Short Wave Magazine

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DECEMBER 1989

SWM SWM SWM SWM SWM SWM SWM

REVIEWED THIS MONTH

ICOM IC-R7000 HF SCANNER

SONY ICF-760IL SW RECEIVER

Plus

REGULAR FEATURES FOR SCANNING, AIRBAND AND BROADCAST ENTHUSIASTS

For The Radio Listener

JUPITER

NEW WORLD LEADER IN SCANNERS?

Don't take our word for it — read what Short Wave Magazine's Alan Gardener says:

"Sensitivity is very good" — *"I like the simple method of keyboard entry"* — *"Good circuit design and 705MHz IF also helps to ensure freedom from unwanted image signals"* — Referring to whip reception Alan Gardener said *"I found it difficult to believe it was possible to receive some transmissions"* — *"I don't think I have had so much fun from using a scanner since I first got my hands on an AOR-2001"* — *"looks set to dominate the hand-held scanner market in the immediate future"* — If that does not convince you fully, then perhaps the specification will!

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- Illumination switch
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FEATURES COMMON TO BOTH MODELS

- **Direct up/down control**
A feature that most scanners do not have but should. Just punch in a frequency and use the up/down arrowed buttons to freely tune around the spectrum.

- **AF Scan**
No more of those annoying blank carriers for the receiver to lock onto. Simply tell it to ignore silent carriers and it will.

- **One Button Memo Read**
Just press one button and you are in the memory bank. Press up/down to move through the memory channels or use direct access to go straight to a memory.

- **Battery Saver**
For long term single channel monitoring select this mode. The battery drain will be reduced dramatically, about the same as a car electric clock.

- **Skip Function**
If you want to bypass a single memory channel or a whole block of memory channels, this can be done at the touch of a couple of buttons. Just tell the receiver what to ignore.

- **High Speed Scan**
No other receiver offers a faster scan rate. The 20 steps per second means you can hunt through the spectrum quicker with this receiver than any other model.

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Enables you to quickly write into the memories, no need to select a number, the receiver finds the next empty memory.

- **User Friendly Search Programme**
You can search in either direction and change direction at the press of a button. Total agility with a speed that will amaze you.

- **Unique Multiband Programme**
No less than 10 separate band segments can be stored in the receiver's memory. You can instantly select the band of your choice for closer inspection.

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JANUARY ISSUE ON SALE
DECEMBER 21

|21| **Icom IC-R7000HF Scanning Receiver**

Cover Mike Richards has put the Icom IC-R7000HF v.h.f./u.h.f. scanning receiver, with its added built-in h.f. converter, through its paces.

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GOOD LISTENING

FIRST WORD

This issue sees another Index, the third since *Short Wave Magazine* was relaunched as a magazine for listeners. In that time the magazine has has become firmly established as the second largest selling hobbyist radio magazine on the UK newsagents' shelves. The biggest selling is, of course, still our sister magazine *Practical Wireless* which, from the January 1990 issue, receives a complete facelift. Look out for it at your newsagent on Thursday 14 December.

The pilot issue of *Vintage Radio* obviously met with your approval, judging by the coupons and letters returned. Publication will start on a regular, quarterly basis next year with the first issue being published in the Spring. The magazine will be available only on subscription and each subscriber will receive a complete volume regardless of when they commence subscribing. Subscriptions will cost £10.00 per year. If you are interested in vintage radio then you should subscribe to *Vintage Radio* - complete the form on page 26 now, before you forget.

The staff of *Short Wave Magazine* wish you all the best in listening pleasure and look forward to your company in the coming year.

DICK GANDERTON

A WORD IN EDGEWAYS

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

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

Sir

I was most interested to read your article on the Jupiter II hand-held scanner. I had, in fact, already purchased the radio prior to the article appearing. I sent for details from a number of retailers, all the addresses being taken from advertisements in SWM.

The best presentation of information was that from Nevada Communications, Northend, Portsmouth. As I had taken their address from SWM, *I felt they were worthy of mention. I'm sure you will understand your readers' anxiety when purchasing by mail order. One wonders what the after sales service will be like. With regard to Nevada, it is excellent to say the least. The service was quick and efficient. Paul Martin, with whom I spoke by telephone, supplied unbiased opinions on the Jupiter and other makes. He was of considerable help in deciding the model to purchase. A problem I experienced with the first Jupiter, was dealt with so quickly that I was left quite impressed. Apart from an immediate replacement, I was contacted by Mr Martin who readily put my mind at ease regarding their after sales service.*

Nevada is a company I feel I can recommend and, one from which I believe your readers may buy with confidence, mail order especially. I shall be giving my "radio" friends their details.

