transmit paired with	
		1150.0
1025.0		
		960.0 or 1150.0
	Aeronautical Radionavigation DME Aircraft transmit paired with	
		1025.0 or 1215.0
1030.0	Aeronautical Radionavigation IFF Interrogation Channel ground transmit paired with	1090.0
		960.0 or 1150.0
	Aeronautical Radionavigation DME Aircraft transmit paired with	
		1025.0 or 1215.0
1090.0	Aeronautical Radionavigation IFF Reply Channel aircraft transmit paired with	1030.0
		960.0 or 1150.0
	Aeronautical Radionavigation DME Aircraft transmit paired with	
		1025.0 or 1215.0
1150.0		1025.0
	Aeronautical Radionavigation DME X Channels ground transmit paired with	
1215.0		1150.0
	Radionavigation Satellites	
1240.0		
	23cm Amateur Band / Radiolocation / Ground Radar	
1325.0		
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SCANNING

v.h.f. airband you may occasionally hear an air traffic controller asking a pilot to 'Squalk' a particular number - this is not an invitation to imitate a parrot but is in fact the the identification code that has to be dialled into the aircraft IFF transponder.

Moving a little higher in frequency we bump into the lower edge of the 1296MHz (23cm) amateur band. This starts at 1240MHz and stretches right up to 1325MHz. It is used for a variety of purposes including TV transmissions and repeater stations. Activity is generally fairly low and outside major cities the band is hardly used. This is mainly due to the propagation characteristics of the band coupled with the cost of commercial equipment. High gain directional antennas such as Yagis or quad loops are commonly used with horizontal polarisation being the norm. The band is shared with Radionavigation aids such as radar and this can create problems for amateurs who live close to main radar sites. The best times to catch amateur transmissions are in the evenings and at weekends when operation is at its highest level.

Still higher in frequency at 1400MHz we encounter one of the most important allocations for radio astronomers known as the 'Hydrogen Line'. As the title suggests this is the resonant frequency of hydrogen molecules. As this frequency remains constant throughout the universe and as hydrogen is one of the most common elements it is assumed by scientists to be one of the most probable frequencies on which intentional transmissions from extra terrestrial sources are likely to be received. You can just imagine it can't you - after decades of monitoring a very weak signal is received, the transmission is discernible as some form of speech, after years of study by the worlds most distinguished linguists the message is deciphered. What does it reveal - a universal greeting? Well my guess is that it would be an intergalactic minicab operator asking if anyone can do a 10 o'clock pick up at Alpha-Centuri!

More next time as we boldly venture further into the microwave regions.

Keep those letters coming to POBox 1000, Eastleigh, Hants SO5 5HB.

Until next month - Good Listening. □

Abbreviations	
a.m.	amplitude modulation
d.c.	direct current
d.m.e.	distance measuring equipment
kHz	kilohertz
l.c.d.	liquid crystal display
MHz	megahertz
n.b.f.m.	narrow band frequency modulation
u.h.f.	ultra high frequency
v.h.f.	very high frequency
w.b.f.m.	wide band frequency modulation

AIRBAND

☞7

failure of the second stage low pressure compressor disc on number 3 engine (this disc holds the rotor blades of the compressor, the whole assembly turning as part of the spool). The crew's correct execution of the relevant drills, including contacting the airport fire service on 121.6MHz, meant that an unfortunate incident was never in danger of becoming a major disaster.

Welcome to newcomer **Ronald Galliers** (Islington, London). As mentioned in the January issue, 121.025MHz appears to be a new frequency used by London airways but, as there's no mention of it in my recent issue of the *Aerad Supplement* I have no more information on offer.

Also in the January 'Airband', **Jeremy Cottingham** (Gainsborough, Lincolnshire) and **P. Barham** (Ashton-under-Lyne, Lancashire) asked about arrangements whereby a controller might transmit on more than one frequency simultaneously. **Stephen Pattrick** (Wisbech, Cambridgeshire) confirms that where both v.h.f. and u.h.f. channels are available to a particular service, communications are often relayed on both frequencies at once. This might result in v.h.f. messages from aircraft being re-transmitted on u.h.f. by air traffic control. An example of this is Eastern Radar, now controlled from West Drayton. Also, Stephen points out that during quiet times at larger airports, one controller might handle two frequencies. Under busier conditions, both frequencies would warrant their own controller. Now you can help Stephen: Eastern Radar's transmitters were previously at Watton and Leconfield. They have now been relocated nearer to Norwich: does anyone know exactly where?

With that question, I leave you till next month.

The next three deadlines (for topical information) are March 2, March 30 and May 4. □

Abbreviations	
CAA	Civil Aviation Authority
CSA	Ceskoslovenske Aerolinie
GMT	Greenwich Mean Time
h.f., HF	high frequency
i.f.r.	instrument flight rules
kHz	kiloherz
MHz	megaherz
n.d.b.	non-directional beacon
NOTAM	notification to Airmen
RS	receiving station
s.s.r.	secondary surveillance radar
u.h.f.	ultra high frequency
v.h.f.	very high frequency

CONVERTING THE R210 RECEIVER

Tom Harrison GM3NHQ
Part 3

In this, the final installment, Tom Harrison describes the addition of a loudspeaker output for the R210 so that you can listen in comfort.

Loudspeaker Output

The existing output transformer is designed to match output impedances from 50 to 150Ω. I preferred to use high-impedance phones and the usual 3 or 8Ω speaker.

To do this the existing output transformer, T2, must be replaced with a low-impedance one. RS Components (Electromail) part 217-567 will just about fit in place with a little bit of filing of the mounting feet and the drilling of two new fixing holes.

The connections are shown in the circuit diagram **Fig. 3.1**. By using a stereo phone jack for the output you can have phones or speaker output without needing any more holes on the front panel!

Further Conversions

Unfortunately the complete circuit diagram of the 'unmodified' R210 is too large to reproduce in the magazine, even if the original I have was halfways readable!

However,the gain control system on the c.w./s.s.b. modes is worthy of mention as opening the ground return on RV1 will provide a ready means of muting the receiver during 'transmit' for use in a TX/RX combination.

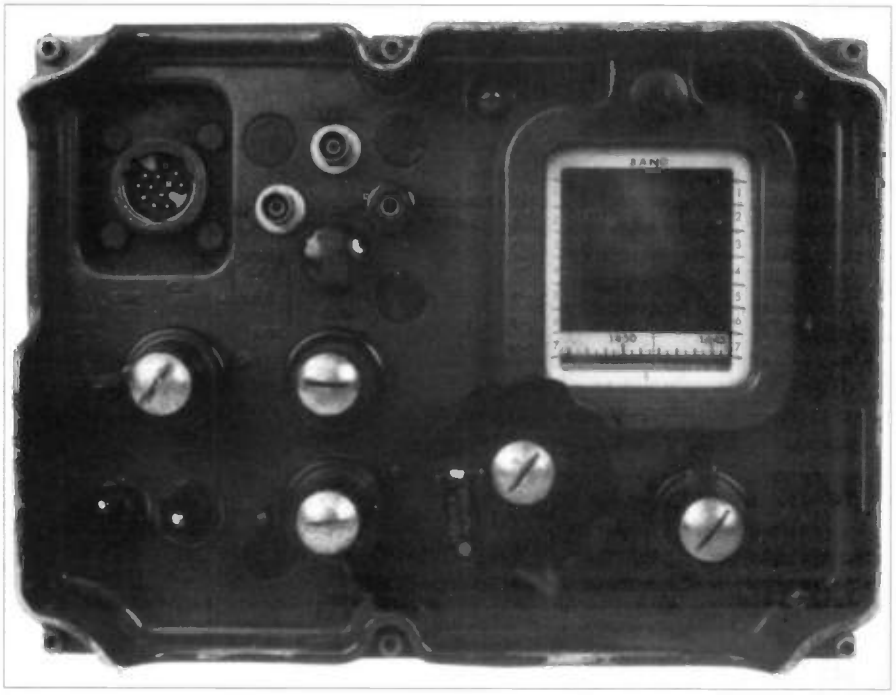
Potentiometer RV1 is mounted on the front panel and is the rear unit ganged with RV2 and labelled on the front panel as GAIN.

As a further check that you have located the correct potentiometer of the two, the wiper is connected to SWAd (the middle wafer) while the top end of the track is connected by a plain wire to Tag F4 and PLA H (the -30V line).

One of the spare coaxial sockets on the front panel could be used to bring in the necessary external connections from the transmit relay contacts on the transmitter.

Have Fun

So that's about it. Have fun, both in modifying and then using your R210 - and if you work GM3NHQ and get a 559 report, it will probably be my own, modified R210 that's dragging your signal in through the QRM.



The front panel of the R210 is rather drab and all the controls are obviously designed to be operated by someone wearing mittens - but it works very well.

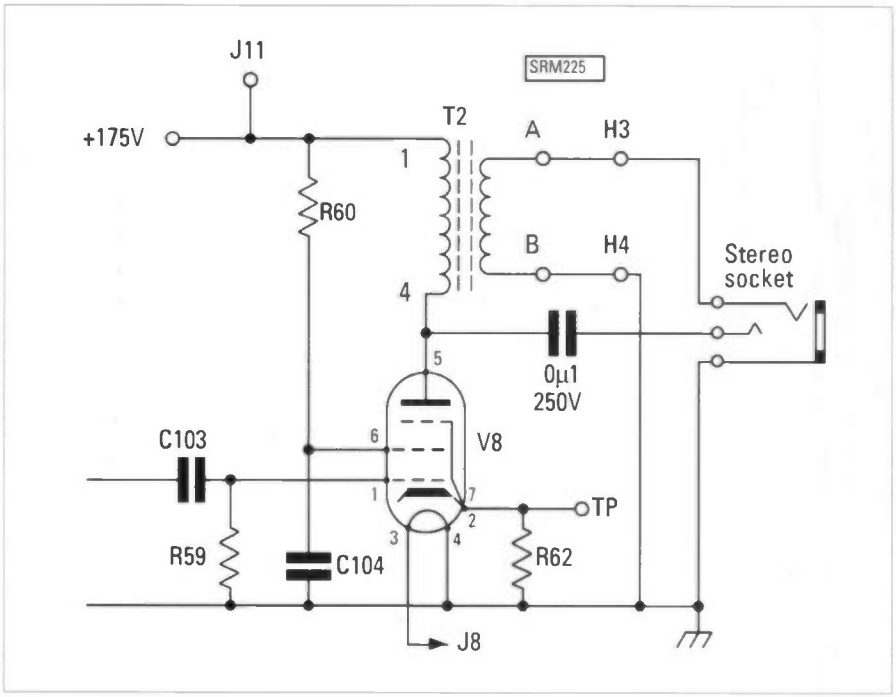


Fig. 3.1: The circuit diagram, showing the connections needed to add a low impedance speaker output to the R210.

You now have a communications receiver capable of excellent performance on frequencies between 2 and 16MHz, running off a.c. mains and a good start to an amateur radio station. What's more you didn't have to rob a bank to get it!

Now, if only I can get hold off a C11 to go with it...! □

Coverage to 30MHz

As the R210 only goes up to 16MHz a design has been prepared for an easy - to - build converter to give full coverage up to 30MHz. Watch out for it later in the year.

HOWES AA2 ACTIVE ANTENNA KIT

Dick Ganderton G8VFH

For as long as I can remember I have enjoyed making things. First it was Meccano models followed by crystal sets with coils wound on toilet roll centres. Even now, after a lifetime with electronics, I still enjoy putting together anything remotely connected with radio.

Kits

Kits have the advantage of providing the constructor with everything needed to complete the project - with the possible exception of the case or housing. The kits provided by C.M. Howes Communications are complete except for the case. With the AA2 Active Antenna kit this is an advantage since the project can be assembled in a variety of different configurations, each requiring a different type of housing. As with other Howes kits which I have built, the p.c.b. and components supplied were of very good quality. The glass fibre p.c.b. was tinned and had all the holes drilled to accept the component leads. What's more, all the components fitted without the need to strain their leads.

Instructions

The instructions were up to the standards which I have come to expect from Howes - comprehensive yet understandable, even for a complete beginner. There are step-by-step instructions on building the kit followed by wiring instructions for the various configurations possible using the finished board. User information completes the instructions, giving useful tips on how to get the best out of the unit.

Building the Kit

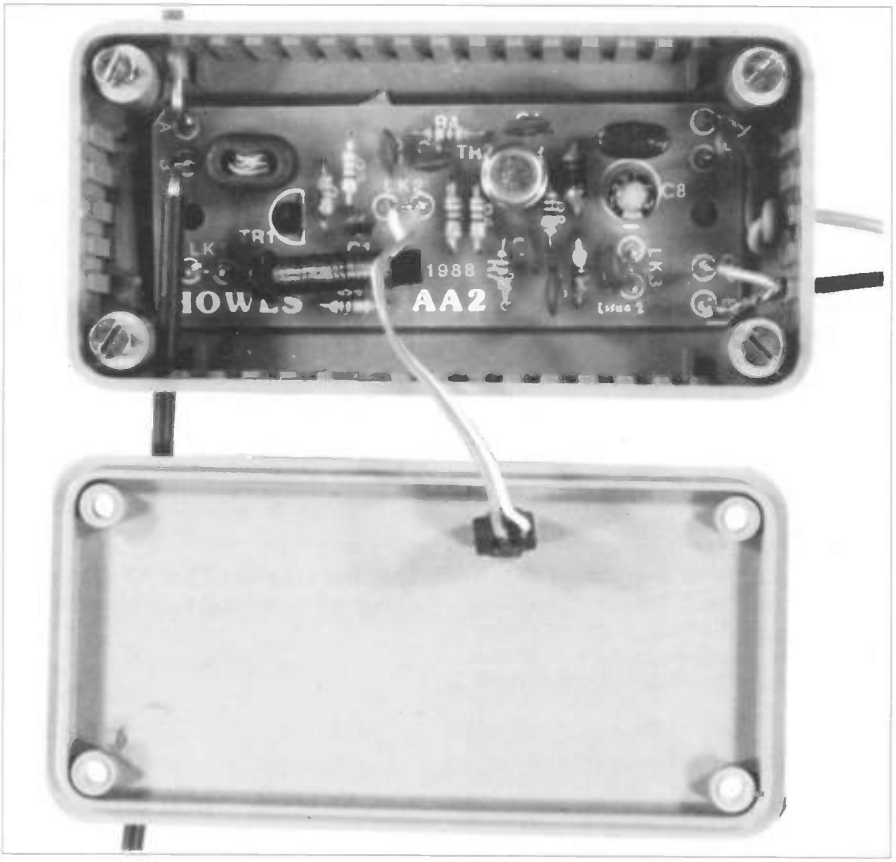
The instructions recommend that the v.h.f. choke is wound and varnished before anything else is done. The choke is easy to wind using the simple technique described fully in the instructions. I also wound L1 while I was in a 'winding frame of mind', again a simple enough operation.

With the coils wound and the varnish drying, the p.c.b. was 'populated'. The components list gave full details of each component and how to identify it from its markings. Following normal techniques for populating a p.c.b. - smallest components first, followed by the next largest and so on, I soon had the board completed with all the component leads soldered to their pads on the trackside of the p.c.b.

Decisions

At this point the decision has to be made as to how the unit is to be used. I rather fancied the suggestion made in the instructions that a short, rotatable dipole might offer the opportunity to null out interfering signals so I opted for this configuration. Two lengths of copper wire about 1.3m long, stripped out of a length of 2.5mm twin & earth mains cable, were soldered to the two dipole input pins and the link fitted to connect the secondary of L1 to the input end of L2. The unit was fitted into a small plastics box with the two dipole wires emerging from each side and the output coaxial lead to the receiver, along with two wires for the 12V d.c. power supply, from the opposite end. A miniature toggle switch was fitted to either make or break Link 2 and change the gain. The AA2 can be powered up the coaxial feeder if desired, and the necessary extra components and instructions are all supplied with the kit.

For many readers a large outoor antenna must remain a dream. An active antenna could be the answer and what could be better than to actually build one?



Performance

The AA2 was used with a Yaesu FRG7 to see how it performed. The null obtained with the dipole arrangement was rather dissapointing and I think that further experiment will be needed here. However, the performance of the unit was very good and compared well with the random length horizontal dipole on the roof. With the wire length chosen the results on the lower frequencies, 2-6MHz, were not needle bending, but adequate. The gain switch shorting out Link 2 made only a mildly discernable difference at these frequencies. On the 28MHz amateur band this had changed to a difference of two full 'S' points as shown on the signal meter and the null had become more pronounced and American amateurs could be heard talking locally to each other with good clarity on this band

The Howes AA2 Active Antenna Kit costs £7.50 from **C.M. Howes Communications, Eydon, Daventry, Northants NN11 6PT. Tel: (0327) 60178** to whom my thanks are due for supplying the kit for review. The unit is also available as a ready-assembled p.c.b. for £11.50. □

Specification

Input:	High impedance f.e.t. with v.h.f. choke
Output:	50Ω unbalanced
Frequency:	150kHz to 30MHz
Power:	12 to 14V d.c. 25mA

ANTENNAS

F. C. Judd G2BCX

Part 13

In this, the penultimate part of his series, Fred Judd looks at some of the more important aspects of transmission lines, matching and v.s.w.r.

All antennas have an input/output load resistance (RΩ) which must be matched with whatever system is used to convey either power from a transmitter to the antenna, or signals detected by the antenna to a receiver.

For most antennas the system will be a transmission line with an impedance ($Z_o\Omega$), although a similar 'electrical' requirement can be provided for antennas which are directly voltage fed via an antenna tuner - i.e. an impedance/load resistance match.

Transmission Lines

The most common transmission line in use today is the 'unbalanced' 50Ω coaxial cable although other impedances, such as 30, 70 and 150Ω, are available; there are also twin inner conductor 'balanced' coaxial cables.

Other types of transmission line are 600 and 300Ω open twin wire, insulated 300Ω close-spaced twin wire (ribbon feeder) and insulated 70Ω very close-spaced twin wire. As shown in Fig.13.1, the currents (I1 and I2) in both twin wire and coaxial transmission lines flow in opposite directions.

Therefore, the electric fields due to I1 and I2 will be 180° out of phase with each other and cancel out - but only if the impedance (Z_o) of the transmission line is matched at one end with the output impedance of the r.f. power source and at the other with the load resistance (R) presented by the antenna.

The cancellation of the fields along the line will be sufficiently complete to prevent all but a negligible amount of radiation from the line itself, and except for a small loss due to cable attenuation all the power from the transmitter will be fed to the antenna.

Transmission Lines and the Travelling Wave

It has been mentioned that when a transmission line is correctly terminated at each end, i.e. the line impedance matches that of the transmitter output, r.f. power ($V^2 = Z_o$) reaching the end of the line will all be dissipated by the load 'R', the antenna. Providing 'R' is a pure resistance, with no inductive or capacitive reactance ($R = Z_o$), none of the power supplied to the line - which constitutes a 'travelling wave' of current and voltage flowing along the line and into R - can be returned to the transmitter.

When the load resistance 'R' does not equal the line impedance Z_o, power which is not dissipated in 'R' is reflected back down the line to the transmitter. The greater the difference between 'R' and Z_o, the smaller becomes the amount of power that can be dissipated by 'R', i.e. the mismatch between Z_o and 'R' becomes larger. Power dissipated by 'R' is known as 'incident power' and power reflected back to the transmitter as 'reflected power'. The ratio of incident to reflected power becomes larger as the impedance/resistance mismatch increases. If 'R' is a short or open circuit at the end of the line then almost all the power is returned to the tranmitter: it has nowhere else to go.

If the mismatch is partial, e.g. with 'R' only a finite amount greater or smaller than Z_o, some power is dissipated by 'R' and some is reflected.

The magnitude of the reflected power is, however, dependent on the difference in magnitude between the incident and reflected power - both of which combine to set up a 'standing wave' on the line and which is normally measured in terms of voltage, $V = \sqrt{(P \times R)}$.

Voltage Standing Waves

A standing wave is normally measured and expressed as a ratio of reflected to forward voltage, hence the expression 'v.s.w.r.' Although a standing wave could be measured in terms of current it is more convenient to use voltage, as a meter for measuring this is fairly easy to construct and reasonably accurate. Incidently, if the load R is a pure resistance the s.w.r. is numerically equal to the ratio between R and the impedance, Z_o, of the transmission line, i.e. s.w.r. = R/Z_o when R is greater than Z_o, or s.w.r. = Z_o/R when R is less than Z_o - but this is very rarely the case.