W. J. HIBBERD
BRIDGEND
MID-GLAM

Sir

Having just read October SWM *I find the letter from Richard Wilmot of Technical Software rather disturbing. To my way of thinking Mr Wilmot is trying to sell his software for the BBC computer. What I find amazing is the fact that he says that the BBC is the best computer for the job. I think that he is a bit behind the times. I will agree that in its day the BBC was the best in its range, but by today's standards 32K of memory looks a bit silly.*

But my main reason for writing is just to put a few facts right. Nearly all of today's computers can be interfaced to any type of amateur radio from the very basic to FAX or packet radio. I use several types myself including Amstrad 664, 6128 and PCW 8256 very successfully as well. I use an Icom IC-R71E with interface for almost everything, FAX, packet, RTTY to store frequencies, etc. I have written software for Amstrad computers for nearly two years with not that many problems. The BBC computer in its very basic form will cost anything from £175 to around £220 second hand. This is very expensive by today's standards. Then, of course, you have to buy a disc drive and all the other items that are required to run the software. The BBC is now getting very long in the tooth and is a very expensive machine for what it does.

And, of course, comes the most important problem of all with the BBC computer. Noise. The BBC was renowned for the noise that it generated. At 10m it is not that good and even with screening it is still bad. Also the RGB monitor socket is very noisy and is not recommended for high quality FAX pictures. I think that anyone who has used this computer will agree with me.

I will not deny that in its day the BBC was the "best" in its class, but those days have passed. At the moment the "in" computers are the Amiga and the Atari ST. The ST is now becoming what the BBC used to be for amateur radio. Some very good public domain software is available for all applications.

I am not trying to start a debate on which computer is the best, but just to show that the ageing BBC is no longer so, in today's world of improvements in computers and electronics. I only hope that Mr Wilmot's letter will not put off budding radio amateurs from buying the computer they want and not a BBC which he seems to think is the best one around today. Just to say keep up the good work with the mag. Still the best one around!

JOHN PALMER
HAVANT

Sir

With reference to the letter from Mr W. R. Semmen of Penzance in the October issue of SWM.

He says that in my letter, published in the August issue of SWM, *I wrote about the attitude of the Amateur Radio fraternity - I did not do anything of the sort. If he had read my letter properly he would have seen that my remarks were addressed to one gentleman in particlular, who, I thought, treated my friend and I rather shabbily. I have always been on good terms with many Amateur Radio members, who have all helped me with any problems I have had to do with radio, and none of them have referred to my excellent Grundigs as "Rubbish".*

Once again, thank you for a wonderful magazine, keep up the good work.

E. S. WALDEN-VINCENT
GREAT YARMOUTH
NORFOLK

Sir

My advice to Mr Semmens is that if you can attend a local radio club, you will find the majority of members are kind, helpful and good people to talk to.

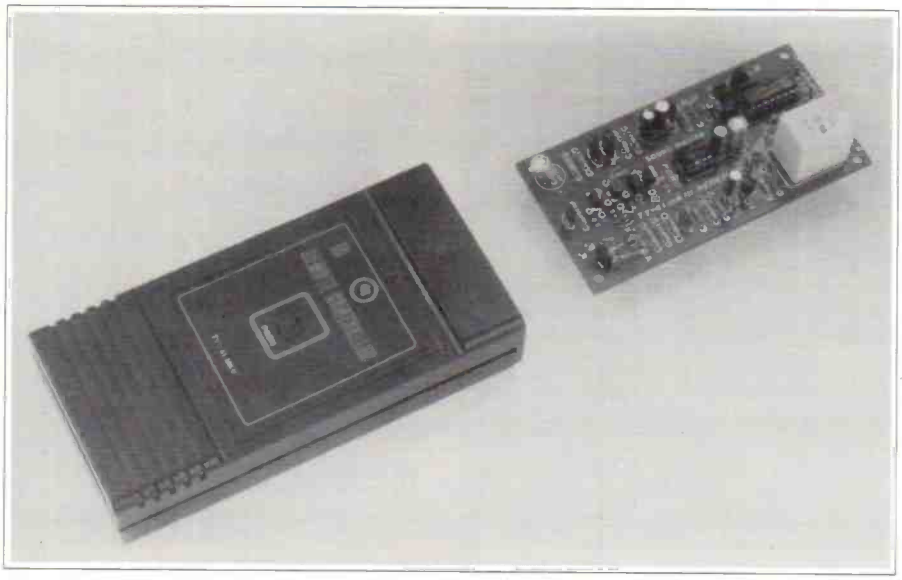
Also, some local authorities have a scheme which enables pensioners and unemployed people to attend the RAE course free.

Last, but not least, let's have some media coverage of the hobby I found by accident when I asked a G4 "is that a CB twig?"

M. CHARLTON
SUTTON IN ASHFIELD
NOTTINGHAMSHIRE

WHAT'S NEW

Infra-red Remote Control Kit



The latest "Sound Master" kit from Maplin Electronics is for a useful infra-red, remote control switch which can be used in situations where it is impractical, or inconvenient, to use direct manual switching.

The completed project provides remote switching of a single pole changeover relay with the provision for either latched or momentary output. To indicate that the system is operating, l.e.d.s on both the transmitter and receiver flash. The transmitter is housed in a purpose-made case but the receiver requires a suitable housing, preferably metal.

The receiver requires a 9 to 12V d.c. power supply at 35mA standby which rises to 120mA when the relay is operated. The transmitter uses one 9V (PP3) alkaline battery and the current consumption, dependent on the required range, is 35 to 180mA when operated. The operating frequency is 18.5 to 23.5kHz.

All the parts needed for both the transmitter and receiver, but excluding a metal case for the receiver, are provided in kit LM69A (IR Remote Switch Kit) which costs £17.95 including VAT from **Maplin Electronics, PO Box 3, Rayleigh, Essex SS6 8LR. Tel: (0702) 554161.**

BBC World Service

Millions of listeners across two continents will find it easier to tune into World Service programmes now that the new transmitters on Ascension Island are in operation.

The improvements are the latest stage in a ten-year investment programme which has included other major projects such as the new Hong Kong relay station that kept listeners in China informed during the recent student demonstrations in Tiananmen square.

The £1million development on Ascension will improve audibility for BBC audiences in West and Central Africa and Latin America. Two new 250kW transmitters have been installed at the BBC's Atlantic relay stations on the island. Signals are sent to the relay from London via satellite.

"We have the biggest listenership and the highest reputation of any international broadcaster," said Managing Director BBC World Service, John Tusa. "But in an increasingly competitive world we risk losing both credibility and audience if we cannot be heard clearly.

"Until now, BBC programmes have been limited at times to one transmitter on Ascension. Now there will be two, increasing the signal strength. As a result, World Service broadcasts in English, French, Hausa, Portugese and Spanish will all be easier to hear. And so will our increasingly popular BBC English teaching lessons," Mr Tusa added.

The Ascension improvements are part of a £100m capital investment scheme sanctioned by Parliament in 1981. The scheme was aimed at boosting the BBC World Service global audience - now standing at 120 million people - by replacing worn-out transmitters, some of which dated back to World War Two.

9-Band Portable Radio

The new Steepletone MBR9 has been introduced to fill a gap in the company's range. Described as a multi-band, personal radio, it covers 150 to 281kHz long wave, 522 to 1620kHz medium wave, 87.5 to 108MHz v.h.f. f.m. and 5.85 to 6.20, 7.10 to 7.50, 9.45 to 9.90, 11.45 to 11.98, 15.10 to 15.55 and 17.45 to 18.06MHz on its six s.w. bands. Tuning is by means of a conventional rotary control on the right-hand end. Frequency indication is by a conventional horizontal scale with a vertical pointer. Band selection and volume are controlled by means of slider controls and the on-off control is a push-button. A world time zone map on the rear of the set provides the user with useful information. "On station" indication is provided by an l.e.d. For v.h.f. listening a five-section telescopic antenna is fitted and a stereo headphone socket allows private listening. Power requirements are two size 7 batteries or a mains adaptor which is an optional extra. The MBR9 measures 170 x 80 x 40mm and is available in any colour "as long as it is black". **Steepletone Products Ltd, Park End Works, Croughton, nr Brackley, Northants NN13 5RD. Tel: (0869) 810081.**

WHAT'S NEW

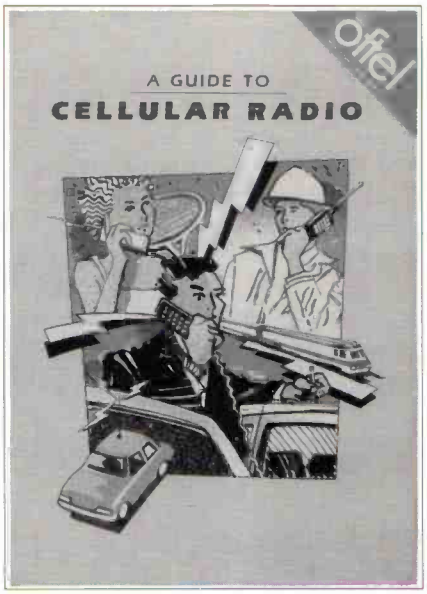
Jamboree-on-the-Air

The most significant development in this year's Jamboree-on-the-Air, otherwise known to millions of Scouts world-wide as JOTA, is the DTI's initiative in persuading 32 countries to allow Scouts and Guides to exchange greetings messages via amateur radio. Until now only Canada, the USA, Pitcairn and the Falkland Islands have allowed this facility.

JOTA takes place every year using amateur radio with scouts broadcasting from locations all over the UK, including tents, village halls, schools and local Scout Headquarters. This year's dates were 21-22 October.

"Jamboree-on-the-Air provides young people with a chance to talk to each other and learn more about Scouting in many of the 150 countries where Scouts can be found", said Michael Beach, the UK's International Commissioner. "Friendships are formed, maps and atlases are studied and young people throughout the world become much more aware of each oher. The special arrangements negotiated by the Department of Trade and Industry, encouraged by the Radio Society of Great Britain, make the 1989 event particularly exciting and represent a considerable boost to international Scouting links."