The relationship between forward and reflected voltage is illustrated, albeit in a simple way, in Fig.13.2. The condition for (A) is that the transmission line has either an open or short circuit at the end, i.e. 'R' is infinite or zero. Since no power can be dissipated by 'R' it is all reflected. The phase of the voltage associated with the reflected power is reversed, so both forward and reflected voltages become in phase - thus producing a standing voltage of much greater magnitude and a v.s.w.r. meter reading of infinity. It's worth mentioning in passing that if this condition is prolonged it could result in damage to transistors, or valves, in a

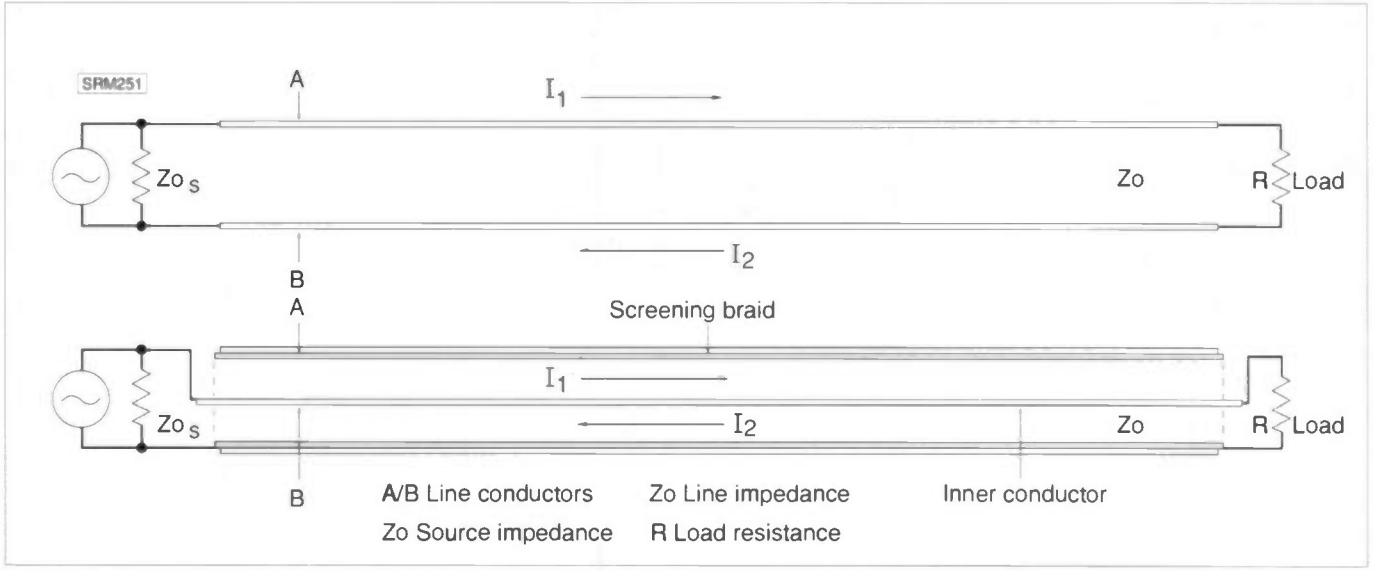


Fig. 13.1: Open wire and coaxial cable transmission lines; current flow is along the conductors. Note that the screening braid of a coaxial cable forms one conductor.

transmitter if no protection device is incorporated.

The condition for (B) is that the line does not match the load because 'R' is a finite amount smaller, or larger, than the line impedance Z_o. Some of the power is dissipated by 'R' but some is reflected. Again, the forward and reflected voltages add together, this time to produce a standing wave with a finite magnitude 'X' related to 1, i.e. a ratio of X:1.

For (C) we have the optimum condition where the load 'R' is equal to the line impedance Z_o. All the power delivered from the transmitter via the line is dissipated by the load, so the travelling wave is uniform and the standing wave is unity, with a ratio of 1:1.

Reflection Co-efficient

The ratio of reflected to incident voltage is known as the 'reflection coefficient' - which is really what a v.s.w.r. meter measures - and is derived from $r_o = E_r/E_f$, where r_o is the reflection coefficient, E_r is the reflected voltage and E_f the forward or incident voltage. The reflection coefficient is determined by the relationship between the line impedance, Z_o, and the load "R" terminating the line. For any given line and load r_o is a constant, and provided the line itself has negligible loss the coefficient can never be greater than one, an indication that the line is matched to the load.

If the load 'R' is purely resistive, the reflection coefficient, r_o, can be found from $(R - Z_o)/(R + Z_o)$; note that r_o is positive if 'R' is greater than Z_o and negative if 'R' is smaller than Z_o. The change in polarity co-exists with the change in phase of the reflected voltage.

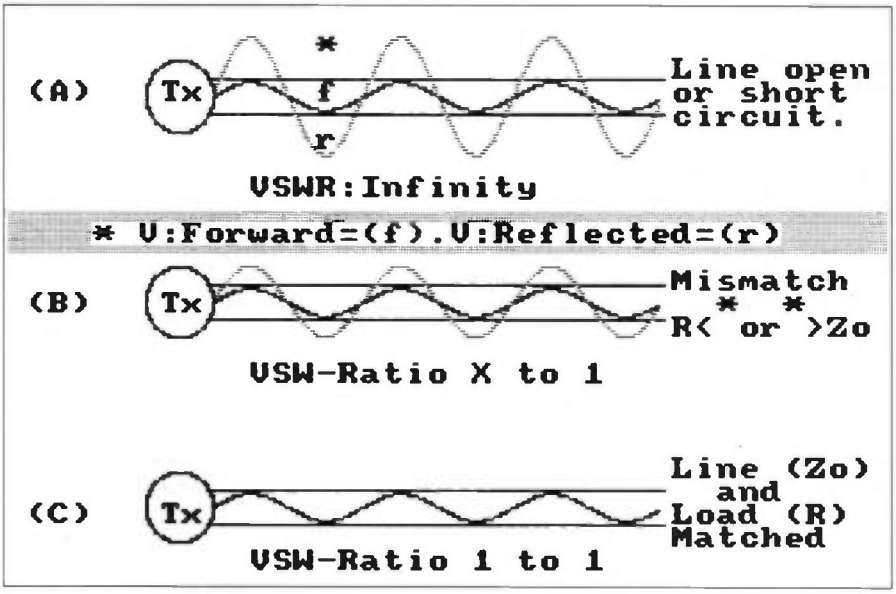


Fig. 13.2: v.s.w.r. *versus* mismatch at the end of a transmission line; see text.

Reactive Termination of a Transmission Line

Even though a transmission line might be terminated with a load having a pure resistance equal to the characteristic impedance, Z_o, of the line, a condition can exist that will cause the v.s.w.r. to be greater than an otherwise optimum 1:1.

This condition arises when the terminating load, the antenna, presents 'reactance' to the transmission line and which occurs when the antenna is not perfectly resonant at the frequency of operation. Provided the antenna is resonant at operational frequency it presents a non-reactive and therefore almost purely resistive load to the line.

In the final part of this series Fred Judd will consider the bandwidth versus v.s.w.r. of an antenna, look at travelling waves, reflection co-efficients and power loss in transmission lines. He also comments on the performance specifications of antennas.

Correction

In Part 12, page 26, February 90, the captions for Figs. 12.5 and 12.6 were transposed. The photograph of the gamma-matched loop d.f. loop for 28 - 30MHz is Fig. 12.5. □

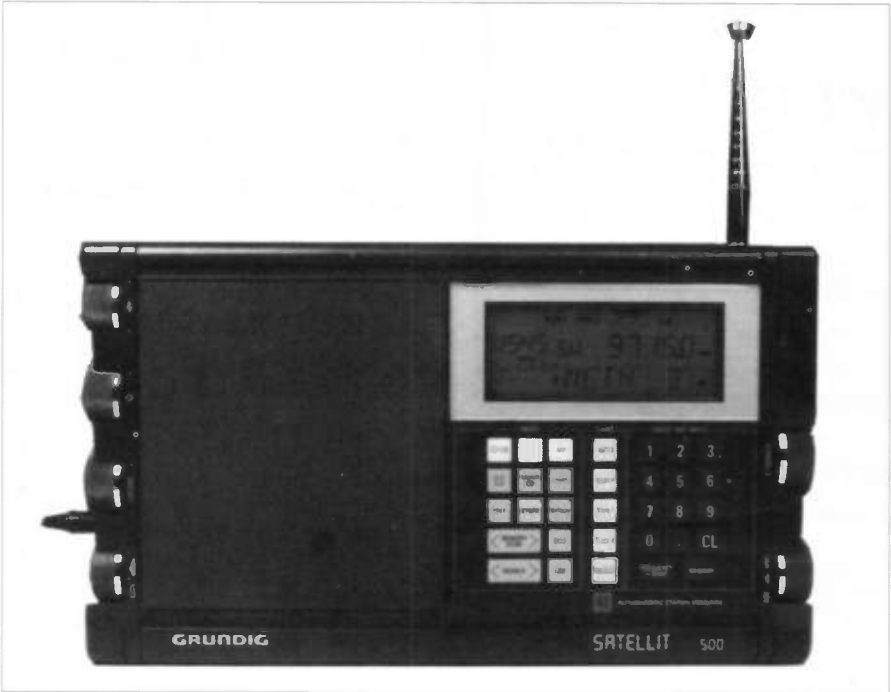
Abbreviations

MHz	megahertz
r.f.	radio frequency
u.h.f.	ultra high frequency
v.h.f.	very high frequency
v.s.w.r.	voltage standing wave ratio
V	volts
W	watts
Ω	ohms

GRUNDIG SATELLIT 500

Peter Shore

More than two years in development, the new Grundig Satellit 500 may bear some resemblance to its predecessor, the Satellit 400, but its new features put it in an entirely different class.



When one first looks at the Grundig Satellit 500 it seems remarkably similar to many other digital receivers on the market. A large loudspeaker on the front of the set divides it in two, with the keypad controls and digital display taking up the rest of the panel. Rotary knobs on either side of the receiver provide the control of volume, tone, tuning and gain. There, however, the similarities seem to stop.

The digital display is highly comprehensive, measuring some 40 x 95mm and comprising in excess of 100 segments. When the receiver is off, a 24 hour clock is displayed from one of the two clocks within the machine. Once the set is switched on, the display springs into life. Current time moves from the centre to the extreme left of the display, with a.m. frequencies to the nearest 100kHz and f.m. frequencies to 25kHz displayed in large, clear figures on the right. To the left of the frequency the band is displayed (MW, LW,SW or FM).

On powering up, if batteries are being used, a battery condition meter is displayed in the bottom left, with a scale indicating the power left in the cells in use. After ten seconds, this changes to a field strength meter scaled from nil to five, divided into sixteen bars. Beneath the frequency a box is provided for use with the comprehensive memory capabilities of the set which will be looked at in detail later in this review. The top of the display panel has seven boxes which give bandwidth setting, mode (l.s.b., u.s.b. or synchronous detection) for use on a.m. bands and timer functions. The display has been logically devised and is easy to read providing all information required at a glance.

Conventional

Tuning of the set is conventional - either direct keypad entry of frequencies, or by turning the tuning knob. Entering frequencies directly reveals the sophisticated nature of the software which controls the Satellit 500. For example, Radio Norway International on 25.75MHz may be entered either as 25730, or 25.73, whilst the f.m. frequency of 95.8MHz must be entered as 95 decimal 8 or 958kHz will be called up. Frequencies such as 7MHz may be entered directly as '7.' followed by the frequency key. Alternatively, if one wishes to access a metre band it is simply necessary, to obtain the 22 metre band for example, to press 22 followed by the Frequency/M-BAND button, and the mid range frequency of 13.70MHz is provided. Amateur bands may also be directly selected, in which case a frequency at the start of the band is tuned.

If at any time during the tuning sequence something is entered which is incompatible with the software, an 'Error' display is shown for a couple of seconds.

For manual tuning, it is necessary to select the appropriate band by pressing the 'FM' key, of 'AM'; repreated pressing of the latter will move the set from l.w. to m.w. to s.w. and so forth, and the station last tuned to in the respective band. During manual tuning, the frequency is altered by 1kHz on a.m. in normal operation and by 25kHz on f.m. Using the synchronous detection mode, a.m. tuning is in 100kHz steps.

The memory capability of the Satellit 500 is, as we have already suggested, comprehensive. A ROM (read only memory) enables a maximum of 42 frequencies to be stored, in any order, from all four wavebands. In addition to simply storing the frequency and mode, as is common with most synthesised receivers, an alphanumeric abbreviation of four characters may be assigned to each memory. For example, Radio Netherlands might be noted as NETH, whilst BBC Radio 2 could be BBC2. An alternative for international stations is perhaps to use the official ITU country code (e.g. HOL for The Netherlands, URS for the Soviet Union, etc.).

Storing a frequency is extremely straightforward: once a frequency has been selected, it is possible to check whether the channel is already in the memory by depressing the 'STORE' button. If the frequency is already stored, the memory number will appear in the display (e.g. STAT 14). Keeping this button depressed will indicated whether the channel is stored more than once, and on which memory number or numbers. If an abbreviation has been assigned to the memory, this will be displayed too. If the frequency is not yet in the memory, the display shows 'NEW'.

It is possible to select a memory position by asking the receiver to check whether a particular memory number has been used already by entering, say '35' followed by 'MEMORY'. If the memory position is not occupied, the display will show 'FREE', but if it has already been used, the frequency and abbreviation will be displayed. Another way of checking for a vacant memory position is to press the 'FREE' key - keeping this depressed will cause all the free memories to be displayed sequentially. Should all memories be full, this will be shown on the display.

Store

To store a frequency already being listened to, key in the number of the free memory position, and then press 'STORE'. This will cause the display to show 'MEMORY' and the number of the selected memory location. To assign an

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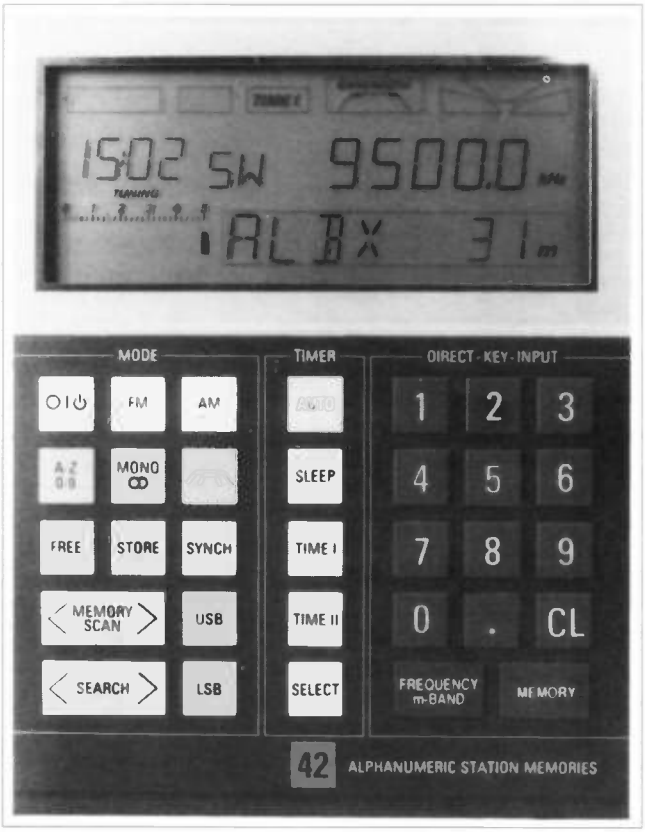
GRUNDIG SATELLIT 500



alphanumeric code, the key marked 'A-Z 0-9' is pressed and whilst keeping it depressed, the tuning knob is turned causing the display of letters A to Z and numbers 0 to 9 in the first cursor position in the memory display. Each further depression of the key will move the cursor on one position.

Frequency scanning is once again a comprehensive feature. The 'SEARCH' button used on short wave will cause the receiver either to select metre bands (by brief depressions of the key) or to search along a band previously selected in 5kHz steps. At the end of any particular metre band, the scanning device reverts to the start of the band. Scanning may be interrupted by pressing any key, or turning, the tuning knob. If during the scanning procedure, a frequency is passed which is stored within the memories of the set, details will appear in the memory section of the display, including any alphanumeric code which has been assigned to that frequency.

In addition, it is possible to scan through memories using a separate MEMORY SCAN button. All memory positions which are in use are called up in order from 1 to 42.

Power supply is either by 4 HP2 (or IEC LR20) batteries, or by an external adaptor (provided with the receiver) which gives a 9V d.c. input. A rechargeable lithium battery provides data protection, but does not keep the clock functioning when the power supply (adaptor or cells) is disconnected. When the d.c. adapter is used, the digital display and the keypad are illuminated constantly. During battery use, the display is lit each time a keying sequence occurs.

Short wave receivers of this calibre always have the capability to connect external a.m. antennas and the Satellit 500 is no exception. A coaxial socket allows the connection of a 75Ω antenna for all wavebands and a switch adjacent to the coaxial socket allows the telescopic and ferrite antenna to be disconnected.

One additional feature not found on many receivers in this class is f.m. stereo recption. Plugging in either headphones or an external loudspeaker system engages the stereo decoder. The stereo symbol appears in the display adjacent to the f.m. waveband indicator.

Using the Satellit 500

With so many facilities, this is not a set which it is possible to unpack and use straightaway - even setting the time foxed me until the instruction book has been dissected in detail. However, once one has mastered the complexities of day to day operation, it seems to be easy to use and well thought out. For short wave listening, operation is straightforward - anyone who has used a digital receiver in the past should be able to handle the intricacies of this set. With narrow (1.9kHz) and wide (3.4kHz) filters, it is possible to obtain reasonable separation of crowded parts of the bands (particularly the 49m band at night, for example). In addition, the synchronous detector allows fine tuning in 100kHz steps which enhances separation by tuning away from the unwanted station in heavily used parts of the bands. This does not, however, seem to be quite as effective as the synchronous detection on the Sony ICF-2001D. Trying to null out adjacent interference on Radio Australia during early evening on 7.205MHz was not as effective on the Grundig as on the Sony when tried side by side.

Useful Feature

One useful feature is the trimming device for input circuit selectivity which is most effective for h.f. listening. This is activated by depressing the MONO key and turning the tuning knob to achieve maximum reception quality. This can make a dramatic improvement to signals, although usually the automatic circuit trimming functions sufficently well.

Tuning is pleasant when using the rotary tuning knob which has a very precise feel to it. The 1kHz steps on short wave are fine for accurate slow tuning, but moving rapidly to another part of the band is equally good, for the knob can be turned very quickly which effectively increases tuning steps from 1kHz to 10kHz. The keypad buttons require to be pressed quite distinctly to ensure that the selection is registered. A raised 'blip' on the '5' key will help visually handicapped users to find their way around the numeric keys.

Manual tuning on this set, as on all other synthesised receivers, suffers from the click generated by the synthesiser circuitry. This is not too annoying once one is used to it, but how long will it be before this can be cured?

The method of memory storage and recall has already been described and in practice is straightforward with a simple two-step procedure to recall stored stations. The memory scan is also of help when one cannot remember which station and frequency is stored in which memory.

It is quite novel to have a method of identificaton for stored stations visible on the display and Grundig are to be congratulated on the way this has been designed. It is regrettable the the real reason for such an identification system is not available on models sold outside the Federal Republic - of which more later.

Limited Scanning

Scanning on short wave is limited to the broadcast and amateur bands: it is not possible to scan outside the defined band parameters, which is at times annoying especially since large numbers of users are outside the bands. For example, it is not possible to scan around 7.325MHz (a BBC World Service frequency) for the set will switch either to 7.10MHz or to 9.50MHz and scan from there. However, it might be argued that since many of the users of out-of-band frequencies are not regular operators, but clandestines and so forth, scanning in 5kHz steps is not altogether worthwhile.

Use in s.s.b. modes is excellent with precise tuning, and switchable bandwidth (which is not provided on the comparable ICF-2001D) an additional useful feature. Variable gain control assists for amateur listening. With a line output, it is possible to use the Grundig for RTTY reception - frequency stability at around ±20Hz enables operation for this type of use.

Overall, sensitivity is excellent on all ranges, even using simply the 11-segment telescopic antenna, although

GRUNDIG SATELLIT 500

SPECIFICATION
UK model

Frequency coverage:		
	l.w.	148 - 353kHz
	m.w.	513 - 1611kHz
	s.w.	1.612 - 30MHz
	f.m.	87.5 - 108MHz
Power Supply:		
		4 x 1.5V HP2/IEC LR20 batteries
		IEC K35/62 accumulators
		External 9V d.c. supply
Intermediate Frequencies:		
	f.m.	10.7MHz
	a.m.1	54.5MHz
	a.m.2	450kHz

results are enhanced with external facility. Sensitivity on the f.m. band is particularly good, and with good separation provided by the 25kHz tuning steps, listening to the crowded local parts of the band is a pleasure. The only drawback is that just one coaxial input is provided for both a.m. and f.m. external antenna, which necessitates either swapping over coaxial plugs every so often or building a switch unit oneself.

Selectivity on a.m. is also excellent, with the narrow filter (1.9kHz) works well for crowded parts of the broadcast bands, and for amateur and RTTY reception. The wide filter (3.4kHz) is well suited for stronger broadcast station listening.

To prevent accidental detuning of a signal, a lock facility is provided. Turning the rotary LOCK knob by one quarter locks the set onto the frequency and disables the keypad. Depression of any key will cause a bleep to be emitted from the speaker, and ERROR to be displayed on the l.c.d.

Impressions of the Satellit 500

Inspection of the circuitry of this Portuguese-built receiver reveals an excellent standard of construction, and the clear thinking and design of the German engineers. Sound output is of a higher quality than that of many comparable receivers, and the benefit of stereo f.m. reception should not be overlooked. Operation is reasonably straighforward for most users, and the keypad has been well thought out for easy use.

In addition to the usual clock and alarm facility found on digital receivers, it is possible to use the Satellit to remotely control a tape recorder through the automatic timer facility for unattended recording. A simple circuit diagram is included in the comprehensive handbook to demonstrate how to set up such a system.