Over 350 special event licences were issued by the RSGB for the 1989 JOTA event. The Girl Guides must now be hoping that similar relaxations can be obtained for their own amateur radio event - *Thinking Day on the Air* - next February.



Cellular Radio Guide

The Office of Telecommunications (OFTEL) has recently published an interesting basic user guide to the cellular radio networks.

The 24-page booklet covers a range of topics including how the networks operate, what to consider before signing a contract and what to do if the service fails.

The booklet has been produced to meet a need identified in the review of the cellular service which was published by the Director General of Telecommunications, Sir Bryan Carsberg, in May of this year. One of the conclusions reached in the review was that many customers had insufficient knowledge about the system to enable them to form expectations of the service.

Enquiries to OFTEL have also revealed that customers have signed airtime contracts without realising the full implications of the contract terms.

BACT, the Advisory Committee on Telecommunications for Small Businesses has also contributed to the booklet, which is titled *A Guide to Cellular Radio* and is available, free of charge, from OFTEL's Library Tel: 01-822 1665. OFTEL's report, *Quality of service on the Cellular Networks* is still available, free of charge, from the same source. **OFTEL, Atlantic House, Holborn Viaduct, London EC1N 2HQ.**

FIRST AID

Mr E. Rowe has been reading with great interest, the letters in the "Word in Edgeways" column about the old ST Radios. With his brother, he has been trying for quite some time to get information on the last radio made , the **ST Super.8**

If you can help, contact him at: **11 Thorstone Drive, Irby, Wirral, Merseyside L61 4XR.**

Could any reader please help with information on how to receive SSTV to an s.w.l. now turning after 20 years to this mode on the h.f. band. Derek Lawrence is using a Sony ICF-6700W and a Spectrum 128 with a RMS-3 program. He can find the signal, but cannot resolve it into a picture. **Derek Lawrence. 145 Tudor Way, Dines Green, Worcester.**

What is the **equation for converting metres into MHz** and *vice versa*? Kevin Langthorne used to have this equation in a computer program, but has sold the computer and the program has been lost. Can anyone help? **Kevin Langthorne, 127 Blackfell Road, Blackfell, Washington, Tyne & Wear NE37 1JU.**

Has anyone got a manual or circuit diagram of a **Pye Table Radio model PE340**? Photocopies would do, and all expenses will be met. **Chris Buckhurst, 66 Corringham Road, Stanford-le-Hope, Essex SS17 0AE.**

Mr Porritt is curious about **BERNE** (sometimes pronounced BERNA) Radio. He listens to Berne Maritime on a number of frequencies - 4.379, 8.784 - all messages seeming to involve ships in the Mediterranean. Its location is Berne Switzerland - 200 miles inland, why there? Is the transmitter up in the Alps? **H. Porritt. 7 Birney Edge, Danas Hall, Ponteland NE20 9JJ.**

Mr Levers is looking for a service manual/information on the GEC HF Communications Receiver type **RC410/R or RC411/R**. All costs will be paid. **M. Levers "Waverley", Independent Hill, Alfreton, Derbys DE5 7DG.**

Mr K.G. Arnold has an **Armstrong linear** and separate amplifier which have developed a fault in the left channel - it ceases to separate after some 15 minutes of being switched on and makes a loud "swishing" and "plopping" noise. A local engineer has not been able to rectify the fault and so he would like to locate the makers who used to be in North London. **Mr K.G. Arnold, 66 Bromeswell Road, Ipswich, Suffolk IP4 3AT.**

Mr S. Gallagher owns a **Midland 2001** 27MHz f.m. transceiver (precision series) and he is looking for the circuit diagram and any technical data to help him in the refurbishment task. **S. Gallagher, 24 Valient Court, Townparks North, Antrim, N. Ireland BT41 2HY.**

Graham Mott is in the process of renovating a **very old signal generator** which unfortunately has had its identification details removed before he acquired it. The instrument was manufactured by Marconi Ecko Instruments Ltd and he suspects its origins may well be prior to 1939. It contains three Mazda valves type AC/P (still working well) and a rectifier type UU4.

It would be nice to identify the instrument and, if possible, to obtain a circuit diagram, handbook or any relevant information. Marconi have tried to assist but their efforts have regrettably been unfruitful. Much of their old records have been lost apparently. However, from data acquired so far I believe that the generator is possibly a version of model type TF144, but prior to the well-known model TF144G although of the same size and slightly different front panel layout. He is also seeking a coaxial plug for the r.f. output. **Graham Mott, 9 Grampian Way, Oulton Broad, Lowestoft, Suffolk NR32 3EP.**

TRADING POST

FOR SALE Bearcat 200XLT new, boxed with p.s.u. and instructions, £195 o.n.o. A. Healy. Tel: Hemel Hempstead 232110 evenings only.

FOR SALE Trio JR310 receiver, fitted new bands also 160m eleven bands, £100 cash. R216 v.h.f. receiver five bands 2/4/6 and 15/12/10, £30 cash. Buyers collect. HRO-MX nine coils, £100 p.s.u. nice. Mr N. Walker, 35/37 Brighouse Denholme Rd, Queensbury, Bradford BD13 1NA.

FOR SALE Yaesu FRG-965 (9600) v.h.f./u.h.f. receiver, 60-950MHz, hardly used, excellent condition, boxed, complete with h.f. converter, 100kHz-60MHz, £295. Robert Mobberley. Tel: Coventry 450245.

FOR SALE PRO-32, 200 channel scanner, 68-88, 108-136, 138-174, 380-512MHz, £150, boxed, good condition or **exchange** for Yaesu FGT-7 or similar. Also 144MHz hand-held transceiver complete with charger, etc., £50. R. Taylor G3OHV. Tel: Tunbridge Wells 23044

FOR SALE Icom R7000 v.h.f./u.h.f. scanner, as new, excellent condition, manual, circuit, original box, £725 o.n.o. Datong multi-mode audio filter model FL3, manual, power supply, as new, £90. J. House, 4 Elizabeth Way, Kennilworth, Warwicks CV8 1QP. Tel: Kennilworth 54556.

FOR SALE Yaesu FRG-7700 all-mode communication receiver 0.15-30MHz. Four FRV-7700 v.h.f. converters 70-170MHz. FRT-7700 antenna tuner/switch. FF5 l.f./filter. SP901 external speaker. Plus manuals. Scarcely used. £420. As one lot. D. L. Sutherland. Tel: Wilmslow, (Cheshire) 535142.

FOR SALE Barlow Wadley h.f. RX MkII, excellent condition, £100 o.n.c.o. Uniden Scanner BC100XLT, four months old, £130. J. Castle, 9 Ferndale Walk, Anghering, West Sussex BN16 4DB. Tel: Worthing 774708.

WANTED Communication receiver Heathkit any model considered or similar. M. Stevenson, 124 Green Lane, Eastwood, Essex SS9 5QJ.

WANTED one v.h.f. converter VC10 for Trio R2000, must be in good working order, about £80-£90. **For Sale** One Philips D2935 World Receiver, £130. J. S. Wood. Tel: Clochan 378.

FOR SALE Sony PRO-80, 18 months old, excellent condition with manual, plus Sony AN1 active antenna, both boxed, £225 for both. P. Bennett, 3 St. Lukes Rd, Burton-on-Trent, Staffs DE13 0LW. Tel: Burton-on-Trent 31066.

FOR SALE Pye Olympic f.m. in excellent condition converted and working on 70MHz, plus some spare boards, £75 o.n.o. Ken Ginn G8NDL. Tel: Swanley 613289.

FOR SALE Bearcat 250 50-channel scanner U/S model 115/12 volt handbook and service manual. Includes plug-in solid state automatic recorder switch, £145 o.n.o. M. Calvert. Tel: 01-363 2015.

FOR SALE Kenwood R5000 communications receiver plus Dressler ARA-30 active antenna. Mint condition with boxes and manual, £750. Buyer collects. Jack Levy, London N5. Tel: 01-226 1239 (home) or 01-380 7361 (work).

FOR SALE Sony ICF-7600 DS receiver complete with p.s.u. and all usual Sony extras, new in August, hardly used, £100. A. Henry. Tel: Grimsby 827700 evenings.

FOR SALE Reftec 934MHz transceiver c/w mobile ant £100. 9m aluminium telescopic mast £25. Mr Hagon. Tel: Shrewton 620785 after 6pm.

FOR SALE TMR7602 communication receiver, 150kHz-30MHz, digital receiver, £75. Also Yaesu FRT-7700 ant tuner, £35. Both in good condition. Andrew. Tel: 01-642 3961.

FOR SALE AOR AR-900 hand-held with p.s.u., v.h.f/u.h.f. antennas and case, as new and boxed, under warranty, £190. Mr D. Critoph. Tel: Aylesbury 81624.

FOR SALE JIL SX-400 (big brother of the very popular SX-200) as new. A bargain at £300. Mr G. Clarke. Tel: Tunbridge Wells 35804.

FOR SALE Bearcat 200 XLT, five months old, case, charger, Tandy centre loaded antenna (modified). All as new in original box, £175 o.v.n.o. H. Davies. Tel: Aberdare 876586 9am to 5.30pm Mon-Friday.

FOR SALE NRD-525 communications receiver with 250Hz filter fitted £850. Amiga A500 computer with software £270. Both items are only a few weeks old and in excellent condition with handbooks and original boxes. Robert Webster. Tel: 051-489 1241.

FOR SALE Realistic PRO-34 hand-held scanner, complete with Royal 1300 discone antenna, p.s.u./charger, rechargeable batteries, *Scanner* book and realistic telesopic antenna. Still under warranty, £220. Dave Willis. Tel: Yoxall 472579 evenings.