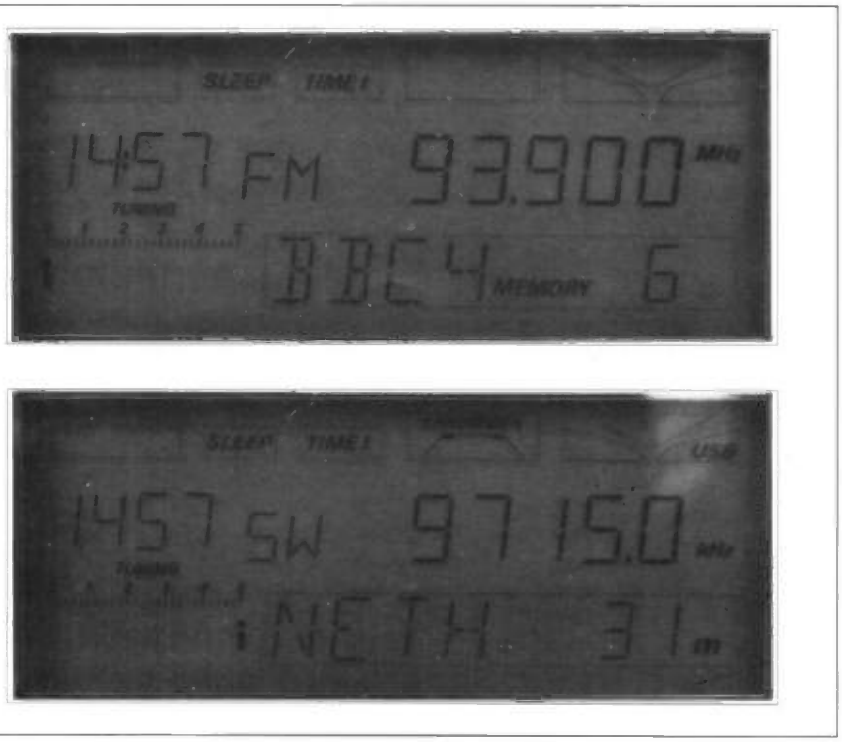
This receiver seems to show a way forward for short wave broadcast receivers - it is not simply the same old digital radio regurgitated within a different casing. The memory system, including the alphanumeric station identification is an excellent progression. For a serious short wave listener, the addition of the identifications is a must.

But, as was mentioned earlier, the real reason for the development of this system is not apparent on models sold outside the Federal Republic of Germany. There. the ROM is factory-programmed with 156 frequencies from 40 international broadcsters with German language services. The criteria for frequency selection is simply those which do not change: RAIS, DW (60975MHz), BBC and so on. There are 13 Deutsche Welle channels, six each of Swiss Radio International, BBC and Radio Finland and a lesser number of other (such as one for Radio Sofia) assigned.

During the summer last year, I spoke to Manfred Lichius, Product Manager of Portable Audio at GRundig in West Germany who was one of the engineers responsible for the design of the Satellit 500. I asked him whether it was intended to release models with similar pre-programming onto other markets. I was told that this was not the intention at that time, as the company could not justify devoting the resources needed. However, we went on to discuss the future of short wave receivers and in particular the idea of a receiver which could read 'Smart Cards' issued by radio stations containing frequency information for a receiver to read and make life easier for the day-to-day listener to short wave radio stations. I suspect that this will be some time coming - in point of fact, a set devoted to only one station is not, I feel, either practical or wanted, but in producing this receiver, Grundig has demonstrated that technology does not stand still.

With such an interesting and clever product, Grundig can be proud of their short wave radio engineers - and anybody lucky enough to own such a set can be proud too. It is a pity that Grundig equipment is not more widely available, for it has shown the way forward and it will be only a matter of time before another manufacturer (undoubtedly in the Far East) comes up with a similar model.

In conclusion, I feel that the Satellit 500 is suited for almost any category of listener - the beginner will find new ways to explore the short wave bands; experienced listeners will benefit from the sophisticated technology and excellent sensitivity and selectivity; radio amateurs can make use of the set for listening to voice and RTTY transmissions. □



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STARTING OUT

Brian Oddy G3FEX

Despite the fact that most modern superhet receivers employ high gain radio frequency (r.f) and intermediate frequency (i.f.) stages to select and amplify a desired signal, the output from the demodulator will be insufficient to drive a loudspeaker directly. At least two stages of audio frequency (a.f.) amplification are generally required, namely a pre-amplifier and a power amplifier.

The role of the audio amplifier stages in a receiver is to build up the demodulated output to a power level that will be sufficient to drive the loudspeaker system. The operation of some of the basic circuits are outlined this month.

Pre-amplification

The role of the pre-amplifier is to boost the demodulated signal voltage to a level that will be adequate to drive the power amplifier to full output if required. The basic circuit of a pre-amplifier used in some transistorised receivers is shown in Fig. 1. In this arrangement the input is applied between the base and emitter of a bipolar *npn* transistor (TR1) and the output is obtained between the collector and emitter, consequently this is known as the **common emitter** configuration.

When the potential from the voltage divider (R1, R2) connected across the supply voltage (V_{cc}) is applied to the base of TR1 as a fixed bias (V_b) it will set the base current (I_b) to some small steady value. This will cause TR1 to conduct, since V_{cc} is applied to the collector via the load resistor (R3). The collector current (I_c) flowing through R3 will reach some steady value. The emitter current (I_e) will be approximately equal to $I_c + I_b$. The flow of I_e through the emitter resistor (R4) results in a voltage drop which provides a self-bias on the emitter - this serves to stabilise the transistor against temperature variations, e.g. if the emitter-collector current increases due to a rise in temperature, then the voltage drop across R4 will also increase, thereby making the emitter more positive and reducing the effect of the fixed forward bias applied to the base-emitter junction. To prevent feedback at signal frequencies and a consequent loss of gain, R4 is by-passed by a large capacitor (C3).

If a signal to be amplified is applied to the base of TR1 via the d.c. blocking capacitor C1, the base current I_b will be increased during one half cycle of the waveform and reduced during the following half cycle. Although I_b is only a small percentage of Ie, it controls the current flowing in the emitter-collector circuit (I_c). Small changes in I_b result in large changes in I_c. During the half cycle when I_b causes a rise in I_c the voltage drop across R3 will increase, thereby decreasing the collector voltage (V_c). During the next half cycle both I_b and I_c will fall, so there will be less voltage drop across R3 and V_c will increase. The voltage at the collector is therefore 180 degrees out of phase with the input signal. The amplified output is **capacitor coupled** to the next stage via C2, which blocks the d.c. component. The reactance of both C1 and C2 must be low at signal frequencies.

To ensure that the output is an amplified replica of the demodulated waveform at the input, the pre-amplifier must be operated in a linear manner. Good linearity can be achieved if the transistor is biased to some mid-point in its operating range, so that collector current flows during the entire input cycle. Under these conditions the collector current conduction angle is 360 degrees and the amplifier is said to be operating in Class A. One method of setting up the circuit for Class A operation is to adjust the fixed bias applied to the base of TR1 so that voltage at the collector (V_c) is exactly half that of the supply voltage (V_{cc}) in the absence of an incoming signal. This can be achieved by selecting suitable values for R1 and R2, but they must be chosen with care since they are effectively in parallel with the base emitter resistance and therefore affect the input impedance. It is desirable to make the total value (R1 + R2) as large as possible, but if R1 is made too high there will be large variations in the voltage drop across it when I_b is varied by the incoming signal. If the values are too low they will reduce the input impedance and may result in an excessive current drain from the power supply. In some designs R1 and R2 are selected so that current flowing through them is about ten times the base current I_b. The value of R2 is usually substantially lower than R1 and R4 is generally a fifth to a tenth of R2.

Distortion will arise if the pre-amplifier is driven into a non-linear state by the demodulated signal, so an **audio gain** or **volume control** is usually installed between the demodulator and the input to the pre-amplifier. The control is often mounted directly on the receiver front panel and then connected to the appropriate points in the circuit via screened leads so that the operator can manually control the level of signal applied to the pre-amplifier and hence the volume of sound from the loudspeaker. The response of the human ear to changes in sound levels approximates to a

Fig. 1

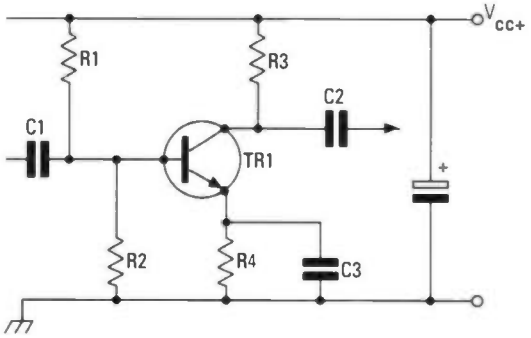


Fig. 2

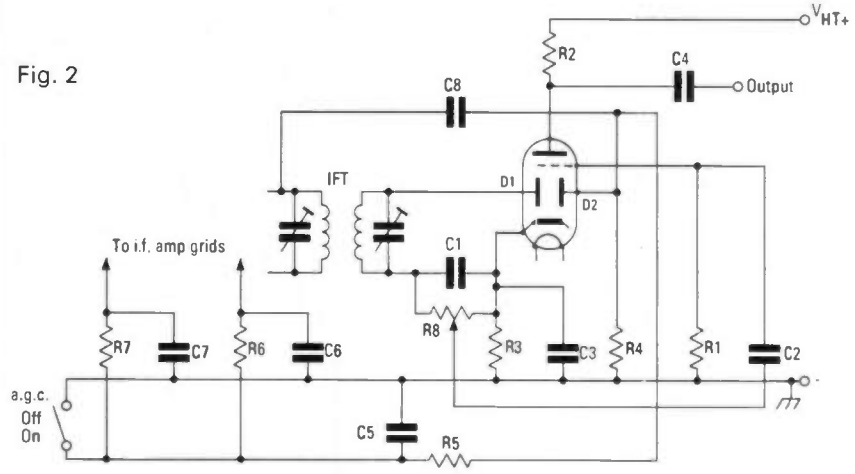
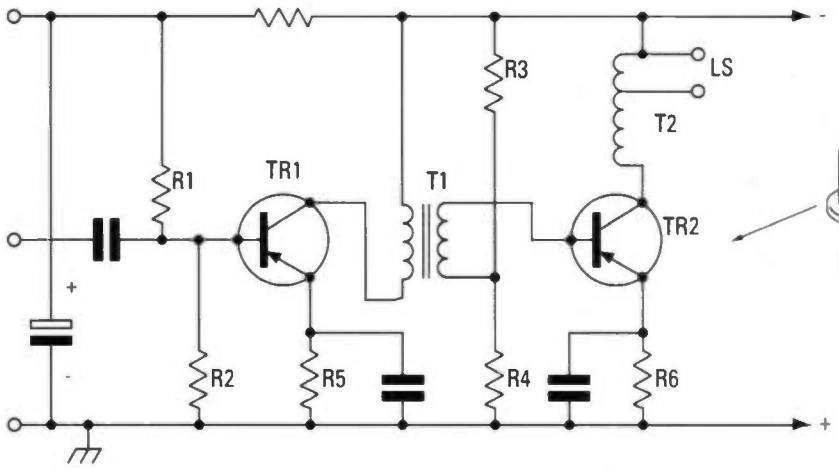


Fig. 3



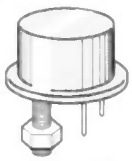


Fig. 3a

logarithmic scale (see 'Starting Out', *SWM* February '90), so a potentiometer with a logarithmic track is used for the volume control.

Many of the older superhet receivers employ a double - diode - triode valve in the first audio stage. Although quite separate roles are played by the diodes and the triode, they share a common cathode. A typical circuit is shown in Fig. 2. In this arrangement one of the diodes (D1) is used to demodulate the desired signal at the intermediate frequency (i.f.) - see 'Starting Out', *SWM* July '88. The signal across the secondary winding of the last i.f. transformer (IFT) is applied to the anode of D1 and to the common cathode via the i.f. by-pass capacitor (C1) connected across the diode load (R8). The setting of the slider on R8 determines the amount of demodulated audio applied via coupling capacitor (C2) to the control grid of the triode, thereby acting as a volume control.

The triode is operated as a class A audio pre-amplifier. A positive potential (Vht) is applied to the anode via a load resistor (R2). The current flowing through the cathode resistor (R3) results in a voltage drop, thereby making the cathode positive. Since there is no grid current flowing in the resistor (R1), the grid is in effect negatively biased with respect to the cathode. The by-pass capacitor (C3) prevents negative feedback and a loss of gain. By choosing a suitable value for R3 the triode can be biased to the centre of the straight portion of its V_g/I_a characteristic so that anode current (I_a) flows during the whole of the input cycle. When the demodulated signal is applied to the control grid it will cause variations in I_a and an amplified signal voltage will be developed across R2 - this will be 180 degrees out-of-phase with the input signal. Resistance capacity coupling is used to block the d.c. component (C4) but allow the signal to pass on to the control grid of the power amplifier.

The second diode (D2) is used to rectify a small sample of the i.f. signal to provide the negative potential required for the automatic gain control (a.g.c.) applied to the i.f. stages - see 'Starting Out', *SWM* November '88. The i.f. sample is taken from the primary winding of IFT via a small capacitor (C8) and rectified by D2. The negative potential across the diode load (R4) is smoothed (R5, C5) and filtered (R6, C6; R7, C7) before being applied to the grids of the variable-mu i.f. amplifier valves.

Sometimes the output from the pre-amplifier is inadequate to drive the power amplifier to full output, so a **driver stage** has to be employed between the pre-amplifier and the power amplifier. Although its operation is similar to the pre-amplifier, it is designed to accept higher levels of signal input and provide sufficient output to drive the power amplifier fully if required.

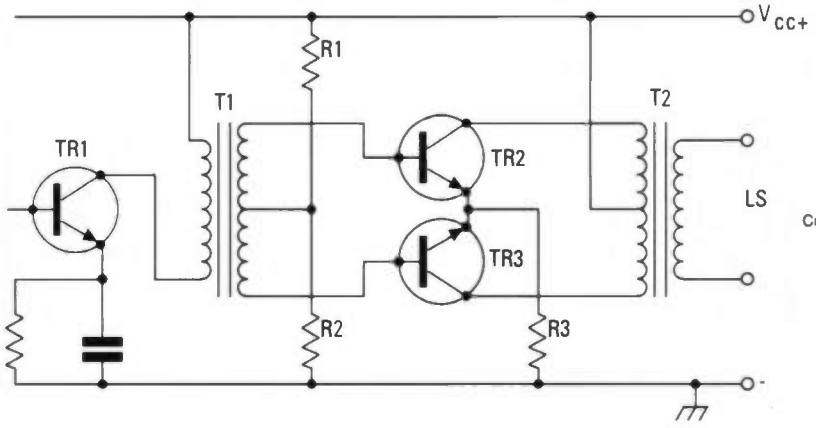
Power Amplifiers

The role of the power amplifier is to provide the audio frequency energy required to drive the loudspeaker, which then converts it into compressions and rarefactions of the air, i.e. sound waves. A single transistor can be used to amplify the whole of the input waveform, but to avoid distortion it must be operated in Class A. It can be shown that the efficiency of a Class A transistor power amplifier cannot exceed 25 per cent, which implies that a considerable amount of the power flowing in the collector circuit will be dissipated as heat. If the transistor is biased so that the voltage on the collector (V_c) with no signal applied is exactly half the supply voltage (V_{cc}), then the power flowing in the collector circuit will equate to $V_c \times I_c$. Most audio power transistors are housed in a metal case attached to the collector, so that the heat can be dissipated by bolting it to a specially shaped metal block with cooling fins, called a **heat sink**.

The basic circuit of a *pnp* driver stage transformer coupled to a *pnp* power amplifier is shown in Fig. 3a. This is a convenient arrangement when the equipment has to be operated from a positive earthed supply, e.g. some types of car radio. The fixed bias potentials derived from the dividers (R1, R2 and R3, R4) set the base currents of the driver (TR1) and the power amplifier (TR2) for Class A operation. Auto bias is also provided by their respective emitter resistors (R5, R6). Each half cycle of the audio applied to the base of TR1 results in a change in the collector current flowing through the primary of the coupling transformer T1, thereby inducing a voltage in the secondary winding. The alternating secondary voltage varies the base current of TR2 and results in large changes in the collector current flowing through the auto-transformer (T2). The amplified output developed across T2 is applied to the loudspeaker (LS) via a low impedance tapping point. The physical appearance of a typical audio power transistor is depicted in Fig. 3b.

A considerable saving in d.c. power can be achieved by employing two audio power transistors in a **push-pull** circuit and operating them in a mode called **Class B** - see Fig. 4a. In this arrangement the fixed bias potential from the divider (R1, R2) is applied to the base of both power transistors (TR2, TR3) via the centre tapped secondary winding of the driver transformer (T1). The bias sets the base current of both transistors so that the flow of collector current is just "cut off" - they are then operating in Class B. During the conduction period some autobias is provided by the common emitter resistor (R3). Each half cycle of the signal applied to the base of the driver stage causes a change in the associated collector current flowing through the primary of T1 and this induces

Fig. 4



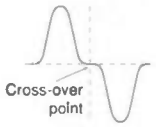


Fig. 4a

a voltage in the centre tapped secondary. The polarity of the voltage across the secondary will change with each half cycle - when it makes the base of TR2 positive it will conduct. At this time the base of TR3 will be made negative and it will be turned off. The opposite situation will occur during the next half cycle. Their collector currents flow alternately through half the primary winding of the centre tapped output transformer (T2) and each transistor reproduces half the input waveform. Each output induces a signal in the low impedance secondary winding on T2, and the combined output is applied to the loudspeaker. If the two outputs do not combine correctly **cross-over distortion** will occur - see Fig. 4b. This can be corrected by adjusting the bias on TR2, TR3. □

Abbreviations

a.f.	audio frequency
a.g.c.	automatic gain control
d.c.	direct current
i.f.	intermediate frequency
r.f.	radio frequency

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AMATEUR BANDS ROUND-UP

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

There's not been a lot of activity chez GW3KFE during the past month, thanks to a touch of the pestilence. The local variety had an odd twist to it - one would have a mild 'go' and quickly feel well enough to be out and about again when the bug would sneak back and present one with what can best be described as a real haymaker; at that stage one rapidly lost interest!

The SLP - December 2/3 1989

The top scorer was **Philip Davies, ILA 023**, of Market Drayton. Noticeably, although he had the highest claimed score, Philip made great efforts to meet the rules and spirit of the game, and so he did not include quite a few signals that other people would have or did claim. Most of the action was on 21MHz, although his log contains entries for 1.8, 3.5, 7, 10, 14, 18, 21, 28MHz. Philip makes a good point when he notes how it was on the quieter WARC bands that the good propagation was to be noted, while on the older bands, noise was limiting things. One thing that upset the plan of campaign was the early shutdown of the bands on the first evening. Equipment was an Eddystone 840A, plus homebrew antennas. Among the interesting prefixes noted were the CT500 stations; CT500A, 500B and CT500C all went into the log, while the fourth one was noted shortly just after the SLP time was up. Another one was Y93VL the first East German with such a high number he has logged. Talking of high numbers Philip's score was some 199680 points, from 139 logged QSOs, putting all Continents and 52 countries in the log. A worthy winner, and our congratulations.

The runner-up was **John Heath RS 92658** (Kirkby Mallory) who was so chuffed over his third place in the previous SLP that he bought an extra copy, tore out the relevant page, framed it and hung it in the shack! This time, he went for the multipliers, with ten bands sampled, including 144 and 432MHz. Oddly enough John logged the same number of QSOs, but unluckily only 37 countries, giving a final score of 140600 points. John has a Yaesu FRG8800, plus the v.h.f. and u.h.f. receivers all 'inhaling' from the same 37 metres of longwire. We suspect that this wire, which would be quite seriously directive on the higher bands, and particularly at v.h.f./u.h.f. might well have had some bearing on the result.

Anyway, suffice it to congratulate a winner and a runner-up who quite obviously both took thought on their strategy before embarking on the task. It's an interesting thought that had we given a points premium of times 1.5 for a log containing some c.w. entries - an idea we did indeed toy with - then the winner and runner-up positions would have been reversed!

As for the others, the other letters made a reference, and offered a log, but didn't run the first two at all close.

Events

One supposes the big events of the past few weeks have been the changes in the Eastern Bloc, and inevitably it has reflected into amateur radio. For example, the change of prefix to LY in Lithuania, and to ES in Estonia puts the clock back by over fifty years. In addition it is now possible for holders of W. German calls to operate in East Germany with no additional paperwork needed, and of course we are seeing all sorts of joint East/West amateur radio activities, the reporting by Russian amateurs in Western magazines, joint East/West expeditions and much more. It is even noticeable that despite the more repressive outlook on the upsets manifested in China, no attempt was made to reduce BY amateur radio activity and the issue of personal calls proceeds slowly, too. Let us hope that the Albanians, and the repressive Black African countries who grant licences only to expatriates and not to their own nationals, will also 'get the message'.

At the time of writing the Scandinavian Bouvet show was just closing down, while in the morning mail we received a letter indicating that the American expedition was cancelled.

Between 22-28 March, A61AD will again be operational under WB2DND, while we hear that A61AC is active on RTTY. On a different tack it should be noted that CE0OGZ is to leave Juan Fernandez after his tour of duty on January 31.

Christmas Island, East Kiribati will be on for a week, between 14-21 February, operated by W9GW - QSL to the home call.

Sunspots

It is interesting to notice how well this cycle has been going; almost parallel with the record breaking sunspot cycle Number 19, and if this is much to go by, then we would be looking at a peak, around March 1990; of course we won't be able to be sure of this until we see the 'smoothed' figures around the end of the year. Normally of course, the time around the winter solstice, December 21, is a time of lower m.u.f.s and less DX; however, we think only the six-metre addicts will have noticed the effect this winter! Certainly things are notably different to the minimum time around September 1986.

Letters!