FOR SALE Bearcat Uniden BC100XLT, 100 channel hand-held scanner £95 o.n.o. Bearcat Uniden BC175XL, base unit, 16 channel, 66-88, 118-174 and 406-512MHz, a.m.-f.m. £85 o.n.o. P. C. Lock. Tel: Aldershot 332035 evenings and weekends.

FOR SALE Eddystone model S770R communications receiver. 19MHz to 165MHz with manual, £100 o.n.o. P. S. Evans. Tel: Newport 413367.

WANTED Airband receiver. Simple v.h.f. model would suffice. M. Hely. Tel 01-935 7119 between 1 and 2pm.

FOR SALE Sony Air-7 scanner air/a.m./f.m./p.s.b. Many facilities, boxed, antenna, instructions, 18 months old, v.g.c., £120. Sony ICF7600D receiver, v.g.c., £80. Sony AN1 antenna system, unused, boxed, £30. C. Farquhar. Tel: 01-504 2136 6pm to 8pm.

FOR SALE FRG-965 £300 with p/p. Will **exchange** for Racal RA117E with cash. A. Fellows. Tel: Barnoldswick 815224.

FOR SALE OR SWAP R1155/T1154 original, unmodified, with manuals, l/r meter. Eddystone 770R, needs attention. Hallicrafters S27. PCR receiver. Offers or swap scanner. M. A. Lane. Tel: Leicester 413892.

FOR SALE Icom R7000 radio scanner, 26-1300MHz, no gaps, 99 memories, with 500kHz-30MHz converter fitted internally giving 99 extra memories. Perfect with manual and original packing, £750, buyer collects. Harry Scrase, 1 Jubilee Rd, Sandwich, Kent CT13 0QP. Tel: Sandwich 612540.

FOR SALE Icom R71E communications receiver, 100kHz-30MHz, fitted with f.m. unit, s.s.b. filter, voice synthesiser, d.c. unit and remote control unit. Manual and original packing, perfect, £750, buyer collects. Harry Scrase, 1 Jubilee Rd, Sandwich, Kent CT13 0QP. Tel: Sandwich 612540.

FOR SALE SX200N scanning receiver, good condition with manual, £140. Paul Legg, 42 Oxford St, Northwood, Isle of Wight. Tel: Isle of Wight 297084.

FOR SALE Sony ICF-2001 synthesised receiver, 150 to 29.999kHz, f.m., a.m., s.s.b, c.w. Digital readout with memory facility. Complete with power supply unit, original packing and manual, excellent condition, £100. R. V. Henderson, 8 The Woodlands, Broom, Biggleswade, Beds. Tel: Biggleswade 315395.

WANTED Samatron U-verter or similar airband u.h.f. to v.h.f frequency converter. Mark. Tel: Crawley 563161 day or Horsham 53958 after 6.30pm.

FOR SALE Yaesu FRG7 general coverage receiver, 500kHz-29.8MHz, little used, manual, headphones, a.t.u., £105. E. A. Leavesley. Tel: York 658928.

FOR SALE Grundig RC60 casseiver super hi-fi to Din45-500, f.m./m.w./l.w., 2x50W or 4x30w, touch controls, 8 f.m. presets, full range in/out sockets, brown metallic case 630x150x340mm, mint condition but no audio, hence price £30. Alan Bennett. Tel: 061-653 1163 evenings only.

FOR SALE AR-900 hand-held scanner, seven months old, boxed with instructions, charger, v.h.f./u.h.f. antennas, £175. Dick De Las Casas. Tel: Bordon 34962.

FOR TRADE GEC BRT400 receiver. Lafette HE80 g/c receiver. Yaesu FR101 receiver bandswitch (new in box). Two 1930 broadcast receivers. **Wanted** Eddystone 659 wire wound ballast register, Eddystone 680x band switch or wafers, Trio R599 receiver. J. Wright, 54 Queen Mary Ave, Basingstoke, Hants RG21 2PG. Tel: Basingstoke 468649.

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.

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SWM DEC 89 TP

GRASSROOTS

Lorna Mower

Derby & District ARS have a Junk Sale on December 6, a Constructors' Contest on the 13th and their Xmas Party on the 20th. Wednesdays, 7.30pm at 119 Green Lane. Kevin Jones G4FPY on Derby 669157.

South East Kent (YMCA) ARC have Natter Nights on November 29/December 6, Winter Fox Hunt on December 13 and their Xmas Social on the 20th. Wednesdays, the Dover YMCA, Godwynehurst, Leyburne Rd. B. Joyner G8ZYZ on Dover 852533.

South Bristol ARC have a Committee meeting/14MHz Rx Dx on November 29, Judging for Terry Dunsford Trophy G3XED on December 6, HF Activity on the 13th, their Christmas Party G4YZR on the 20th and 14MHz Activity on the 27th. Wednesdays at the Whitchurch Folk House, East Dundry Rd. Len Baker G4RZY on Whitchurch 832222 (Wednesday evenings).

Cheltenham ARA have their AGM with film or social event on December 1. Stanton Room, Charlton Kings Library. Dave Abbott G4FRU at Holmbury, Thorncliffe Drive, Cheltenham GL51 6PY.

Bath & District ARC, contact Howard G6EIY on Bath 428010.

Carrickfergus ARG meet Tuesdays, 6.30pm in the Downshire Community School, the last Tuesdays are talks by guest speakers. November 28 is Utilising Surplus Transformers GI4NFG, December 5 is Construction and CW and the 12th is their last meeting of 1989, a Social. Geoff Pike GI0GDP on Carrickfergus 366109.

Cheshunt & District ARC have Natter Nights on November 29/ December 13, Top Band Operation G3RFS on December 6 and Xmas Social G4UNL on the 20th. Wednesdays, 8pm in the Church Room, Church Lane, Wormley. Roger Frisby G4OAA on Hoddesdon 464795.

Aylesbury Vale RS have the G6NB Bill Biltcliffe Trophy Construction Contest on December 6 and an Informal social reflecting the success of 1989 on the 20th. 1st & 3rd Wednesdays, 8pm at Hardwick Village Hall. Geoff Groom G3YLC on Buckinghamshire 817496.

Rugby ATS meet Tuesdays, 7.30pm at the Cricket Pavilion outside Rugby Radio Stn. December 5 is the UC1332 Upconverter G3TSQ and the 9th is their Annual Dinner G8HYU. Kevin Marriott G8TWH on Rugby 77986.

Hasting Electronics & RC have their Xmas Social on December 20. 3rd Wednesdays, 7.45pm at West Hill Community Centre, Croft Rd and Fridays, 7.30pm in the Clubroom, Ashdown Farm Community, Downey Close. Reg Kemp G3YYF at 7 Forewood Rise, Crowhurst, East Sussex TN33 9AH.

Southgate ARC have an Informal on November 23 and their AGM on December 14. Holy Trinity Church Hall Upper, Winchmore Hill, 7.45pm. Brian Shelton on 01-360 2453.

Norfolk ARC meet Wednesdays, 7.30pm at The Norfolk Dumpling, The Livestock Market, Harford, Norwich. December 6 is an Informal/ Committee meeting, the 13th is Beyond Packet - the Computer Works G0KRU and the 19th is their Xmas Party. Steve Sewell G4VCE on Mulbarton 78258.

Sutton & Cheam RS meet 3rd Fridays, 7.30pm at Downs Lawn Tennis Club, Holland Ave and 1st Mondays in Downs Bar for Natter Nights. November 29 is Committee meeting at Palfreys, Picquets Way, Banstead, December 3 is 144MHz Fixed and AFS Contest, the 4th is a Natter Night in the Downs Bar, the 10th is CATS Christmas Bazaar and the 15th is their Xmas Get-Together. John Puttock G0BWV on 01-644 9945.

Southdown ARS have Club 2m VHF Contest SSB on December 3 and their Xmas Social on the 4th. 1st Mondays, 7.30pm at the Chaseley Home for Disabled Ex-Servicemen, Southcliff, Bolsover Rd, Norfolk. Wednesdays and Fridays in the Clubroom, Hailsham Leisure Centre, Vicarage Rd. C. R. Evans G4VOS on Heathfield 3168.

Yeovil ARC have RF Resistance G3MYM on November 23, Natter Night on the 30th, Video Night on December 7, Multi-band Antennas G3MYM on the 14th, Mince Pies and On the Air on the 21st and a Natter Night on the 28th. Thursdays, 7.30pm at the Recreation Centre, Chilton Grove. David Bailey G1MNM at 7 Thatchem Close, Yeovil BA21 3BS.

Pembrokeshire RS meet Mondays, 7.30pm at the Further Education Centre at Tower Hill, Haverfordwest. 1st Mondays are Lectures and 2nd are Committee meetings. Martin Goodall GW8ZMU on Haverfordwest 764009.

Lothians RS have a Social on December 13. 2nd & 4th Wednesdays, 7.30pm at Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. P. J. Dick GM4DTH at 21 West Maitland St., Edinburgh EH12 5EA.

Mid-Warwickshire ARS meet 2nd & 4th Tuesdays, 8pm at 61 Emscote Rd (St. Johns Ambulance HQ). November 28 is Technical Topics and Draft Programme for 1990 and December 12 is their Xmas Supper Night with RSGB Guest. Mike Newell G1HGD on Kenilworth 513073.

Fylde ARS have a Construction Competition on November 23 and a Supper/Social Evening on December 14. 2nd & 4th Thursdays at South Shore Tennis Club, Midgeland Lane. Frank Whitehead G4CSA on St. Annes 720867.

Farnborough & District RS meet 2nd & 4th Wednesdays, 7.30pm at the Railway Enthusiasts Club, off Hawley Lane (by M3 bridge). December 13 is their Xmas Social. Tim FitzGerald G4UQE on Camberley 29231.