Always we can use more and more letters! **Alistair Boyd** in Livingston got his letter in early, just before Christmas, before the Festive Fare could dent his enthusiasm! Alistair is exclusively a mobile listener, even on c.w. Taking 28MHz first, s.s.b. yielded K4PI/PJ7, V47KO(QSL via K3NZ), WA8HSV, W1EXC, LY2CL, K8KKK, AD3V, SV1YH, KA2YZW, WP4Q, XL32AR for a VE special event station, KA3TSN and KA3LOQ. On this same band, c.w. produced WB4FFW, VE1AID, W7IR, WB8VP, NE3P, PY2CYE, UO5OGQ, RA3GD, PY2ACJ, K4FAD, PY1JE, PS7HMB, KA0O, and VE3DXR who was originallly from Glasgow. Turning to 14MHz, we find on s.s.b. , HG9R, PI4DEC, UW9AWZ, W8CXX, K5NA/2, N4WW, AA3B, G0ATV/CT1, KY1H, K1ZM, AI2C, NX9T/P/4, AG1C, K0EJ/P/4, K5TNA/P/2, EA8/DK4KF, DJ0MAA, a Scotsman living in Hamburg, G0BBM/P/TF, DL/EL2GZ, W8HSV, UL8LWZ from Kazakh, GM0IJY/P on an oil platform, N4PBR, UL7OB, VE3PHU, 4X1BD, W8JWC/P/8, KO7N, VE7TB, W6RXF, VE6MV, VE7IG, AB8K, VP5Q,, HI3HBD, KD7TI, UL7FEC, VP2EXX, EI4GL, WA2TMZ and smaller fry. As for CW, a listen at that end produced VE3BMC, VE2GNW, VE3IVT, UA1ZY at Murmansk and U3AJ in Moscow. Obviously Alistair is a connoisseur in the line of prefixes!

A. G. Halligey (Bridgend) wrote to ask if we could lead him to a particular magazine supplier for a friend of his in USA, a problem we solved in a matter of a few moments. Always pleased to be of help! However, do please enclose an s.a.e., it helps enormously at this end.

E. Trowell comes next; he is almost entirely a c.w. user, and covers, as the mood takes him, all the bands for which he is equipped. This time saw Top Band signals taken in from LX/DF3CB, LX7A, OH0MM, CT1AOZ, 4N9N, DF2RG, 4U0ITU, OY9JD, and OK3TPV. On Forty there were OY7ML, UD6DKW, KY1H, UL7LEB, CT3M, N2MM, and WZ4Z. On 10MHz - woefully neglected, these WARC bands - GW3SB and CT3FT, and on 18MHz VO1HP and JR6CF, which left W1FWW, N7HID, N6JV, and W6OV to be picked out of the 24MHz band. 14MHz was looked at of course, and VK3VJ, NL7G, WB6HGJ, 4S7NR who was crystal controlled with 4W, N8ABL, KP4L, and HK3RQ. Finally, a quick peep at Ten found W6DU.

Now we turn to **D. L. McLean**, who notes that the 28MHz band has been opening around 0800 until 1900Z plus the odd 'evening excursion' to as late as 2030, while 21MHz managed to be usable between 0800 and as late as 2100Z normally. On Ten, Don logged A92FB, BY1PK, CT3FT, EL2CX, EL2FO, FS5R, HC2G, JAs, KH0AC, N1EDM/Aeronautical mobile, TG0FRACAP for a conference station, TI1W, N9AG/J6L, OX3LX, TA3F, UW0MF, VK8NLV, VO2AA, VO2AC, WP4Q, XT2KG, XW8DX, XW8KPV, 3X1SG, and 8P9EM. Turning to the 21MHz log, CO2RX, CP8HD, HL1CG, HL3UW, IQ1A, J88BS, JAs, JT1BV, JT1KAI, KG4DD, NP4WR, OH9SCL(Santa Claus Land, no less!), OY9A, RA0AD/JT, UA2FEK, UA9WO/RW9J, UH8AAQ, UL7GY, UM8QAF, UW0LT, V29OA, V31BB, VE7DGI, VK2XG, VP2VE, VQ9IF, XT2PS, XW8DX, XW8KPV, YI1BGD, ZB2IZ, ZC4NC, ZL3RK, 9K2DB, and 9N1RN.

After a fifteen-year lay-off, **H. Wood** returns to the fray, with a Philips D2935 and telescopic antenna. His crop of 28MHz s.s.b. stations included KQ9L, WB1GQR, NW3B, N2HR, NQ3N, JA6WFM, W9EP, K3EST, W0AIH, N8FU, K1AR, 9J2FR, NU4Y, NB1H, N8DGV, KA1OFC, K3ZO, NC7OK, VE3ABH, K1FUY, VE3XO, VE3CUX, K8YSE, KA1GG; on 21MHz the list was shorter but still included UI9APV, VO2AC/P, 8P6CC, K2EWB, NM3U, UA6LHB, K1QHH, and KB7NL. That leaves the 14MHz band for which the pickings were W5ISF, W1IDP, UZ4AYN, OZ1LLP, A47RS, JY5IN, 4X6UO, KL7XD, ZB2AZ, ZS6WPX, and 9K2HA plus Europeans. Quite obviously the old skills have not deserted him!

P. Keighley has a 'nest' of dipoles up, covering 3.5, 7, 14, 21, 28MHz, plus a half-wave vertical for Ten; Paul says he is mainly a c.w. fan, but will have the odd listen on s.s.b. - just to show he isn't a square! Operating times tend to be after midnight unless on holiday, when the shack door might be opened for a late-afternoon or early evening session. Favourite band seems to be Forty, so let's start there, with T77C both on c.w. and s.s.b., OD5VT (s.s.b.), UL7FEC (s.s.b.), UA9TA, UA9YHT, UF6FDR, UG6GAT, UG6GAW, UJ8AE, UJ8JKK, UL7JGX, UL7PGA, UL7VAB, UM8NC, UW9YY, UL7LEB, UV9AAA, UD6DKW, RA9AAV, UZ9CWW, UZ9XWH, RZ9WXW, 4X4HQ, CT500B, 4U1ITU, ZD8VJ, EA8/OZ2WG, CM6AI, PY1RSA, VU2PTT, VE1AUU, VE1JBC, VE3CUI, NN1G, W1HMD, W3NJZ, WA3TBL, W4SVG, W4YE, AA4XU, KN5U, and WB5IGF, not to mention the smaller fry from Europe.

Angie Sitton has been fairly active of late so we must cut the list down, ere we run out of space. Again, a forty-metre addict, and she mentions K1VV, K1BU, KY1H, WQ4W, W3NX, K3SUI, WA2YSJ, NN2E, KQ3F, N4HB, KU3X, KJ3Q, N2RR, KA4IFF, N4RU, W4PBC, KF2T/MM, VE2BOH, VE1AUU, VE1OK, J79DX, 8P9HT/K4BAI, HK1AMW, UZ9JXD, UA9MJA, CT3MAW, EA8AB, T77C, 4U1ITU, and ZD8VJ plus assorted Europeans.

The letter from **John Heys** was written on Boxing Day, in between the odd session on Six Metres, which is, in the main where it all happens for John. However, on Top Band, John mentions RL7PAJ, UI8LA, UA9KAA, CT1UP, CT1NK, YO3APJ, VE1ZZ, W1ZE, WB3AAI, 4X4DK; on 14MHz there was FY5YE, on 21MHz EC8ASD, 8P9EM, and on 28MHz XT6KG, HI8HFD, UV9FM, VK6HQ, and ZD7CW.

Life After SWL!

We used to hear from **Leighton Smart** (Trelewis) fairly regularly, but now we must refer to him as **GW0LBI** now operational and active with just one watt, a trap dipole, and dipoles for 14 and 21MHz, all around 4m a.g.l. As Leighton says, he likes a challenge! So far, on 14MHz, PA0HTT, DJ2IO, OK1DXK, IK1DHA, SM5LJB, 4N7N; on 7MHz, SP3LO, UA3YAN, and for 21MHz UB5ZFN and HA8KRQ were all worked.

Still talking about Forty - but the comments apply just as much to Eighty - **B. Fields** says that life begins on Forty!! And yet, so many people steer clear of this and other l.f. bands, or complain they can never hear anything. If the antenna is anything at all, it will almost certainly be found that anti-clockwise turning of the RF GAIN control with no other adjustments will suddenly produce a sharp fall in the noise level and lots of signals pop up out of the suddenly reduced noise. The reason, in essence, is that the sort of high signal strength levels normally found on and around the 1.8, 3.5 and 7MHz bands are beyond the ability of the

receiver to take without overload and consequent loss of linearity. When overload occurs, every signal mixes with every other signal that reaches the overloading stage resulting in the noise you hear; bear in mind that the receiver input will usually have a very load (about 50Ω) resistor comprised in the antenna, shunting and damping the input Q. Thus, of course, sneaks in the megawatts of BC station energy outside but near the band or even inside it. So when you press the attenuator button and 20dB of attenuator goes in, maybe you do attenuate the wanted signal by 20dB - but you will attenuate the unwanted noise by 30dB or more! A fixed lump attenuator is tolerable in a commercial receiver, as is the use of the RF GAIN control, but the ideal solution is to build an attenuator which will give, say, 1dB steps up to 60dB. There are plenty of designs about in the books, but it is seriously recommended that you follow the designed mechanical layout carefully, or you may suffer much trauma and pain trying to stop r.f. leakage between stages, even at these low frequencies. In use, you get as much signal as you can out of the antenna/antenna tuner combination, with the attenuator, set to zero attenuation between the a.t.u. and the receiver input. Now go from zero attenuation upwards in 1dB steps, until suddenly you will hear the noise drop and previously inaudible signals are found.

What, then, is the difference between using an attenuator and just winding down on the RF GAIN control? Basically the attenuator method presents the signals to a receiver operating at its designed sensitivity and noise figure. Winding down the RF GAIN control instead has the same basic effect, but as we do so the sensitivity and the receiver's noise factor also deteriorate. And of course, it goes without saying that the better the antenna on Forty (or any other l.f. band), the worse the problem gets, if the same antenna goes for transmit as well as receive. Hence, for example, the Top Band addicts love of the Beverage and similar antenna, which reduce the noise pick-up level at the expense of reduced (but less so) signal pickup.

Please Tell Us!

We want to know if the way we do things these days in this column is the way **you** like it. Yes, you, the silent majority.

Would you like more, or less, technical chat, more or less of the DX goings-on, more or fewer SLPs, a 'ladder' to have a go at, or whatever else turns you on.

After all, if you don't tell us, how are we to know: the crystal ball here in deepest Powys doesn't seem to work on nine volts!

Even if you think the column is not worth the time of an s.w.l. who listens on the amateur bands, please say so, telling us what's wrong. That way, we'll be able to make it even better!

DECODE

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

Readers Letters

It would appear that sales of the ERA Microreader have increased somewhat around the Christmas period judging by some of the letters I have received from readers. **Cephas Ralph** from Oban is one such case and he uses the popular Sony ICF-2001D receiver with the AN1 active antenna. As with a lot of newcomers to the Microreader, his initial success has been with commercial c.w. stations and very little joy with RTTY reception. Cephas needn't worry, as after some practice he will find that his success rate increases dramatically. If he continues to have problems I know that ERA have a superb after sales service and they will be only to pleased to help him overcome any problems.

Another worry that he has concerns 100Hz tuning steps and whether they are suitable for RTTY. Well, this depends very much on what type of signals you are trying to receive and the decoder you are using. It's true that for best results with RTTY you need tuning steps of 10Hz to 15Hz, but this mainly applies to the reception of the narrow 170Hz shift signals such as amateurs and ARQ. As many of the popular commercial stations such as press agencies use 425Hz or 850Hz shift, the problem is reduced and 100Hz tuning steps are often perfectly OK. In confirmation of this, I have received many letters from readers on this very point, reporting very satisfactory results using the ICF2001D/Microreader combination.

John Henry of Nottingham is another Microreader user but he is using an ageing Lowe SRX-30 receiver ,which he reports to be working very well. John also records RTTY signals on tape for playback later. He has found this a very useful technique for identifying stations which do not send callsigns regularly, as he can quickly search through a tape to spot the end of a message and catch the callsign. For this system to work properly you need to connect both the cassette recorder and the Microreader (or any other decoder for that matter) to the receiver during recording and adjust the receiver tuning to suit the decoder. This process in necessary as without modifying the casette recorder, you cannot normally alter the frequency of the signal from the recorder on playback. John Kerr of Mansfield uses a Yaesu set-up with a FRG-8800 receiver and the FRT-7700 antenna tuning unit. The antenna is loft mounted and is some 25m long, which implies that either he has an extremely large house or the antenna takes an interesting route around the loft! Whichever is the case the important point is that the results are good. John is yet another Microreader user and reports excellent experiences with ERA's after sales service.

It would seem that I owe **Adrian Donaldson** an apology as I seem to have mislaid his request for information on utility station addresses. I think I actually owe quite a few readers an apology as I have been inundated with a variety of technical questions from readers. I'm afraid that these very specific enquirys do tend to take a lot of my time, so I'm sfraid that delays are inevitable.

Last month I mistakenly credited **Graham Atkinson** with using a Commodore 64 computer to run the J & P FAX system. Of course, he runs it on a Spectrum - J & P don't produce a FAX program for the Commodore so it's no use all you lot out there writing to them asking for software for the C64.

Ken Longley writes with a question regarding my frequency list. It concerns the use of the letters N & R associated with the shift. Although quite happy that R means reversed, he wonders why I sometimes use N and sometimes nothing. Well Ken, it's actually quite straight forward as I only use N if the station has been positively confirmed as using normal signal polarisation. This subtle difference is required as many loggings only give the shift frequency with no reference to the polarity. Having said that I'm sure some of you are wondering what on earth I'm talking about so I'll take this opportunity to give a little more detail. RTTY signals use two frequencies for the transmission, one to represent the mark signal and the other for the space.

There are many different standards for the shift or difference between these two frequencies, but the most common are 170Hz, 425Hz and 850Hz. This in itself is not really a problem, but there are some discrepancies regarding which of the two frequencies are used for the mark and space. This is termed the polarity of the signal and transmissions are commonly known as either "normal" or "reversed". depending on which way round the frequencies are used. The technical term for this is actually erect or inverted. So there we are a simple (I hope!) explanation of RTTY shifts.

Mr A. Jenkinson of Leeds uses a ZX Spectrum computer running software from Technical Software in the form of their RX-4 and TX-3 programs. In addition he has the ON5 program and FAX. The receiver is an Eddystone 840, which takes me back a bit as I used to be the proud owner of one of these. The antennas comprise a 44m long wire, two dipoles and a ground plane for 28MHz. He reports great success on all modes, with one exception - FAX. For some reason he has had great difficulty with this mode, so let's try a few suggestions.

The first is to concentrate on trying to receive one reliable stations rather than searching around for likely signals. One point to remember about a lot of FAX stations is that they often send carier only for quite long periods of time. One of my favourite stations for testing decoders is Rome Meteo IMB56 on 13.5974MHz. This stations usually gives good quality reception with minimum multi-path problems and is active for long periods of time. Having selected a good station the next step is to get the FAX program running and see the results. If your FAX set-up includes a tuning indicator, the receiver tuning should be adjusted for optimum tuning according to the manufacturers instructions. If you are without a tuning indicator, trial and error is the only way and this requires a certain amount of patience. First tune to what you think is the correct point. If the resulting image is not too good, try tuning slightly higher in frequency and wait to see the result.

If this gives an improvement try tuning a little higher. If however the results are worse then you will need to tune down in frequency. Repeat this tuning process until you have achieved the best possible picture. If after going through this process you still cannot obtain a good picture I would suggest you have a word with the supplier of you decoder ofrsoftware, as you may either have a fault or perhaps be making a basic error with the operation.

Phil Lee, of Swansea uses the Technical Software decoding programs with a Matsui MR-4099 receiver. His question is simply - Is it worth buying the extra filters that are available from Technical Software? The simple answer Phil is yes, and for a fuller explanation see my comments regarding the BARTG R5 filter.

FAX Converter

Technical Software have just released a new unit which I'm sure will prove to be attractive to FAX enthusiasts. This unit, called the APT-2, enables APT FAX transmissions to be decoded with a standard f.m. FAX system. Some you of course may not have been aware that there was more than one FAX system.

In fact, there are a great many systems, especially in the world of land-line FAX. However, as far as radio FAX enthusiasts are concerned there are basically two systems. First is the f.m. system where a carrier is moved between two frequencies - one representing black and the other white. This system is the one normally used for FAX transmissions on the shortwave bands as it is both simple and effective. The other system is commonly known as WEFAX and one or two other names, and is used primarily for weather satellite transmissions.

So what does the Tecnical Software unit do? It works only with audio signals, so for satellite signals you still need all the normal radio equipment, but instead of applying the audio to a dedicated WEFAX decoder the signal is applied to the APT-1, where it is converted to standard h.f. fax, i.e. f.m. The resulting signal can then be decoded as if it

were a standard h.f. FAX transmission. The APT-1 incorporates a VOGAD i.c. to provide a.g.c. for the incoming signal. This eliminates the need for black and white controls and greatly simplifies the reception of this type of transmission. There are pre-set controls for brightness and contrast giving the user some flexibility in the presentations of the final image. The advantage with the configuration used in the APT-2 is that it can handle a wide range of input levels with no adjustments. The APT-2 also features clock frequency recovery which eliminates picture distortion due to the doppler effect or tape speed variations on recorded signals.

Users of the Technical Software RX-8 decoder will be pleased to hear that the APT-1 comes complete with all the necessary connections and a software upgrade to make best use of the new facilities. This upgrade known as version 2.1 includes a number of enhancements to all types of FAX reception, including a new nine level printer greyscale to give a reproduction which is claimed to be near photographic. The APT-1 comes ready built and calibrated costing £59.00 inclusive of postage and v.a.t. If you purchase and APT-1 and RX-8 together the APT-1 comes at a special price of £39.00. For further information contact Technical Software, Fron, Upper Llandwrog, Caernarfon, Gwynedd LL54 7RF.

BARTG Filter

Another equipment release this month comes from BARTG (British Amateur Radio Teledata Group). They have just announced the release of a p.c.b. for their R5 audio filter unit. This versatile filter is based on an article in the American magazine *QST*. In fact rather than comprising one filter the R5 is actually two variable filters, one a high-pass while the other is a low-pass. When combined these filters create a bandpass effect which can be varied over a very wide range. Each of the two filters can be tuned over the range 40Hz to 3600Hz in 100Hz steps a feat which is greatly eased by the use of switched capacitor filter techniques, which enables the tuning of both filters to be handled by two 40-way switches (CB type channel switches are recommended). Obviously in order to build the filter you will need some constructional experience or perhaps you could persuade a friend to build it for you.

So, how does a filter help utility reception? In order to explain this we first need a reminder of the make-up of the type of signals we are receiving. I'll use RTTY as the example but the principle applies equally to the other modes. When we receive a RTTY signal it appears as a combination of two tones - one for mark and one for space. A typical press station uses a shift or difference between the two tones of 425Hz. This signal is then tuned-in with the aid of some sort of tuning indicator, such as a bargraph display. When corectly tuned most decoders would want to see received audio frequencies of 1275Hz and 1700Hz respectively for the mark and space frequencies. I'm sure that most of you who have tried to receive RTTY when there is a lot of interference about have noticed the increase in errors in the received signal.

These errors are primarily due to the decoder getting confused between the wanted signal and the noise, so we should be able to see an improvement if we could get rid of some of the noise. This is where the filter comes in, as with an adjustable filter we can carefully adjust the tuning so that the filter only passes frequencies between say 1200Hz and 1800Hz. By doing this we should be able to eliminate a great deal of the interference and in consequence reduce the number of errors in the decoded signal. Although I have described this in relation to the BARTG filter, the same principles apply to most tuned filters, providing of course they cover the required range.

If you're looking for a commercial ready built filter those produced by Datong have a very good reputation and I have received letters from several readers who use these filters regularly. If anyone out there is using a filter for their utility reception why not drop me a line with the details.

Frequency List

Now for the frequency list which is just a few example from logs received this month. If you would like a copy of the full list then please send three stamps to the address at the head of this column and Elaine and I will do the rest. We usually aim to turn these list round in a few days but just occasionally we get caught with deadlines and the list falls behind, so please be patient! The format used for this month's selection is the normal of frequency, mode, speed, shift, callsign, time and notes.

2.222MHz, RTTY, 75,?, PBC32, 1711UTC, DN Noordwijk.

4.015MHz, RTTY, 100, ?, ?, 1538UTC, UNID Meteo.

6.948MHz, RTTY, 100, ?, ?, 2030UTC, UNID.

8.494MHz, FAX, 120, 576, GZZ40, 1501UTC, RN Northwood

9.242MHz, FAX, 60, 288, LRO64, 2111UTC, DyN Buenos Aires press

9.318MHz, RTTY, 100, ?, DHJ51, 1658UTC, Grengel Meteo

10.600MHz, RTTY, 50, ?, XVN37, 1547UTC, VNA Hanoi

10.720MHz, RTTY, 50, ?, RBGB, 1407UTC, Indian Army?

16.275MHz, RTTY, 75, ?, ?, 1535UTC, UNID 5 fig groups

18.215MHz, RTTY, 75, ?, WFG93, 1107UTC, VoA Greenville

18.255MHz, RTTY, 50, ?, ATB68, 1004UTC, MEA New Delhi

18.278MHz, RTTY, 50, ?, 9KT351, 1614UTC,KUNA Safat

18.542MHz, RTTY, 75, ?, WFK48, 1605UTC, USIA New York

19.275MHz, FAX, 90, 576, RXO74, 1144UTC, Khabarovsk Meteo

20.015MHz, FAX, 120, 576, NAM, 1138UTC, USN Norfolk, N. Atlantic

20.045MHz, RTTY, 50, ?, HGX21, 1117UTC, MFA Budapest

20.470MHz, FAX, 120, 576, NGR, 1130UTC, USN Kato Soli.

22.955MHz, RTTY, 50, ?, ISX22, 1200UTC, ANSA Rome

YOUR NEXT DEADLINES ARE MARCH 19, APRIL 16 & MAY 18

INFO IN ORBIT

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

My postbag has been heavy during the last few weeks - its pleasing to see the great interest in satellite activities.

Cassette Tapes

More requests for cassette tapes of Meteosat and Goes data came in over Christmas. **Chris McCarthy G3XVL** from Ipswich has built his own framestore, the YU3UMV unit. He uses a modified Redifon ex-p.m.r. fitted with 50kHz i.f. filter and crystals for 137.50 and 137.62MHz. His antenna is a home-made crossed dipole mounted about 4m above ground level. Chris can receive signals from North Africa to just north of Scotland - because his house gets in the way! His framestore works well though and he has been able to impress the neighbours with his pictures. I wonder whether Chris might like to add two or three more crystals to allow reception of the Russian meteor satellites? Watch the look on their faces when you tell them that you are tuning into a Russian satellite!

Picture Quality

Chris had previously seen satellite pictures taken using computer print-outs and had assumed that that was the best that could be achieved.

It is worth remembering that the printed results from a computer system will depend on not only the computer but also the printer. In the worst case, a 32K BBC computer and 8-pin dot matrix printer will hardly show anything recognisable unless great care is taken. I have used such systems in the past and it does requires effort to produce a good picture.

Going further up the market there are some good computer systems available using hardware that was not around a few years ago and these can be used to provide good quality pictures. Photography of the monitor will give the optimum results, but you can use a printer and in this case the quality depends on how many pins are used to generate the grey scales. A 24-pin printer will produce considerably better results than an 8- or 9-pin printer. The pictures shown in these columns in most months were produced by screen photography with just the occasional printer dump thrown in for variety.

The attraction of computer screen dumps is their instant production. If I produce a really good weather system picture on the computer I can photograph it and wait about 2 months for the film to be completed, or I can connect the printer and do an instant picture.

ARRL

I received a nice letter from **Paul Pagel N1FB** of the American Radio Relay League who has been monitoring Met 3/3 but had not received any Kepler elements at the time of writing. I hope that those printed in the January *SWM* were useful. Paul commented that 'Info in Orbit' is the first thing that he looks for when he receives *SWM* - thanks!

Keplers from NASA

My thanks are also due to Goddard Space Flight Centre for sending me all of the Kepler elements that I had requested (Herstmonceaux please note). I had asked for elements for a number of satellites that may be transmitting signals that I, and others, have been receiving in the 136MHz band. The elements are in 2-line form which have to be converted to the more usual Keplers but I have found a description of the process in various journals. Given time I expect to match up some of the signals with known satellites.

Satellite frequencies

P J Quintel of Highgate, London has sent me a poser! He has listed several frequencies on which he has heard signals; 450.3MHz, bursts near 144MHz, tones on 138.25MHz,

periodic tones on 87.275MHz, and unusual signals near 130.437MHz. Mr Quintel asks whether these signals can be identified as of satellite origin. I have to admit a difficulty in answering questions like this.

The signals just above 138MHz are probably from the paging systems scattered around the country. The 87MHz signal may come from the fixed p.m.r. (private mobile radio) band. Satellites normally transmit in the bands allocated to them and the major one of interest to us is the 136.0 to 138.0MHz band used by a variety of spacecraft from scientific to meteorological satellites.

A glance at a list of recently launched satellites and their frequencies, such as the one kindly prepared and sent to me by **Geoffrey Falworth** of Preston reveals that the Russians use a variety of frequency bands for their various types of satellites. Some cosmos satellites use a number of frequencies including around 20MHz, around 40MHz and around 230MHz and there are others at higher frequencies as well! So it is quite possible for a determined listener to hear genuine satellite telemetry on a variety of frequencies. Geoffrey has also supplied me with Kepler elements for a number of satellites which will prove very helpful.

Geoffrey makes a study of all official announcements regarding satellite activities and launch vehicles and notes the expected operational lifetimes of satellites. As a result of these studies he produces a regular list of anticipated satellite launches which makes fascinating reading. The list included a new meteor satellite which we know to be Met 3/3.

Met 3/3

This new generation Russian weather satellite was launched on October 24 and has been transmitting continuously since then, making it possibly the longest transmitting Russian met satellite. It remains on 137.85MHz though I expect that it is capable of using other frequencies if necessary. Its predecessor Met 3/2 has remained off since before the launch of 3/3 and I would now be surprised to hear it again.

As with 3/2 the infra-red pictures from 3/3 are the reverse of the format used by NOAA polar orbiting satellites. Cold clouds are black and the warm sea is white. Those receiving signals will know that 3/3 transmits standard Met-type visible pictures, so that clouds show up very well, as do the bright African deserts, but the darker lands of the European countries are very difficult to distinguish unless you adjust your black and white level controls very carefully.

Change-over

An unexpected change occurred with Met 3/3 on December 28 when I was watching the 1541UTC afternoon pass. The craft was travelling northwards and so it was in sunlight for a few minutes after aos, providing good pictures as it approached twilight. Then, instead of switching over to the usual black only format, which lasts about 5 minutes, it immediately changed to perfect infra-red. This change could be clearly heard so you didn't need a framestore to know what was going on.

Fig. 1:GOES-E; 10 August 89; 1500UTC; Eastern USA.

Fig. 2: Met 2/18; 14 June 89; 1935UTC; East coast of Greenland.

During the next pass the switchover returned to its more usual sequence. For those not sure of what is happening - for instance if you can't decode the pictures - the visible picture becomes totally black with a complete change of sound as the detail vanishes! Then after 5 minutes the picture changes again, this time to totally white! Then after a further minute, normal infra-red picture modulation returns and things stabilise.

During later days this sequence of the first UK pass seeing an immediate switch to IR and all later passes seeing the slow sequence to IR has been repeated. Satellite listeners without picture decoders should now be able to understand what has been going on! I wish I knew the reasons for it.

Because of 3/3's higher orbit we can see it while it is over the USA and I have been watching some of the very low elevation westerly passes. Sometimes I hear it while it is below my theoretical horizon, and I have stored pictures which include the Melville Peninsula! If you can't find that on your atlas have a look at Hudson Bay in Canada!

Other Mets

Mets 2/16, 2/17 and 2/18 have continued normal operations with visible light transmissions only. It was recently the turn of 2/18 to go through the twilight orbit period and so listeners may not have heard much on 137.30MHz during Christmas and the new year.

Here is a definitive list of frequencies for those monitoring the weather satellites:

Met 2/16 and 2/17 on 137.40MHz
Met 2/18 on 137.30MHz
Met 3/3 on 137.85MHz
NOAAs 9 and 11 on 137.6 MHz
NOAA 10 on 137.50MHz
Okean 1 (occasional transmissions) on 137.40MHz

I have seen some erroneous lists circulating recently including some from official sources! Some years back the Russian satellites were changing their APT frequencies quite often but things have become very stable recently.

OKEAN on Again

While suffering from a dose of something like 'flu I was taken aback to hear Okean-style signals suddenly come from the scanner in early January. A visible light picture was transmitted for about 2 minutes before the craft was switched off. Running Kepler predictions suggest that it was almost certainly Okean 1 undergoing checkouts. Another 2 minute picture was received on 14th January.

The NOAA satellites are providing very good thermal pictures showing just how much warmer the Mediterranean is than the seas around the UK. The channel, similarly, is much warmer than inland.

GOES-E

I have to report that the signal strength at my station is degraded much more than I have previously seen. I can still recognise the various pictures being transmitted but they are not good enough now for use or reproduction.

I have tried re-adjusting the dish but without improvement. It may be that the fuel shortage mentioned on a recent WEFAX bulletin is causing pointing problems. I've recently ordered the parts for a new high specification pre-amp for GOES-E frequencies and I am looking forward to seeing how much it can improve the signal strength.

Meteosat-4

The recent gales moved my dish a few degrees away from Met-4 and when I came to look at the pictures I was puzzled at the signal loss. After checking all connections, voltages and cables I noticed that the wooden blocks that raise the dish a few inches had gone for a walk down the garden. After retrieving them I re-positioned the dish and was very relieved to see the strong signal return.

Regular monitors of Met-4 will know that this satellite transmits not only its own formats such as pictures of the Atlantic and Africa but also pictures that originate from GOES-E. These pictures appear to be suffering from the same degradation mentioned previously. At the end of December some of the North American infra-red pictures were not being transmitted and similarly the visible ones of North America were missing. A day or so ago they were back again though looking rather noisy on my framestore.

Pictures

Two pictures this month, if they are reproducible, Fig. 1 is the LZ format transmitted by Meteosat-4 and is a visible light image from GOES-E of the eastern coast of America and Fig. 2 is from Met 2/18 last June and shows the eastern coast of Greenland melting somewhat.

I shall be pleased to include your prints if you send them to me and please include details of your station for mention in the column.

Amateur Space Activities

I mentioned in January that Acton High School were looking for miniature transmitters for their rocket programme. During recent months a new Space Society has been formed in Hounslow and I had a call from its president **Magdalena Jarzykowska** who told me that the group has arranged to launch a rocket in France next May involving collaboration with the French Space Society. The payload will consist of a microtransmitter and radiation sensitive plastic.

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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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~~£649~~ **£585!**

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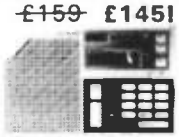

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AOR 2001 25-550MHz	£259
R532 118-136MHz	£179
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SEEN & HEARD

BAND II DX

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

Simon Hamer (New Radnor) had a real propagation variety during the month prior to January 10 when he received several East European f.m. broadcast stations between 66 and 73MHz, via Sporadic-E, on December 12 and 13, listened to BBC Radio One's air-tests from Blaen-Plwyf in Wales and Tacolneston in Norfolk on the 17th, logged stations from each Scandinavian country and from the Benelux countries while tropospheric openings were in progress on December 27 and January 4 respectively and heard the 'pings' of signals from Denmark (Rangstrup) on 99.9MHz on January 3, during the peak of the Quadrantids meteor shower and Denmark (Naestved) on 99.6MHz on the 5th.

Tropospheric

That early December tropo which coincided with the very high pressure still makes good reading. In Prestwich, **Barry Bowman's** barometer reached 1038mb (30.65in) on the 2nd when he logged BBC Radio Humberside and ILR Radio Wyvern. Next day he added signals from Belgium (BRT), BBC Radios Cymru, Derby, Lancashire, Leeds, Manchester, Merseyside, Sheffield, Shropshire and Stoke and Radios Aire and City (Liverpool), Marcher Sound and Piccadilly, Pennine, Red Rose, Signal, Sunset (Manchester) and Viking Radios from the IBA.

Between 1600 and 1632 on December 25, **Leo Barr** (Sunderland) heard foreign language and weak music on 92.6 and 97.5MHz and a noisy signal from BBC Radios 1 and 2 from Holme Moss. He also heard BBC Radio Scotland from Skriaig, under the local Radio 4 transmission from Pontop Pike at 2235 on the 30th. "I had a late 'DXing Christmas present' this year as the airwaves came full of different stations for about a week starting on Thursday 28 December," wrote **Russ Reed** from Lewes, who, with his Sangean ATS803-A receiver and its telescopic antenna logged BBC Radio One FM from East Anglia, Oxfordshire and the Midlands, BBC Radios Bedfordshire, Bristol, Cambridgeshire, Essex, Oxford, Wiltshire Sound and WM (Birmingham) and ILR CN FM from Cambridge, Fox FM from the Banbury transmitter, GWR from Swindon, Orwell from Ipswich and Radio 210 from Basingstoke/Andover. Russ wants to know if there is a DXing club or organistation specifically for Band II, I personally don't know of one, but perhaps some of you kind folk can help.

Weather

Various people have expressed interest in that photograph of streak lightning which I used in our October 1989 issue. You may remember that this was the 'jackpot' among a series of pictures which I took, with my Minolta 5000 camera, while a violent thunder storm was raging around 0130 [yes, one-thirty am!] on last July 7.

Now, take a closer look at Figs. 1 and 2 which were among the same batch of night-time pictures. These are the views from my windows facing south-west and east respectively and those considerable areas were illuminated by the sheet lightning of the storm. The "misty" appearance on both photographs is no doubt due to the prevailing overcast skies and the heavy rain that was falling at the time.

"Conditions were good from Wednesday December 27 onwards as I expected due to a large ridge of high pressure extending from central Scotland to Scandinavia which was gradually intensifying all the time," wrote **George Garden** (Edinburgh) adding, "This coupled with very low negative temperatures and an abundance of fog over the whole of the UK produced some quite interesting results."

At 1600 on the 28th, George was parked in a lay-by near Inverbervie and heard BBC Radio Cumbria from the Sandale transmitter "at phenomenal strength." He also logged BBC Radio Newcastle and ILR Radios Forth and Tees.

By the 29th, the opening had spread down south where, at 0850, I received strong signals from BBC Radios Bristol and WM, ILR GWR with adverts for the Swindon area and two strong French stations on approximately 98 and 100MHz. During this period the weather over Sussex was generally overcast, chilly with an average pressure around 30.2in (1022mb).

The weather buffs among you may like to know that I recorded 6.05in of rain between December 10 and 23 making a grand total for 1989 of 29.73in. I heard a radio announcement today, January 16, that December 1989 was the wettest for some years but not enough to solve our current water problems.

At 1330 on the 29th, George was on a by-pass outside Laurencekirk and received a very strong signal from ILR Radio Tay's Dundee transmitter and to his surprise an equally strong signal from Radio Clyde at Black Hill.

I used my Plustron TVR5D, with its own rod antenna while parked in East Sussex at 1310 on January 3 and while a high pressure system was on the move I found three 'warbles' of co-channel interference between 90 and 95MHz and several Dutch and French stations throughout the band.

Fig. 1: View to the south west at 0130!

Fig. 2: View to the east.

TELEVISION

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

Satellite TV

Edwina and Tony Mancini (Belper) tell me that the Swedish Nordic channel has now come off Eutelsat-1, F1 and is now on Eutelsat-1, F4, along with RTL Plus. Also that Spain's TVE-1 has made way for TVE Internacional on Eutelsat-1, F5 for Europe and F1 for America. At times they have been watching game shows and 'soaps' among the test transmissions, Fig. 1, from the new Spanish TV3 on Eutelsat-1, F1.

Band I ('F2')

In New Radnor, **Simon Hamer** received signals from Australia on their Ch. A0 (46.25MHz) and China on Ch. C1 (49.75MHz), via the 'F2' region of the ionosphere, around 0900 on December 12. **John Woodcock** (Basingstoke) noted unidentified smeary pictures between December 14 and 16 and **Bob Brooks** (Great Sutton) recognised Arabic captions, an announcer and dancers on Ch. E2 (48.25MHz) early on the 1st and 18th and other smeary pictures on days 2, 4, 13, 22, 23 and 30.

"Since then [November 7] we are regularly receiving F2 from SE Asia, and occassionally from Russia, Australia and China," wrote **Lt. Col. Rana Roy** (Meerut, India) on December 23 and to give you some idea of Rana's eye for detail his log entry for November 3 reads; *"0730 - F2 pictures from Malaysia TV3 with very clear sound. Just below E2 received another station with distorted sound in English (probably Australian on channel A0). Pictures were present till 0915. From 1850-2230 on E2 Malaysia was seen with movies, commercials. A '3' at right bottom confirmed it was TV3 of Malaysia."* During November he saw 525-line pictures on Ch. A2 (64.25MHz) on days 7, 8 and 10 and 625-line from China at 1745 on the 10th and again from 1800 to 1955 on December 10, Malaysia on November 3, 4, 6 and the USSR on the 1st.

Band I (Sporadic-E)

On November 15, Rana Roy received a Russian station on Ch. R1 "(probably via Sporadic-E)" between 1800 and 1910. In the UK, **David Glenday** (Arbroath) logged signals from the USSR (Leningrad test-card) from 1055 to 1150 on December 7, Spain (TVE1) at 1830 on the 12th, Norway (Norge Hemnes) at 1159 and Austria (ORF-Teletext), Czechoslovakia (CST football - Sparta Prague) and Yugoslavia (JRT Zagreb) around 1645

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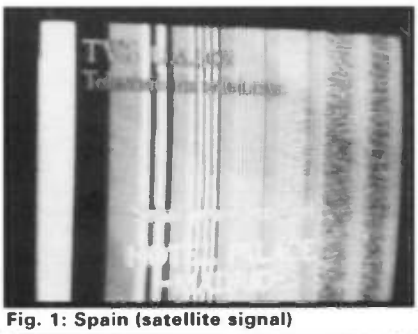

Fig. 1: Spain (satellite signal)

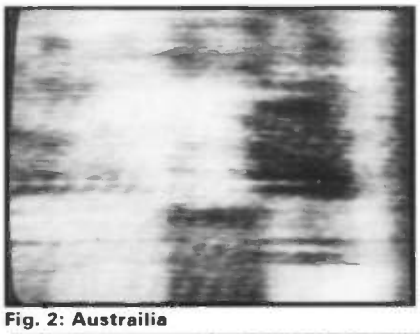

Fig. 2: Austrailia

Fig. 3: Malaysia

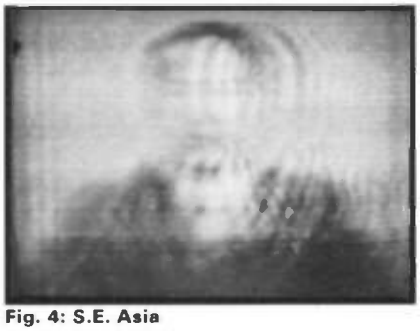

Fig. 4: S.E. Asia

Fig. 5: Germany

Fig. 6: Germany

Fig. 7:Germany (relay)

Fig. 8: Holland

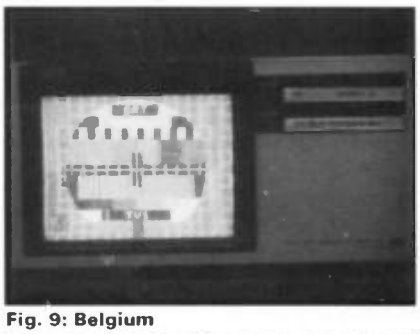

Fig. 9: Belgium

Fig. 10: Fred Steggall's SSTV station

Fig. 11: SSTV received by Fred Steggall

Fig. 12: SSTV received by Fred Steggall

on the 13th, a pop concert on Ch. R1 at 0920 on the 14th, some pictures and a caption (Reklana) on Chs. R1/2 at 1620 on the 21st and unidentified pictures on Ch. R2 at 1655 on the 31st.

Bob Brooks found some winter Sporadic-E when he saw the film *Birds* and the clock opening logo from Sweden (SVT) on Ch. E2 plus a cyrillic caption on Ch. R2 (59.25MHz) between 0838 and 0936 on December 7, programmes from Italy (RAI) on Ch. Ia (53.75MHz) and Spain (TVE) on Chs. E2, E3 (55.25MHz) and E4 (62.25MHz), the Hungarian (MTV) 'MAGYAR' ident on Ch. R1 and the film *Hart to Hart* from Switzerland (+PTT SRG1) on Ch. E2 during the evening of the 12th, a regional test card from Norway (Norge Melhus) on Ch. E2 at 1125, TV1 news from Hungary at 1700 on the 13th, test cards from Denmark (DR Danmark Radio) at 0852, Sweden at 1015 and the USSR at 1118 on the 14th, a film from Italy at 0901 on the 18th, test cards from Poland (TVP) and the USSR around 1050 on the 21st, a programme from Norway *New Roumania*, a test card scribed Televerket and a regional test card (Norge Steigen) with the wording "Televerket Onsker God Jul" from 2300 to 2340 on the 22nd.

That Steigen test card was seen again at 0903 along with a test pattern from the USSR on Ch. R1 at 1625 and a film and caption from Austria (ORF) on Ch. E2a (also 49.75MHz) around 1640 on the 23rd.

I heard weak television sync. pulses on Ch. R1 at 0850 on the 29th and the Mancinis received a test card from Sweden (SVT Kanal 1) on January 3. Simon Hamer logged pictures from Albania (RTSH), Austria, Czechoslovakia, Denmark (DR), Hungary (MTV), Italy, Norway, Poland, Portugal (RTP), Sweden and the USSR (BPEMR) around 1700 on the 12th, Czechoslovakia with adverts for Skoda cars, Italy (RAI-UNO), Roumania (TVR) and Spain (TVE1 and 2) on the 13th and Hungary and the USSR on the 18th and 23rd.

Band I (Meteor Scatter)

Simon also saw 'pings' of pictures via meteor trail reflection from Czechoslovakia, Denmark and Finland (YLE1) on December 15, 17 and 27 respectively and Germany (ARD), Italy, Poland and Scandinavia, all identified by their logos, during the peak of the Quadrantids meteor shower on January 3 and from Denmark again on the 9th.

Picture Archives

During an 'F2' disturbance on October 15, **Garry Smith** (Derby) received pictures from Australia (DDQ-0 Queensland) on Ch. A0, Fig. 2 and Rana Roy sent photographs of typical 'F2' signals which he received on Ch. E2 from Mayaysia (TV3), Fig. 3, at 2230 on March 30 and South East Asia at 1515 on the 31st, Fig. 4.

The high pressure coupled with hot fine weather systems were responsible for many of the 1989 tropospheric openings which meant that u.h.f. pictures were on screen long enough to photograph some interesting results. For example, David Glenday received two captions from West Germany, Figs. 5 and 6 on June 18 and 19 and the RTL logo, Fig. 7 and one of the AVRO announcers, Fig. 8, on the Dutch televison network

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on July 6. In October I received a colour picture from belgium, Fig. 9, on Band III with only a chimney mounted dipole feeding my JVC CX610 receiver.

Tropospheric

Looking back to that big tropo opening during the first week of December, **Andrew Jackson** (Birkenhead) received pictures from Ireland (RTE1 and Network2) in Band III on the 2nd and 3rd, and Denmark, France (Antenne 2), Holland (PTT NED1) and Sweden in the u.h.f. band on the 2nd and France (TDF Antenne 2 and FR3), Germany (NDR3) and Holland (PTT NED1, 2, and 3) in the u.h.f. band on the 3rd.

"The highlights of this massive opening came on the 2nd and 3rd of December when I received the Danish TV2 test card and clock, followed by programmes for the whole day along with Sweden SVT2, both were in very strong colour," said Andrew. "Signals were appearing on all sorts of channels that had been empty before," remarked **Clive Grey** (West Kirby) who, received pictures , generally in good colour, from Ch.4 on Ch. 66, probably from as far away as Hannington in Sussex, saw the HTV West logo on Ch. 61, BBC1 with regional news for Bristol on Ch. 58 and fluctuating signals from Ireland on Chs. 40 and 46. **George Garden** (Edinburgh) found u.h.f. conditions good on December 27 and, from an upstair room near Laurencekirk, he received a strong monochrome picture from the Black Hill transmitter of Ch.4 with an indoor 48-element antenna.

Bob Brooks logged pictures in Band III from Belgium, France and Ireland on the 2nd, France, Holland and Ireland on the 3rd and all again on the 4th. "We have been plagued with Canal+ on Ch. L5 since our last report. It has been coming in from superb to poor," wrote the Mancinis on January 7.

Bob saw a cartoon from Canal+, an Abbott and Costello film on RTE1 and a programme on RTE2 on the 29th. David Glenday saw line paring on some u.h.f. channels on the 27th and realised that an opening was brewing up and during the last three days of 1989, he logged pictures from Czechoslovakia, England (Crystal Palace), France, East and West Germany (DFF-2 and DDR-F2 test cards and ARD1, HR-3, SW3-BADN, SWF-3, and ZDF captions), Holland (PTT NED.2 and 3) and of course much unidentifiable co-channel interference.

At 1310 on January 3, I received a strong picture from France in Band III, using my Plustron TVR5D with its own rod antenna, while parked in East Sussex and John Woodcock received pictures from Canal+ around the same time and on the 4th, Simon Hamer logged signals from Belgium, France and Luxembourg (RTL Plus) in Band III and France, Holland and Ireland in the u.h.f. band.

From his home in Meerut, Rana Roy, received pictures in Band III from Bhatinda (Ch. E12), Jalandhar (E9), Kasauli (E6) and Lahore (E5) during tropospheric openings on October 21 and 22, November 3, 11, 12, 13, 14 and 23 and December 8 and 10.

In order to see French pictures the right way round I have added a YOKO TVC 8M, from Aerial Techniques, Poole, to my portable gear, but more about that next time.

SSTV

The slow scan television equipment made by Drae (top left), Hamvision (lower left), Scarab (above monitor) and the Dragon computer, used by **Fred Steggall** (Woolwich) can be seen in Fig. 10 and the faces of two SSTV operators, Figs. 11 and 12, are among the multitude of pictures in his computer memory stores.

LONG MEDIUM & SHORT

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

Reports predict that the peak of the present 11-year sunspot cycle 22 will occur during the next few weeks, but others would have us believe that the peak will not be reached until 1991.

The highest peak since official records began in July 1749, was set by cycle 19 during 1957/58. The second highest peak occured during cycle 21, but that has already been exceeded by the present cycle which is well on the way to becoming the highest ever recorded!

Long Wave DX

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

All of the broadcasters operating above 245kHz should have complied with the final stage of the l.w. band plan on February 1 and moved slightly lower in frequency. The new frequencies, which are spaced 9kHz apart, are shown in the chart alongside the original ones in brackets. Note that the upper band limit is now 279kHz. The changes in frequency may affect the efficiency of the antenna system at the stations concerned, so no doubt they will welcome detailed reception reports compiled during daylight and after dark. Your reports on the changes will also be of interest to other listeners, so please send them along to me for inclusion in 'LM&S'.

The broadcasts from Atlantic 252 in Clarkestown, S.Ireland (500kW) were mentioned in many of the reports this time. Listening in Brussels, **Steven Verhaegen** rated their signal as 34443 at 1315. Whilst good reception is noted in some areas of the UK, apparently it leaves much to be desired in others. Reporting from Folkestone, **Andy Cadier** says their transmissions suffer severe co-channel interference from Tipaza, Algeria (1500kW) during the day and after dark. In Morden, **Sheila Hughes** has encountered problems with 'splatter' from Atlantic 252 when trying to listen to the broadcasts on adjacent frequencies - further reports on this topic from other listeners would be welcome.

Good reception of the broadcasts from Lahti, FInland (Eng at 1900) and Tipaza, Algeria (Fr, Ar) has been noted in Edinburgh by **Kenneth Buck** after Atlantic 252 has closed down. If his loop is positioned so that both carriers are received there is a 1Hz beat between them, which causes the r.f. level meter on his receiver to swing rhythmically between zero and full scale deflection. It seems that at least one of them does not control the frequency very accurately!

MW Transatlantic DX

Whilst checking the band for the first time from his new location in Grimsby, **Jim Willett** was very surprised to hear so many transatlantic signals as his antenna is far from ideal, being strung between the rafters in the loft! The first signal to reach him stemmed from VOCM in St.John's, Newfoundland on 590, which rated as SIO 332 at 2300. The strongest signals were WNBC in New York 770 at 0030 and CJYQ in St.John's 930 at 0100 - both peaked SIO 333. All of the Canadian signals suffered from deep fading. It lasted for up to 12 minutes on CFGO in Ottawa on 1200, which just goes to show how important it is to check and re-check the band if it seems dead!

Fading on the DX signals was also observed by **Roy Patrick** in Derby. He picked up the broadcasts from CJYQ on 930 around 2330, but the fading on them made reception rather poor. In Bristol, **Tim Shirley** found that the conditions generally favoured Canada and few signals were heard from the USA. During one night however, he heard the broadcasts from Radio Globo in Rio, Brazil on 1220, which reached him quite well at 0200.

Considerable variations in the reception conditions were noted during the month by **Mark Thompson** in Wakefield. There were two really good nights when VOCM was heard at 2107 and several stations were logged for the first time. In addition to his entries in the chart Mark heard five more transatlantic signals, but he was unable to identify them.

Other MW DX

The long hours of darkness have encouraged some listeners to make a detailed check on the sky wave signals which reach them in this band. The most distant transmissions noted in the reports stemmed from Esfahan, Iran on 1467, rated as SIO 233 at 2150 by **Ted Walden-Vincent** in Gt.Yarmouth; Al Arish, Quatar on 954 (1500kW), heard at 2200 by Tim Shirley; also Jeddah, Saudi Arabia 1512 (1000kW), rated as 34433 at 0315 by **Matthew King** in Hayes.

Quite a number of the broadcasts from Algeria, Egypt, Tunisia and Morocco were logged during the evening and after midnight - see chart. The transmissions from Tripoli, Libya 1251 (500kW) are not often reported, but **George Millmore** heard them several times while checking the band during the evenings in Wootton, IOW.

The 5kW transmissions from Torshavn in the Faroe Islands on 531 are seldom mentioned in the reports. Listening in New Radnor, **Simon Hamer** picked up their broadcast at 0715. They welcome detailed reception reports and their QSL may well be an interesting addition to your collection! Send your report to PO Box 328, Torshavn, Faroe Islands.

MW Local Radio DX

Anyone new to this aspect of our hobby will probably find that searching the band during daylight will produce the best results, because at night the sky wave signals from powerful stations in Europe tend to swamp the local radio signals from distant places. However this is not always the case, as **Phil Townsend** discovered while checking the band in London during the early evening. He was listening to Bayerischer Rundfunk via Muchen-Ismaning, W.Germany 801 (450/420kW) at 1730 when, much to his surprise, the co-channel 2kW transmission from BBC Radio Devon via Barnstaple took over a few seconds at a time! He was able to hear Bob White with a weather report from the Plymouth centre which provided a positive ident.

During daylight the ground wave signals from some of the local stations often travel quite remarkable distances and there were some long hauls noted in the latest reports! In Glasgow, **Ike Odoom** logged ILR Saxon Radio via Gt.Barton 1251 (0.76kW) as SIO 222 at 0812; BBC Radio Cambridge via Gunthorpe 1449 (0.15kW) - SIO 333 at 0815; ILR County Sound via Peasmarsh 1476 (0.5kW) - SIO 222 at 0800; also BBC Radio Oxford 1485 (0.5kW) - SIO 222 at 0825. In Leeds, **Chris Nykiel** heard BBC Radio Bedfordshire via Luton 630 (0.2kW); BBC Radio Clwyd via Wrexham 657 (2kW); also BBC Essex via Chelmsford 765 (0.5kW). The extensive log from George Millmore included BBC Radio Cornwall via Redruth 630 (2kW); BBC Radio Devon via Plymouth 855 1kW); also Pennine Radio, Bradford 1278 (0.43kW). Sheila Hughes rated the ground wave signal from BBC Radio Clwyd 657 as a remarkable 44333 at 0930!

Short Wave DX

The generally excellent propagation conditions prevailing in the h.f. bands have been disturbed by the effects of solar flares during some days and the reception of many broadcasts has been rendered poor or even impossible during those periods.

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Unfortunately these unpredictable events are likely to continue during the months ahead.

The **25MHz 11m** broadcasts to Europe from Radio RSA in Johannesburg, S.Africa on 25.790 (Du 0830-1000 Sun only; Du 0900-1000 Sat only; Ger 1000-1100 Sat/Sun; Eng, Fr 1100-1300; Eng 1400-1600) have reached their target well during most days. The SINPO 43343 rating noted at 1420 by **Cliff Stapleton** in Torquay is fairly typical just now. The broadcasts in Arabic from the Voice of the UAE in Abu Dhabi may now be heard on 25.895. Using a home built single transistor receiver in Bungay, **Ron Pearce** rated them as SIO 444 at 1123.

Several broadcasters use this band to reach listeners in target areas outside Europe. Listening in Quebec, Canada **Alan Roberts** rated the broadcasts from Radio Norway Int, Oslo to N.America on 25.730 (1400-1500) as 45555 at best, but they only peaked 15311 during some days. Reception of their transmission to C.America on 25.740 (1400-1500) varied between 35555 and 25433. His log of eleven broadcasters included the BBC via Daventry, UK 25.750 (Eng to Africa 1100-1615), which rated 35444 at best. Alan says that the late sunrise stops him from hearing Radio Nederlands broadcast to Africa via Flevo on 25.970 (Du 1030-1125, Suns only). Although their broadcast is audible here, it was not mentioned in the reports.

Long distance paths have been open in the **21MHz (13m)** band. During the early morning Radio Australia's broadcasts to Indonesia, Malaysia and Singapore via Carnarvon 21.525 (Eng 0100-0900) have often reached the UK. Listening at 0700, Simon Hamer rated them as SIO 444.

Many of the broadcasts in this band are intended for listeners in Europe. Those noted stemmed from Radio Japan via Moyabi, Gabon 21.690 (Sw, It, Fr, Eng, Jap 0530-0830). rated as 54344 at 0725 by **Chris Shorten** in Norwich; Radio Free Europe via Gloria, Portugal 21.665 (Pol 0700-1700) - SIO 444 at 1105 by **John Coulter** in Winchester; Radio RSA Johannesburg, S.Africa 21.590 (Eng 1400-1600) - SIO 454 at 1402 by Kenneth Buck; Radio Kuwait, Sulaibiyah 21.675 (Ar ?-1800) - 55555 at 1417 by **John Nash** in Brighton; WCSN Scotts Corner, Maine 21.780 (Eng 1400-1600) - SIO 444 at 1500 by Ron Pearce; RCI via Sackville, E.Canada 21.545 (Russ, Uk, Fr, Eng, Pol 1430-1630) - 45544 at 1553 by **David Edwardson** in Wallsend; Radio Japan via Moyabi, Gabon 21.700 (Eng, Jap 1500-1700), heard by **Dennis Maxted** in Woodford Green; UAE Radio Dubai 21.605 (Ar, Eng 0615-1730), heard at 1600 by **Julian Wood** in Birnie Elgin; WYFR via Okeechobee, Florida 21.615 (Eng, Ger, It 1600-1845) - 43434 at 1630 by Cliff Stapleton; Radio RSA Johannesburg, S.Africa 21.535 (Du, Eng 1800-2000) - 33433 at 1852 by **Leo Barr** in Sunderland; Radio HCJB Quito, Ecuador 21.470 (Cz, Ger, Eng, Sw, Norw, Da, Fr 1800-2130) - 43443 at 1930 by **Carl Yates** in St.Helens.

Some of the broadcasts to other areas were noted in the logs, namely Radio Austria Int, Vienna 21.490 (Eng, Ger, Fr to Australia, New Zealand 0800-1100) - 34444 at 0830 by **David Wratten** in Cambridge; Vatican Radio, Rome 21.485 (Fr, Eng, Port to Africa 1000-1200) - 44444 at 1115 by Sheila Hughes; BBC via Ascension Island 21.660 (Eng to S.Africa 0900-1745) - 44344 at 1300 by **Rhoderick Illman** in Thumrait, Oman; Radio Norway Int, Oslo 21.705 (Eng to W.Africa 1700-1800) - SIO 433 at 1715 by **Darren Beasley** in Bridgwater; Radio Nederlands via Bonaire, Ned.Antilles 21.630 (Ar to N.Africa 1730-1825) - SIO 444 at 1810 by **Philip Rambaut** in Macclesfield; WCSN Scotts Corner, Maine 21.640 (Eng to Africa 1600-2000) - 44334 at 1927 by **Ted Agombar** in Norwich.

Darren Beasley at his listening post in Bridgewater.

Good long distance reception has also been noted in the **17MHz (16m)** band. The broadcasts from Radio New Zealand, Wellington 17.705 (Eng to Pacific areas 2245-0045; 0230-0630; also 0045-0230 Sat/Sun only) have been attracting the attention of many UK DXers around 0530. Mark Thompson picked up their transmissions for the first time and rated them as SIO 222 at 0540. Radio Australia's broadcasts to S.Asia via Carnarvon 17.715 (Eng 0100-0915) have also been reaching our shores - David Edwardson noted them as 23432 at 0130.

Quite a number of the broadcasts to areas outside Europe were logged: Radio Japan via Yamata 17.810 (Eng, Jap to S.E.Asia 0100-1000), noted as 34433 at 0507 by **Kenneth Reece** in Prenton; AIR via Aligarh, India 17.805 (Hi, Gu, Swa to Africa 0315-0530) - 44433 at 0525 by Rhoderick Illman (Oman); KHBI Saipan, N.Mariana Islands 17.780 (Eng to Japan, China 0200-0800) - SIO 322 at 0715 by **Alan Smith** in Northampton; Radio Moscow, USSR 17.655 (Eng to Australia, New Zealand 0000-0900), heard at 0814 by **Scott Caldwell** in Warrington; SRI via Schwarzenburg, Switzerland 17.830 (Eng, Fr, Ger, It to S.E.Asia 1045-1300) - SIO 544 at 1045 by Darren Beasley; RBI via Nauen, GDR 17.880 (Eng, Hi to S.E.Asia 1345-1630) - 44444 at 1345 by John Nash; Radio Pakistan, Islamabad 17.565 (Eng to Middle East 1600-1630) - 35433 at 1605 by **Eddie McKeown** in Co.Down; RTM Tanger, Morocco 17.595 (Fr, Eng to Middle East 1400-1700) - 44444 at 1612 by **Darran Taplin** in Tonbridge; RFI via Issoudun, France 17.620 (Eng to Africa 1600-1700) - 32332 at 1652 by **Dave Taskis** in Romford; also on 17.795 (Fr, Eng to Middle East, Africa 1600-2100) - 44334 at 1645 by **John Sadler** in Bishops Stortford; KHBI Saipan, N.Mariana Islands 17.770 (Eng to New Zealand 1800-2000) - SIO 322 at 1825 by Philip Rambaut; VOA via Greenville, USA 17.785 (Eng to W.Africa 1600-2200) - SIO 343 at 1845 by Kenneth Buck; WYFR via Okeechobee, Florida 17.610 (Eng, Ar, Fr, Port to Africa 1600-2245) - 43433 at 1930 by Cliff Stapleton; Radio Nederlands via Bonaire, Ned.Antilles 17.605 (Eng, Fr, Du to W.Africa 1830-2125) - SIO 444 at 1949 by John Coulter; RCI via Sackville, Canada 17.820 (Eng, Fr to Africa 1800-2200) - 34332 at 1920 by Carl Yates.

Surprisingly few of the broadcasts to Europe were mentioned: Radio Bucharest, Romania 17.850 (Eng 1300-1356), rated as 53343 at 1300 by Chris Shorten; Radio Moscow, USSR 17.840 (Eng 0700-1800) - 55555 at 1403 by **Jim Cash** in Swanwick; RCI via Sackville, E.Canada 17.820 (Russ, Uk, Pol, Fr, Eng, Ger 1430-1800) - 55444 at 1723 by Andy Cadier; Radio Suriname Int. via RNB Brazil 17.755 (Du, Eng 1700-1750) - 43333 at 1734 by David Wratten; Radio HCJB Quito, Ecuador 17.790 (Cz, Ger, Fr, SW, Norw, Da, Eng, Sp 1800-2230) - SIO 333 at 2130 by **Alf Gray** in Birmingham.

Good long distance reception has also been noted in the **15MHz (19m)** band. During some mornings the broadcasts from Radio New Zealand, Wellington on 15.485 (Eng to Australia, Papua New Guinea 0230-0630) have been audible in the UK around 0530. At times their signal may peak SIO 333, as noted by Mark Thompson at 0540. From time to time Radio Australia's broadcasts to Asia via Carnarvon 15.415 (Eng 0900-1100) have also been audible here - Chris Shorten logged them as 23233 at 1000. Later, their broadcasts to Asia via Darwin 15.245 (Eng 1530-1830) may be heard. Listening in Eyemouth, **David Middlemiss** rated them as SIO 323 at 1600.

Many broadcasters choose this band to reach listeners in Europe. They include UAE Radio Dubai 15.435 (Ar, Eng 0615-1645), rated as 44444 at 1612 by David Edwardson; RNB Brasilia, Brazil 15.265 (Eng, Ger 1800-1950) - SIO 423 at 1851 by Philip Rambaut; WWCR Nashville, USA 15.690 (Eng 1700-0200) - 44444 at 2000 by Eddie McKeown; WRNO New Orleans, USA 15.420 (Eng 1600-0000) - 54354 at 2021 by **Robin Clark** in Plymouth; Radio HCJB Quito, Ecuador 15.270 (Cz, Ger, Sw, Norw, Da, Fr, Eng 1800-2200) - SIO 444 at 2130 by Alf Gray; RAE Buenos Aires, Argentina 15.345 (Ar, Ger, It, Sp, Eng 1700-2300) - 23232 at 2131 by Jim Cash; WRNO New Orleans, USA 15.420 (Eng 1600-0000) - 43434 at 2230 by Cliff Stapleton.

Throughout the day there are many broadcasts in a variety of languages to other areas. Those noted stemmed from Pyongyang, N.Korea 15.180 (Eng, Kor to S.E.Asia 0400-0700) - 22322 at 0400 by Kenneth Reece; RFO Papeete, Tahiti 15.170 (Fr, Tah to Oceana 1600-0930) - SIO 222 at 0505 by Simon Hamer; RFI via Issoudun, France 15.155 (Fr, Eng to Africa, Middle East 1000-1400) - 43443 at 1230 by Carl Yates; Radio Veritas, Manila, Philippines 15.445 (Tel, Si, Ta, Beng, Eng, Hi, Ur to Asia 1300-1630) - 34433 at 1500 by John Nash; Radio DW via Wertachtal, W.Germany 15.595 (Eng to S.Asia 1600-1650) - 54444 at 1601 by David Wratten; VOA via Greenville, E.USA 15.580 (Eng to Africa 1600-2200) - 33333 at 1623 by Rhoderick Illman; Radio Peace and Progress, USSR 15.545 (Eng to Africa 1630-1700) - 44444 at 1630 by Sheila Hughes; TWR Swaziland 15.210 (Eng to E.Africa 1600-1700) - SIO 544 at 1646 by Darren Beasley; BBC via Kranji, SIngapore 15.310 (Eng to S.Asia 1615-1830) - SIO 333 at 1755 by Alan Smith; RBI via Nauen, GDR 15.145 (Swa, Ar, Eng to E.Africa 1600-1915) - 44344 at 1910 by Ted Agombar; Radio RSA Johannesburg, S.Africa 15.125 (Eng to Africa, Middle East 1900-2000) - SIO 444 at 1930 by Kenneth Buck; Africa No.1, Gabon 15.475 (Fr, Eng to W.Africa 1600-2100), noted as 'good' at 2030 by **Robin Harvey** in Bourne; BBC via Ascension Island 15.400 (Eng to Africa 1615-2300) - 25544 at 2049 by Andy Cadier; KHBI Saipan, N.Mariana Islands 15.405 (Eng to China, Japan 2200-0000) - 23423 at 2300 by Leo Barr; WCSN Scotts Corner, Maine 15.300 (Eng to Africa 2200-0000) - 33423 at 2311 by Dave Taskis.

The **13MHz (22m)** band also carries a number of broadcasts to Europe during the day. They stem from Radio Jordan, Amman 13.655 (Eng 0500-1315), rated as 34443 at 0655 by David Edwardson; Radio Korea, Seoul 13.670 (Eng 0800-0930) - SIO 211 at 0926 by Philip Rambaut; Radio Austria, Vienna 13.730 (Ger, Fr, Eng, Sp 0400-1700) - 43334 at 1127 by Ted Agombar; Voice of the UAE in Abu Dhabi 13.605 (Ar 1600-2130) - SIO 454 at 1620 by Kenneth Buck; WHRI Noblesville, USA 13.760 (Eng 1700-0000) - 44334 at 1715 by Ike Odoom; RCI via Sackville, Canada 13.650 (Russ, Uk, Fr, Pol, Eng, Ger 1430-1800) - 45544 at 1729 by Andy Cadier; ISBS Reykjavik, Iceland 13.885 (Ice 1855-1930) - 45444 at 1855 by Roy Patrick; Radio Kuwait, Sulaibiyah 13.610 (Eng 1800-2100) - 44444 at 2036 by Darran Taplin; Voice of Israel, Jerusalem 13.750 (Eng ?-?) - SIO 533 at 2020 by Darren Beasley; WCSN Scotts Corner, Maine 13.770 Eng 2000-2200) - SIO 444 at 2045 by Ron Pearce.

Broadcasts to other areas include WSHB Cypress Creek, USA 13.760

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LongWave DX Chart

Freq kHz	Station	Location	Power (W)	DXer
153	Bechar	Algeria	1000	F*,K*
153	OLF Donebach	Germany (W)	500	A,E,G*,H*,I,J,K,M,P
153	Brasov	Romania	1200	J
162	Allouis	France	2000	A,D,G*,H*,J,J,L*,M,N*,P
162	Agri	Turkey	1000	M*
171	Medi 1-Nador	Morocco	2000	J*,M*
171	Kaliningrad	USSR	1000	H*,I*,J,K,M,P
171	Moscow	USSR	500	A
177	Oranienburg	Germany (E)	750	A,E,G*,H*,I*,J,M*,P
183	Saarlouis	Germany (W)	2000	A,D,E*,G*,H*,I,J,M*,N*,P
189	Motala	Sweden	300	A,D,G*,H*,J,M
189	Tbilisi	USSR	500	M*
198	BBC Droitwich	UK	400	C*,E,G*,H*,J,L*,M,N*
198	BBC Westerglen	UK	50	A,I*
207	OLF Munich	Germany (W)	500	A,E,G*,H*,I,J,M,P
207	Azilal	Morocco	800	J*
207	Kiev	Ukraine	500	I*
216	Roumoules	Monaco	1400	A,D,E*,G*,H*,I,J,M,N*
216	Oslo	Norway	200	A,I*,M
225	Konstantinow	Poland	2000	A*,D,E*,G*,H*,I*,J,M,N
234	Junglinster	Luxembourg	2000	A*,D,G*,H*,J,L,M,N*,P
234	Kishinev	USSR	1000	J
234	Kuybyshev	USSR	1200	I*
234	Leningrad	USSR	1000	M
243(245)	Kalundborg	Denmark	300	A,C*,D,E,G*,I,J,M,N*,P
252(254)	Tipaza	Algeria	1500	A*,D,H*,I*,J*,M*,N*,P*
252(254)	Lahti	Finland	200	A*
252(254)	Atlantic 252	S.Ireland	500	A,B,E,G*,H,I,J,L*,M,N*,O,P
261(263)	Burg (R.Volga)	Germany (E)	200	D,I,J*,M,N*,P
261(263)	Moscow	USSR	2000	A*,K,M*
270(272)	Topolna	Czechoslovakia	1500	A*,C*,D,E*,H*,I*,J,M,N*,P
279(281)	Minsk	USSR	500	A*,D,G*,I,J,M

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

(Eng to Pacific 0800-1000), noted as SIO 544 at 0830 by Alan Smith; KSDA Agat, Guam 13.720 (Eng, In to S.E.Asia 1000-1300) - 24232 at 1000 by John Nash; SRI via Sottens, Switzerland 13.685 (It, Ger, Fr, Eng to Australia, Pacific area 0745-1030) - 45444 at 1010 by David Wratten; Radio Prague, Czechoslovakia 13.715 (Cz, Ar, Fr, Eng, Ger to Asia, Middle East 1400-2125) - 54444 at 1530 by Chris Shorten; Radio Pakistan, Islamabad 13.665 (Eng to Middle East 1600-1630) - 34433 at 1600 by Eddie McKeown; KSDA Agat, Guam 13.720 (Bur, Ta, Mal, Hi, Tel to Asia 1400-1700) - 44333 at 1645 by

DXers:
A: Kenneth Buck, Edinburgh.
B: Andy Cadier, Folkestone.
C: Jim Cash, Derby.
D: Simon Holland, Douglas, IOM.
E: Sheila Hughes, Morden.
F: Matthew King, Hayes.
G: Eddie McKeown, Co. Down.
H: George Millmore, Wootton, IOW.
I: Ike Odoom, Aberdeen.
J: Philip Rambaut, Macclesfield.
K: Tim Shirley, Bristol.
L: Chris Shorten, Norwich.
M: Mark Thompson, Wakefield.
N: Phil Townsend, London.
O: Steven Verhaegen, Brussels.

Local Radio DX Chart

Freq kHz	Station	ILR BBC	Power (kW)	DXer
585	R. Solway	B	2.00	B,C,G,I,N
603	Invicta Snd(Coast)	I	0.10	B,D,E,K,L*,O
603	R. Gloucester	B	0.10	E,O
630	R. Bedfordshire	B	0.20	B,D,E,F,K,O
630	R. Cornwall	B	2.00	E
657	R. Clwyd	B	2.00	D,F,N,O
666	DevonAir R	I	0.34	E,O
666	R. York	B	0.80	F,N,O
729	BBC Essex	B	0.20	B,D,J*,K,O
738	Hereford/Worcester	B	0.037	F,O
756	R. Cumbria	B	1.00	F,I,N
756	R. Shropshire	B	0.63	F,N,O
765	BBC Essex	B	0.50	D,E,F,I,J,K,L,O
774	R. Kent	B	0.70	B,D,E,J,K,L,O
774	R. Leeds	B	0.50	F,I,N
774	Severn Sound	I	0.14	O
792	Chiltern R	I	0.27	D,F,K,O
792	R. Foyle	B	1.00	G
801	R.Devon	B	2.00	E,F*,K*,O
819	Hereford/Worcester	B	0.037	O
828	2CR	I	0.27	B,E
828	R. WM	B	0.20	N,O
828	R. Aire	I	0.12	F
828	Chiltern R	I	0.20	O,K,O
837	R. Cumbria	B	1.50	N
837	R. Furness	B	1.00	F
837	R. Leicester	B	0.45	O,K,O
855	R. Devon	B	1.00	E
855	R. Lancashire	B	1.50	F,N
855	R. Norfolk	B	1.50	O,F,K,L,O
873	R. Norfolk	B	0.30	B,D,F,K,O
936	GWR (Brunel R.)	I	0.18	E,O
945	R.Trent (GEM-AM)	I	0.20	F,N,O
954	DevonAir RI	0.32	B,E	
954	R. Wyvern	I	0.16	O
990	Beacon R. (WABC)	I	0.09	O
990	R. Devon	B	1.00	B,D,E
990	Hallam R.(C.Gold)	I	0.25	F,O
999	Red Rose R	I	0.80	F,N
999	R. Solent	B	1.00	B,D,E,O
999	R.Trent (GEM-AM)	I	0.25	O
1026	R. Cambridgeshire	B	0.50	B,D,F,K,O
1026	Downtown R	I	1.70	G*,N
1026	R. Jersey	B	1.00	B,D,E
1035	R. Kent	B	0.50	B,D,K,O
1035	R. Sheffield	B	1.00	F
1035	West Sound	I	0.32	G
1107	Moray Firth R	I	1.50	G
1107	R. Northampton	B	0.50	B,D,E,O
1116	R. Derby	B	1.20	F,N,O
1116	R. Guernsey	B	0.50	B,D,E
1152	R. Broadland	I	0.83	F*,M*,O
1152	R. Clyde	I	3.60	F*,G
1152	LBC (L.Talkback R)	I	23.50	B,D*,E,K,O
1152	Piccadilly RI	1.50	F,N	
1161	R. Bedfordshire	B	0.10	I,O
1161	GWR (Brunel R.)	I	0.16	E
1161	R. Sussex	B	1.00	B,E
1161	R. Tay	I	1.40	G*
1161	Viking R.(Gold)	I	0.35	F,O
1170	R. Orwell	I	0.28	B,O
1170	Signal R	I	0.20	N
1170	TFM Radio (GNR)	I	0.32	F
1170	Ocean Sound	I	0.12	O,E
1242	Invicta Sound(Coast)	I	0.32	B,D,O
1251	Saxon R	I	0.76	B,G,O
1260	GWR (Brunel R.)	I	1.60	E,O
1260	Marcher Sound	I	0.64	N,O
1260	Leicester (GEM-AM)	I	0.29	O,K
1260	R. York	B	0.50	F
1278	Pennine R.(C.Gold)	I	0.43	C,E,F
1305	R. Hallam (C.Gold)	I	0.15	F,O
1305	Red Dragon R	I	0.20	E,O
1323	Southern Sound	I	0.50	B,D,E,O
1332	Hereward R	I	0.60	B,D,F,O
1332	Wiltshire Sound	B	0.30	D,E
1359	Essex R.(Breeze)	I	0.28	B,D,K,O
1359	Mercia Snd(Xtra-AM)	I	0.27	F*,O
1359	R. Solent	B	0.85	E
1368	R. Lincolnshire	B	2.00	F,O
1368	R. Sussex	B	0.50	B,D,E
1368	Wiltshire Sound	B	0.10	O
1431	Essex R.(Breeze)	I	0.35	O,K,O
1431	Radio 210	I	0.14	E
1449	R. Cambridgeshire	B	0.15	B,G,O
1458	R. Devon	B	2.00	E
1458	GLR	B	50.00	B,D*,E,F*,K,M*,O
1458	GMR	B	5.00	F*,G,N
1458	R. Newcastle	B	2.00	F,G*
1458	Radio WM	B	5.00	O
1476	County Sound Gold	I	0.50	B,D,E,G,O
1485	R. Humberside	B	1.00	F,O
1485	R. Merseyside	B	1.20	G,N
1485	R. Oxford	B	0.50	E,G,O
1485	R. Sussex	B	1.00	D,E
1503	R. Stoke-on-Trent	B	1.00	A*,F,G,O
1521	R. Mercury	I	0.64	B,D*,E,K,O
1521	R. Nottingham	B	0.50	O
1530	R. Essex	B	0.15	B,D,K,O
1530	Pennine R.(C.Gold)	I	0.74	F,H,N
1530	R. Wyvern	I	0.52	H
1548	Capital R. (Gold)	I	97.50	B,D,E,F*,K,M*,O
1548	R. City	I	4.40	N
1548	R. Cleveland	B	1.00	F
1548	R. Forth	I	2.20	F*,G*,M
1548	R. Hallam	I	0.74	H
1557	Chiltern R	I	0.76	F*,H,M*,O
1557	Ocean Sound	I	0.50	B,E,F*
1584	R. Nottingham	B	1.00	A*,F,O
1584	R. Tay	I	0.21	G,M*,N
1602	R. Kent	B	0.25	B,D,O

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

Rhoderick Illman (Oman); WYFR via Okeechobee, Florida 13.695 (Eng to USA 1200-2245) - 43433 at 2240 by Cliff Stapleton.

The broadcasters using the **11MHz (25m)** band to reach listeners in Europe include Radio Australia via Shepparton 11.910 (Eng 0400-0630), rated as 23333 at 0445 by Chris Shorten; Radio Portugal via Gloria 11.800 (Port 1100-1255) - SIO 444 at 1239 by John Coulter; Radio Bucharest, Romania 11.940 (Eng 1300-1356) - 43344 at 1352 by Dave Taskis; Radio Pakistan, Islamabad 11.570 (Ur, Eng, Fr 1645-2015) - 34433 at 1729 by Andy Cadier; AIR via Aligarh, India 11.620 (Eng, Hi 1845-2230) - 44444 at 1845 by David Wratten; Radio Afghanistan via USSR 11.815 (Eng 1900-1930) - 22222 at 1915 by Robin Clark; Radio Cairo, Abis 12.050 (Ar 1530-2350) - SIO 555 at 2020 by Kenneth Buck; Thessaloniki, Greece 11.595 (Gr 0900-2155) - 44434 at 2031 by Leo Barr; RHC Habana, Cuba 11.800 (Esp, Eng, Fr 1840-2100) - 32322 at 2033 by Jim Cash; Voice of Israel, Jerusalem 11.605 (Fr, Eng, Yi 2200-2325) - 54444 at 2230 by Carl Yates; RCI via Sackville, E.Canada 11.945 (Hung, Cz, Russ, Uk, Fr, Pol, Eng 1800-2300), noted as good at 2230 by Robin Harvey.

Some of the many broadcasts to other areas were noted in the reports. They originated from SRI via Schwarzenburg, Switzerland 12.035 (It, Eng, Ger, Fr to USA 0315-0530) - 44433 at 0409 by Rhoderick Illman; Radio Japan via Yamata 11.870 (Jap, Eng to USA 0400-0700) - 23322 at 0558 by Kenneth Reece; Radio DW via Julich, W.Germany 11.715 (Ger to Australia, Pacific 0600-1000) - 45554 at 0845 by David Edwardson; FEBA Radio, Mahe, Seychelles 11.865 (Hi, Eng to S.Asia 1400-1555) - 34233 at 1520 by John Nash; Radio Bucharest, Romania 11.940 (Eng to Africa 1730-1756) - SIO 433 at 1748 by Philip Rambaut; BBC via Tsang Tsui, Hong Kong 11.715 (Eng to E.Asia 2000-2130) - SIO 323 at 2026 by Alan Smith; RCI via Sackville, Canada 11.880 (Eng Fr to Africa 2100-2200) - 44444 at 2145 by Sheila Hughes; KUSW Salt Lake City, USA 11.695 (Eng to Canada 0100-0300) - SIO 433 at 0100 by Ron Pearce; Radio Beijing, China 11.715 (Eng to USA 0300-?) - 44433 at 0305 by Darran Taplin.

Good reception over long distances has been noted in the **9MHz (31m)** band. During some mornings Radio New Zealand's broadcasts to Australia and Papua New Guinea on 9.850 (Eng 0800-1105) have reached the UK! Kenneth Reece logged them as 33433 at 0850. Some of Radio Australia's broadcasts via

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A: Leo Barr, Sunderland.
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C: Scott Caldwell, Warrington.
D: Sheila Hughes, Morden.
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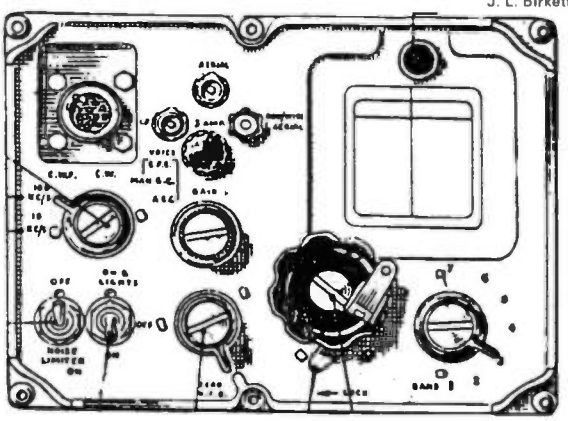

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SEEN & HEARD

Medium Wave DX Chart

Freq kHz	Station	Country	Power (kW)	DXer
531	Ain Beida	Algeria	600	K*,S*
531	Torshavn	Faroe Is	5	D*
531	Leipzig	Germany (E)	100	O,S
540	BRT-2 Wavre	Belgium	150/50	K*,L,Q,S
540	Sidi Bennour	Morocco	600	K*
549	Les Trembles	Algeria	600	K*,T*
549	DLF Bayreuth	Germany (W)	200	J,L,Q
558	Espoo	Finland	100	A*,D*,I*
558	Valencia	Spain	20	K*
567	West Berlin	Germany (W)	100	K*,Q
567	RTE-1 Tullamore	S.Ireland	500	B,F,J,K*,L,Q,R*,S
576	Stuttgart	Germany (W)	300	J,K*,Q
585	RNE-1 Madrid	Spain	200	K*,L*,M*,S*
585	BBC-R3 Dumfries	UK	2	L
594	Pleven	Bulgaria	250	K*
594	HRF Frankfurt	Germany (W)	400	J,Q
594	Oujda-1	Morocco	100	I*
603	Sevilla	Spain	20	K*
603	BBC-R4 Newcastle	UK	2	F,K*,L,M*
612	RTE-2 Athlone	S.Ireland	100	G*,K*,L,M*,P*,Q,R*
612	Lerida	Spain	10	K*
621	RTBF-1 Wavre	Belgium	300	J,K*,Q
621	Barcelona	Spain	10	K*
630	Vigra	Norway	100	K*,M*
630	Tunis-Djedeida	Tunisia	600	K*
639	Liblice	Czechoslovakia	1500	D*,K*
639	La Coruna	Spain	100	K*,M*
648	Palma de Mallorca	Spain	0	K*
648	BBC Orfordness	UK	500	G*,J,K*,L,M*,Q,S
648	Simferopol	USSR	150	O*
657	Burg	Germany (E)	250	K*,M*
657	RCE-2 Madrid	Spain	20	K*
657	BBC-Wales Wrexham	UK	2	M
666	Bodenseesender	Germany (W)	300/180	K*
666	Barcelona	Spain	20	K*,M*
675	Hilversum-3 Lopic	Holland	120	K*,L,M*,Q,S
684	RNE-1 Sevilla	Spain	250	K*,L*,M*
702	Presov	Czechoslovakia	400	K*
702	Aachen/Flensburg	Germany (W)	5	O*
702	Monte Carlo	Monaco	300	Q*
702	BBC via Masirah Is	Oman	500	H
702	Zamora	Spain	5	M*
711	Rennes 1	France	300	L,M*,Q*
720	BBC-R4 Lisnagarvey	N.Ireland	10	L*,M
720	BBC-R4 Lots Rd London	UK	0.5	K*,Q
729	RTE-1 Cork	S.Ireland	10	A*,M
729	Oviedo	Spain	50	K*,L*
738	Paris	France	4	K*,L*
738	Poznan	Poland	300	G*
738	RNE-1 Barcelona	Spain	250	Q*
747	Hilversum-2 Flevo	Holland	400	G*,K*,L,M*,Q
747	R.Cadena, Cadiz	Spain	10	K*
756	Brunswick	Germany (W)	800/200	J,K*,L*,M*,Q*
765	Sottens	Switzerland	500	F,J,K*,M*
774	RNE-1 San Sebastian	Spain	60	K*,M*
783	Burg	Germany (E)	1000	G*,L*,M*,Q*
783	Kiev	USSR	100	K*
792	Sevilla	Spain	20	K*
801	BRF via Munich	Germany (W)	420	K*,L*,M,Q*
810	SER Madrid	Spain	20	K*
810	BBC-Scot.Westerglen	UK	100	K*,L,M,Q,R
819	Batra	Egypt	450	I*
819	Rabat	Morocco	25	K*
837	Nancy	France	200	M*
837	R.Popular, Sevilla	Spain	10	K*
846	Rome	Italy	540	K*,S*
855	RAIS Berlin	Germany (W)	100	K*
855	Murcia	Spain	125	K*,L*,M
864	Santah	Egypt	500	I*
864	Paris	France	300	K*,M
873	AFN Frankfurt	Germany (W)	150	K*,L,M*,P*
882	BBC-Wales Washford	UK	70	K*,L,M,Q
891	Algiers	Algeria	600/300	K*,T*
891	Hulsberg	Holland	20	M
900	Milan	Italy	600	K*,M,S*
909	BBC-R2 Moorside Edge	UK	200	K*
909	BBC-R2 Westerglen	UK	50	M
918	R.Intercont. Madrid	Spain	20	K*
927	Timimoun	Algeria	5	I*
927	BRT-1 Wolvertem	Belgium	300	G,K*,L,M,Q
936	Radio Bremen	Germany (W)	100	K*,L,M
936	Agadir	Morocco	600	I*
936	Lvov	USSR	500	I*
945	Toulouse	France	300	K*,M
954	Al Arish	Qatar	1500	O*
963	Pori	Finland	600	D*,K*,M*,N*
972	NDR/WDR Hamburg	Germany (W)	300	K*,L*,M*,Q,S*
981	Alger	Algeria	600/300	K*,L*
990	RIAS Berlin	Germany (W)	300	L*
990	SER R.Bilbao	Spain	10	M,S*
999	R.Popular, Madrid	Spain	20	S*
1008	Hilversum-5 Flevo	Holland	400	G*,L,M*,Q
1017	Wolfsheim	Germany (W)	600	K*,M*,Q
1035	Prog.3 Lisbon	Portugal	120	K*
1044	ODR-1 Burg	Germany (E)	250	G*,K*,L*,M*
1053	BBC-R1 Droitwich	Uk	150	K*
1062	Kalundborg	Denmark	250	G*,K*,M*
1071	Prague	Czechoslovakia	60	K*
1071	Brest	France	20	K*,M
1071	Lille	France	40	L
1080	Katowice	Poland	1500	K*
1089	Adrar	Algeria	5	I*
1089	BBC-R1 Moreside Edge	UK	150	K*
1098	Ouargla	Algeria	5	I*
1098	Bratislava	Czechoslovakia	750	K*,M
1107	AFN via Munich	Germany (W)	40	K*,L*
1125	La Louviere	Belgium	20	K*,L*
1125	BBC Llandrindod Wells	UK	1	L*
1125	Zagreb	Yugoslavia	200	K*,L*
1134	Valencia	Spain	10	K*
1143	Century R. Dublin	Ireland (S)	?	L,T
1143	Kaliningrad	USSR	150	G*,K*,L*
1179	Solvesborg	Sweden	600	G*,K*,L*,M,R*
1197	VOA via Munich	Germany (W)	300	L*,M,S
1197	BBC-R3 Bournemouth	UK	0.5	K*
1206	Bordeaux	France	100	K*
1206	Wroclaw	Poland	200	G*
1215	BBC-R3 Moorside Edge	UK	100	K*
1224	COPE Madrid	Spain	20	K*
1233	Prague	Czechoslovakia	400	K*,L*,M
1251	Marcali	Hungary	500	K*,L*
1251	Tripoli	Libya	500	K*
1251	Huisberg	Netherlands	10	M
1260	SER San Sebastian	Spain	10	K*
1269	Neuminster	Germany (W)	600	K*,L*,M*,Q
1278	Strasbourg	France	300	K*,L*
1278	RTE-2 Dublin/Cork	S.Ireland	10	A*,G*,M,Q,R*,S*
1287	Litomysl/Liblice	Czechoslovakia	300/200	G*,K*,L*,S*
1296	BBC Orfordness	UK	500	K*,L*
1305	Marche	Belgium	10/5	K*
1314	Kvitsoy	Norway	1200	K*,L,M,Q,S*
1323	BBC Zyyi	Cyprus	50	H
1323	R.Moscow via Leipzig	Germany (E)	150	K*,L,M,Q
1332	Rome	Italy	300	K*,L*,S*
1341	BBC-Ulst.Lisnagarvey	N.Ireland	100	K*,L,M,P*,Q,R*
1350	Nancy/Nice	France	100	F,K*,L*,M,P*
1359	RBI Berlin	Germany (E)	250/100	G*,L,P*,S*
1368	Manx Radio, Foxdale	IOM	20	A*,F,L*,M
1368	Venice	Italy	20	S*
1386	Kaunas	USSR	1000	E*,G*,K*,P*
1395	R.Tirana via Lushnje	Albania	1000	F*,K*
1404	Brest	France	20	T*
1413	BBC via Masirah Is	Oman	1500	H*
1422	Heusweiler	Germany (W)	600	K*
1422	Saarbrucken	Germany (W)	1200/600	L*
1422	Riyadh	Saudi Arabia	20	H
1440	Marnach	Luxembourg	1200	K*,L,M*
1458	R.Tirana, Lushnje	Albania	500	L*
1467	Esfahan	Iran	200	S*
1467	TWR Monte Carlo	Monaco	1000/400	B,G*,K*,L*
1476	Wien-Bisamberg	Austria	600	K*
1494	Clermont-Ferrand	France	20	L*
1494	Leningrad	USSR	1000	C*,K*
1503	Stargard	Poland	300	F*,G*,K*,L*
1512	BRT Wolvertem	Belgium	600	F,G*,M,P*,S*
1512	Jeddah	Saudi Arabia	1000	I*
1521	Kosice	Czechoslovakia	600	K*,L*
1530	Vatican Radio, Rome	Italy	150/450	K*,L*,S*
1539	DLF Mainflingen	Germany (W)	700	K*,L,M
1557	DW via Cyclops	Malta	600	H*
1566	Samen	Switzerland	300	K*
1566	Sfax	Tunisia	1200	I*
1575	RBI via Burg	Germany (E)	250	K*
1593	Langenberg	Germany (W)	400/800	K*,L*,M*

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

Shepparton have also been heard here: 9.580 to S.Pacific area (Eng 0800-2030), rated as 33333 at 0951 by David Wratten; 9.655 to Europe (Eng 0700-1030) - 43444 at 0836 by Leo Barr; 9.770 to S.Asia (Eng 1000-1100) - SIO 322 at 1008 by Philip Rambaut. Later, Jim Cash picked up their broadcast to E.Asia via Shepparton 9.620 (Eng 2000-2130), rating it as 21232 at 2100. Alan Smith has been monitoring ABC in Brisbane on 9.660 (Eng to N.E.Australia 1930-1402). On average their signal rated SIO 222 at 2000.

There are many 31m broadcasts to Europe from places near and far. Some stem from SRI via Lenk, Switzerland 9.535 (Fr, Ger, Eng, It, Sp to Europe 0600-2045), rated as SIO 444 at 0730 by Alf Gray; RBI Berlin 9.730 (Eng, Ger, Fr 1445-1800), noted as 'excellent' at 1530 by Robin Harvey; the Voice of Vietnam, Hanoi 9.840 (Eng 1600-1630), heard by Dennis Maxted; VOIRI Tehran, Iran 9.022 (Eng 1930-2030) - 43424 at 2002 by Robin Clark; AIR via Delhi, India 9.910 (Eng 2045-2230) - 54544 at 2131 by Darran Taplin; Radio Jordan, Amman 9.560 (Eng 1420-2200) - SIO 222 at 2000 by **Francis Hearne** in Bristol; Radio Tirana, Albania 9.480 (Fr, Eng 2200-2300) - 44333 at 2230 by Eddie McKeown.

Broadcasts from distant places have also been reaching the UK in the 7MHz (41m) band. They include WHRI Noblesville, USA 7.355 (Eng to C.America 0800-1100) - 45444 at 0855 by John Nash; Radio Australia via Carnarvon 7.205 (Eng 1430-2030) - 43333 at 1835 by Chris Shorten; Radio Beijing, China 7.420 (Russ to E.Europe 1500-1955) - 33234 at 1955 by Ted Agombar; AIR via Delhi 7.412 (Eng 1845-2230) - 32232 at 2050 by Jim Cash.

Some of the broadcasts to Europe in the **6MHz (49m)** band originate from Radio Australia via Carnarvon 6.035 (Eng 1530-2030), rated as SIO 534 at 1600 by Darren Beasley; Radio Sweden, Stockholm 6.065 (Eng 1800-1830) - SIO 433 at 1815 by Francis Hearne; Radio Bucharest, Romania 6.015 (Eng ?-?) - 43333 at 2010 by Sheila Hughes; Radio Pyongyang,

DXers:
A: Leo Barr, Sunderland.
B: Scott Caldwell, Warrington.
C: Jim Cash, Swanwick.
D: Simon Hamer, New Radnor.
E: Robin Harvey, Bourne.
F: Simon Holland, Douglas, IOM.
G: Sheila Hughes, Morden.
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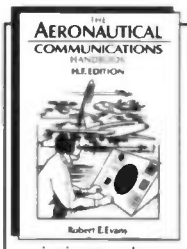

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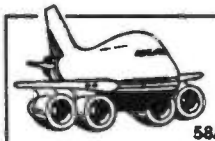

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Tropical Band Chart

Freq kHz	Station	Country	UTC	DXer
2.340	Fuzhou	China	1607	E
2.560	Xinjiang	China	2352	E
3.205	AIR Lucknow	India	1510	E
3.210	R.Mozambique	Mozambique	1800	R
3.215	R.Orange	S.Africa	1810	R
3.230	R.Nepal	Kathmandu	0117	E
3.235	AIR Gauhati	India	1555	E
3.255	BBC via Maseru	Lesotho	1755	R
3.295	AIR New Delhi	India	1518	E
3.345	AIR Jammu	India	1710	R
3.355	R.Botswana	Gabarone	1809	E
3.355	AIR Kurseong	India	1513	E
3.365	AIR New Delhi	India	1551	E
3.365	GBC Radio 2	Ghana	1840	D,K,P
3.395	RRI Tanjungkarang	Indonesia	1545	R
3.905	AIR Delhi	India	1840	E,K
3.915	BBC Kranji	Singapore	1840	D,E,K,P
3.925	AIR Delhi	India	0135	E
3.940	PBS Hubei Wuhan	China	1522	E
3.950	PBS Qinghai Xining	China	1526	E
3.955	BBC Daventry	England	2030	B,C,D,F,G,L,P
3.960	R.L. Munich	W.Germany	2131	D
3.965	RFI Paris	France	1840	C,D,K
3.970	RFE Munich	W.Germany	2320	C
3.975	BBC Skelton	England	0630	D
3.980	VOA Munich	W.Germany	1840	B,C,D,K,N,P
3.985	R.Beijing, China	via SRI Berne	2100	C,D,E,F,L,P,S
3.985	SRI Berne	Switzerland	1830	D,H,K,N,P
3.990	RFE Munich	W.Germany	2131	D
3.995	DW Cologne (Julich)	W.Germany	2044	C,D,F,I
4.005	RRI Padang	Indonesia	1458	E
4.050	R. Frunze	USSR	0013	E
4.055	Kalinin	USSR	0554	D
4.060	R.Moscow Kharkov	USSR	2029	D,E,F,Q
4.220	PBS Xinjiang	China	1547	E
4.330	PBS Xinjiang	China	1535	E,D
4.500	Xinjiang	China	2300	E,R
4.545	Alma Ata	USSR	0115	E
4.635	R.Dushanbe Tadzhik	USSR	1840	E,K
4.735	Xinjiang	China	2300	E,Q
4.740	R.Afghanistan	via USSR	1925	E,K
4.755	Sani Radio	Honduras	0300	M
4.755	RRI Ujungpadang	Indonesia	2159	E
4.760	Yunnan Kumming	China	2353	E
4.760	ELWA Monrovia	Liberia	1925	D,E,K,M
4.760	TWR	Swaziland	1850	R
4.765	R.Moscow	via Cuba	0700	D
4.770	FRCN Kaduna	Nigeria	1930	D,E,K,M,P,R
4.785	PBS Zhejiang 1	China	2210	K
4.785	R.Baku	USSR	2115	E,K,Q
4.790	TWR Manzini	Swaziland	1900	M
4.795	R.Moscow, Kharkov	USSR	2215	C,D,E,F,K,Q
4.795	R.Moscow, Ulan Ude	USSR	2115	C,I
4.795	R.Peace & Progress	USSR	2201	D,P
4.800	R.Popular Cuenca	Ecuador	0511	J
4.800	AIR Hyderabad	India	1544	E
4.800	LNBS Lesotho	Maseru	1800	E,M,R
4.810	R.Yerevan	USSR	2115	I,K
4.815	R.Beijing	China	1205	E
4.815	R.diff TV Burkina	Ouagadougou	2110	K
4.820	La Voz Evangelica	Honduras	0245	J,M
4.820	Khanty-Mansiysk	USSR	1945	K,L
4.825	R.Moscow Yakutsk	USSR	2115	K
4.830	Gaborone	Botswana	2130	E,K
4.830	R.Tachira	Venezuela	0030	E,P,R
4.832	R.Reloj	Costa Rica	0750	E
4.835	R.Tezulutlan, Coban	Guatemala	0220	R
4.835	RTM Bamako	Mali	2108	A,D,E,J,K,D,R

Freq	Station kHz	Country	UTC	DXer
4.840	PBS Harbin	China	1630	E,K
4.840	AIR Bombay	India	0140	E
4.840	R.Valera, Trujillo	Venezuela	0316	J
4.845	RTM Kuala Lumpur	Malaysia	1500	R
4.845	ORTM Nouakchott	Mauritania	2110	K,M
4.850	R.Yaounde	Cameroon	2100	D,K
4.850	R.Luz y Vida, Loja	Ecuador	0320	J
4.850	R.Tashkent	USSR	0008	E,J
4.860	AIR New Delhi	India	1625	B,E,G
4.860	R.Chita	USSR	2110	A,E,F,K
4.860	Kalinin	USSR	1618	Q
4.865	PBS Lanzhou	China	2150	D,E
4.865	V of Cinaruco	Colombia	0825	D,E,J,R
4.870	R.Cotonou	Benin	1735	D,K
4.875	R.Tbilisi	USSR	1606	E
4.880	SABC Radio 5	S.Africa	2013	D,J,P
4.885	R.Beijing	China	1318	E
4.885	Voice of Kenya	Kenya	2110	K,R
4.895	Voz del Rio Arauca	Colombia	0520	J
4.895	R.Moscow, Kalinin	USSR	2110	D,F,H,I,K,N,S
4.900	V de la Rev.Conakry	Guinea	2142	E
4.905	R.Relogio, Rio	Brazil	0144	E
4.905	R.Nat.N'djamena	Chad	2100	E,K,R
4.910	V of People KampucheaCambodia		2335	E
4.910	V. de la Mosquitia	Honduras	0145	M
4.915	R.Ghana, Accra	Ghana	2210	D,K
4.915	Voice of Kenya	Kenya	1920	K
4.920	R.Moscow B, Yakutsk	USSR	0950	E
4.930	R.Moscow, Ashkhabad	USSR	2110	E,I,K,N
4.935	Voice of Kenya	Kenya	1920	K,P
4.940	R.Kiev	USSR	2110	E,F,I,K,Q
4.940	R.Moscow, Yakutsk	USSR	2150	D,J
4.940	R.Continental,BarinasVenezuela		0815	E
4.945	Caracol, Neiva	Colombia	0640	D
4.945	R.RSA, Johannesburg	S.Africa	1920	E,R
4.958	R.Baku	USSR	2139	E,Q
4.960	R.Beijing	China	2135	D
4.960	R.Baku	USSR	2110	K
4.970	PBS Xinjiang	China	0105	E
4.970	R.Rumbos, Caracas	Venezuela	0320	J,R
4.975	R.Uganda, Kampala	Uganda	1930	K,P
4.980	PBS Xinjiang	China	0002	E
4.980	Azad Kashmir RPakistan		0101	E
4.980	Ecos del Torbes	Venezuela	0009	E,P
4.990	AIR via Madras	India	0044	E
4.990	FRCN Lagos	Nigeria	0608	D,E,J,P
4.990	R.Moscow (Yerevan)	USSR	2115	I,K,P
5.005	R.Nacional, Bata	Eq.Guinea	2112	E,K
5.005	R.Nepal, Kathmandu	Nepal	1630	E,R
5.010	SBC Singapore	Singapore	1502	E,G
5.015	R.Moscow Vladivostok	USSR	2005	K
5.020	La Voix du Sahel	Niger	0606	D
5.025	R.Rebelde, Habana	Cuba	0346	J
5.030	R.Impacto	Costa Rica	0602	D,E
5.035	R.Bangui	C.Africa	2210	K
5.035	R.Alma Ata	USSR	2005	E,K
5.040	R.Tbilisi	USSR	2010	F
5.044	R.Impacto	Costa Rica	0536	J
5.045	R.Cultura do Para	Brazil	0110	J,R
5.050	SBC Singapore	Singapore	1414	E
5.050	R.Tanzania	Tanzania	1630	K
5.050	R.Mundial, Caracas	Venezuela	0335	J
5.055	RFO Cayenne(Matoury)	French Guiana	0915	E
5.055	TWR Manzini	Swaziland	1630	G
5.057	R.Tirana Gjirokaster	Albania	2100	C,I
5.060	PBS Xinjiang	China	1645	E,K
5.075	R.Beijing	China	2115	K
5.075	Caracol Bogata	Colombia	0629	D,E,J,D,R
5.275	WYFR Oakland, CA	via Taiwan	1515	R
5.440	PBS Xinjiang	China	0025	E
5.800	PBS Xinjiang	China	2300	Q

N.Korea 6.575 (Russ, Fr, Kor, Sp, Ger, Eng 1500-2150) - SIO 233 at 2140 by David Middlemiss.

Station Addresses

BBC Radio Merseyside, 55 Paradise Street, Liverpool L1 3BP.

ILR Radio Hallam, PO Box 194, Hartshead, Sheffield S1 1GP.

Adventist World Radio (Asia), PO Box EA, Agana, Guam, Pacific.

BBC World Service, PO Box 76, Bush House, Strand, London WC2B 4PH.

Radio Norway International, N-0340 Oslo 3, Norway.

Radio Tahiti, Radiodiffusion Francaise d'Outre Mer, BP 125, Papeete, Tahiti.

Please turn to the next page for details of equipment used for these and previous tables during this month's Seen & Heard.

Transatlantic DX Chart

Freq kHz	Station	Location	Time (UTC)	DXer
		USA		
710	WOR	New York, NY	**0320**	**D**
770	WABC	New York, NY	**0010**	**D**
1010	WINS	New York, NY	**0534**	**C**
1130	WNEW	New York, NY	**0310**	**D**
1210	WCAU	Philadelphia, PA	**0230**	**C,D**
1510	WKKU	Boston, MA	**0015**	**C,D**
		Canada		
550	CFNB	Fredericton, NB	0130	B
590	VOCM	St.John's, NF	2300	C,D
680	CIYQ	Grandfalls, NF	0026	C
720	CHTN	Charlottetown, PEI	0001	B
820	CHAM	Hamilton, ON	0100	B,D
920	CJCH	Halifax, NS	0430	B
930	CJYQ	St.John's, NF	2330	A,C,D
1200	CFGO	Ottawa, ON	0215	B,D
1220	CKCW	Moncton, NB	0538	C
1290	CHRM	Matane, PQ	0615	C
1410	CIGO	Pt.Hawkesbury, NS	0544	C
1470	CHOW	Welland, ON	0637	C
1570	CKLM	Lavel, PQ	0115	D
		C.America & Caribbean		
1610	Caribbean Beacon	The Valley,Anguilla	**2320**	**C,D**
		South America		
1220	R.Globo	Rio, Brazil	2340	B,C,D

DXers:

A: Leo Barr, Sunderland.
B: Darren Beasley, Bridgwater.
C: Andy Cadier, Folkestone.
D: Jim Cash, Swanwick.
E: David Edwardson, Wallsend.
F: Sheila Hughes, Morden.
G: Rhoderick Illman, Thumrait, Oman.
H: Eddie McKeown, Co.Down.
I: David Middlemiss, Eyemouth.
J: John Nash, Brighton.
K: Fred Pallant, Storrington.
L: Roy Patrick, Derby.
M: Tim Shirley, Bristol.
N: Chris Shorten, Norwich.
O: Alan Smith, Northampton.
P: Darran Taplin, Tonbridge.
Q: Neil Wheatley, Lytham St.Annes.
R: Jim Willett, Grimsby.
S: Carl Yates, St.Helens.

DXers:

A: Roy Patrick, Derby.
B: Tim Shirley, Bristol.
C: Mark Thompson, Wakefield.
D: Jim Willett, Grimsby.

SEEN & HEARD

Equipment Used

Ted Agombar: Grundig Yacht Boy 700 + 20m random wire.
Leo Barr: Matsui MR-4099 + internal antenna.
Darren Beasley: Philips D-2935 + a.t.u. + 10m or 25m wire.
Kenneth Buck: Home-built l.w. t.r.f. or s.w. superhet + random wire.
Andy Cadier: Saisho SW-500 + Datong active antenna.
Scott Caldwell: Saisho SW-2000 + random wire.
Jim Cash: Sony ICF-2001D + AN-1 active antenna.
Robin Clark: Saisho SW-5000.
John Coulter: Yaesu FRG-7 + random wire.
David Edwardson: Trio R-600 + trap dipole 22m long.
Alf Gray: Codar CR70 + a.t.u. + rod antenna.
Simon Hamer: Grundig S1400 + 9m wire or Lafayette HE30 + 22m wire.
Robin Harvey: Matsui MR-4099 + s.w. loop.
Francis Hearne: Sharp GFA3 cassette radio + random wire.
Simon Holland: Sangean ATS-803A + built-in whip.
Sheila Hughes: Sony ICF-7600DS; Vega 206; Panasonic DR48 + 15m inverted L.
Rhoderick Illman: Sony ICF-7600DS + 23m random wire.
Matthew King: Sony ICF-7600DS + a.t.u. + 20m random wire
Dennis Maxted: Panasonic RF-B65 + built-in whip.
Eddie McKeown: Tatung TMR -602 portable.
David Middlemiss: Yaesu FRG-7 + random wire.
George Millmore: Tatung TMR-7602 portable.
John Nash: Kenwood R-5000 + random wire.
Chris Nykiel: Matsui MR-4099 + random wire.
Ike Odoom: Philips D-2935 portable.
Fred Pallant: Trio R-2000 + random wire in loft.
Roy Patrick: Lowe HF-125 + 20m wire.
Ron Pearce: Home-built one transistor RX.
Philip Rambaut: Int.Marine Radio R-700M + random wire.
Kenneth Reece: Icom R-9000; JRC-NRD 525; Kenwood R-5000 + delta loop.
Alan Roberts: Home-built 'Epsom' superhet + 19m or 31m dipole.
John Sadler: DX-100L + indoor s.w. loop.
Tim Shirley: Trio R-600, Sony ICF-2001D or Realistic DX-400 + loop.
Chris Shorten: Matsui MR-4099 + 10m wire.
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 inverted L.
Dave Taskis: Sony ICF-2001D + built-in whip.
Mark Thompson: JRC NRD-525 + 1m loop or 20m random wire.
Phil Townsend: Lowe SRX-30 + a.t.u. + random wire.
Steven Verhaegen: Trio 9R-59DS + GP at 15m; Nat.HRO-7R; home built O-V-2.
Ted Walden-Vincent: Grundig Satellit 1400SL + random wire.
Neil Wheatley: Sangean ATS-803 + built-in antenna.
Jim Willett: RCA AR77; Trio 9R-59DS + Diawa CL-22 a.t.u. + indoor 'X' dipole.
Julian Wood: Trio R2000 + 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.

Languge Abbreviations

Ar	Arabic	Fr	French	Kor	Korean	Sw	Swedish
Beng	Bengali	Ger	German	Mal	Malay	Swa	Swahili
Bur	Burmese	Gr	Greek	Norw	Norwegian	Ta	Tamil
Cz	Czechoslovakian	Gu	Gujaratl	Pol	Polish	Tah	Tahitian
Dan	Danish	Hi	Hindi	Port	Portuguese	Tel	Telugu
Du	Dutch	Ice	Icelandic	Russ	Russian	Uk	Ukrainian
Eng	English	It	Italian	Si	Sinhala	Ur	Urdu
Esp	Esperanto	Jap	Japanese	Sp	Spanish	Yi	Yiddish

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And its control panel is refreshingly simple. So you can hop around the band *fast* to nail those DX stations. While other guys are warming up their amplifiers, you can be working the DX!

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You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan plus auto-resume memory scan via the microphone up/down buttons.

Great receiver. Utilizing a directly-driven mixer, the FT-747GX receiver features superb overload protection. You also get factory-installed narrow CW *and* AM filters. A one-touch noise blanker. All-mode squelch. RIT. And a 20-dB attenuator for local QSOs.

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