Dragon ARC meet 1st & 3rd Mondays, 7.30pm at the Four Crosses, Menai Bridge. December 4 is talk by Mr Llewellyn Jones, The United States - the Welsh Connection and the 18th is their Xmas Party. Tony Rees on Bethesda 600963.

Todmorden & District ARS have George Dobbs Annual Xmas Lecture on December 4 and Fun and Games Night on the 18th. 1st & 3rd Mondays, 8pm at the Queen Hotel. Mrs E. Tyler G0AEC on Halifax 882038.

Thornbury & District ARC meet 1st & 3rd Wednesdays, 7.30pm in the United Reform Church, Chapel St. December 6 is a Quiz. Tom Cromack G0FGI at Rose Cottage, The Naite, Oldbury-on-Seven, Bristol, Avon BS12 1RU.

Loughton & District ARS have a Film Show on December 1 and their Xmas Meal on the 15th. Room 14 of Loughton Hall, Rectory Lane, 7.45pm. John Ray G8DZH on 01-508 3434 after 7pm.

Wimbledon & District ARS meet 2nd & last Fridays, 7.30pm in St. Andrews Church Hall, Herbert Rd. November 24 is Film Night and December 8 is their Xmas Social. Nick Lawlor G6AJY on 01-330 2703.

Cambridge & District ARC have Visit to Magnetic Resonance Scanner, Addenbrookes Hospital on November 24, an Informal on December 1 and their Xmas Party on the 8th. Fridays, 7.30pm in the Audio Visual Aids Room of Coleridge Community College, Radegund Rd. Brian Davy G4TRO on Cambridge 353664.

The Amateur Radio Club of Nottingham meet Thursdays, 7.30pm at Sherwood Community Centre, Mansfield Rd, Sherwood. Paul G1WBZ on Nottingham 733740.

Stevenage & District ARS have a Junk Sale on December 5 and Test Equipment Usage G1ZZH on the 19th. Ground Floor Lecture Room, "D" Block, Ridgemond Training Centre, Telford Ave, 7.30pm. Pete G0GTE on Stevenage 724991.

Chelmsford ARS have a Sale of Surplus Equipment on December 5 and Club Social on the 16th. 1st Tuesdays, 7.30pm in Marconi College, Arbour Lane. Roy G3PMX on Chelmsford 353221 Ext. 3815.

Biggin Hill ARC have their Xmas Party on December 19. 3rd Tuesdays, 7.30pm at The Victory Social Club, Kechill Gdns, Hayes. Geoff Milne G3UMI on 01-462 2689.

Verulam ARC have their Annual Great Erg Race on November 28 (this is the event originally scheduled for October 24). 2nd & 4th Tuesdays, 7.30pm at the RAF Association HQ, New Kent Rd, St. Albans. Andy Ince G0BZS at Cottage No. 1, Rounton, 28 Nascot Wood Rd, Watford WD1 3SD.

Horndean & District ARC have Survival G4DIU on December 7. 1st Thursdays, 7.30pm at Merchistoun Hall, London Rd. Stuart Swain G0FYX on Havant 472846.

Hornsea ARC have Natter Nights on November 29/December 27, Switched Mode Power Supplies G8EWX on the 6th, Middle East Trucking G1KT on the 13th and RAF Electronics G1YVL on the 20th. Wednesdays, 8pm at The Mill, Atwick Rd. Jeff G4IGY on (0964) 533331.

Stourbridge & District ARS meet 1st & 3rd Mondays, 7.45pm at the Robin Woods Centre, Scotts Rd. December 4 is On Air/Natter Night and the 18th is NiCad Batteries. Clive Williamson G4IEB on Stourbridge 392006.

KEEP THOSE CLUB DETAILS COMING IN FOR ALL YOUR NEW YEAR EVENTS...
HAPPY CHRISTMAS TO YOU ALL Lorna

HOT-RODDING THE ICF-2001D

Steve Whitt
Part 4

This month Steve Whitt concludes his modifications by offering suggestions to improve the S-meter.

S-Meter

The S-Meter is one feature on a receiver that can be the source of more debate than almost any other, particularly in respect of its usefulness in providing an accurate gauge of signal strength. I have not actually implemented any changes in this area of the circuit, but if you feel that the S-meter is rather too sensitive, there is a very simple modification which provides scope for further experimentation. As supplied, resistor R60 in the S-meter circuit (Fig. 4.1) is 39kΩ but this component can be safely replaced by any value down to about 10kΩ; the smaller the value the less sensitive the S-meter display.

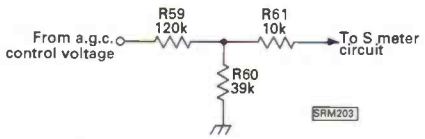

Fig. 4.1: Details of the modified S-meter circuit.

l.e.d. No	Received Signal (*) (μV)
1	1.1
2	1.4
3	1.7
4	2.2
5	2.7
6	3.9
7	6.2
8	15
9	31
10	55

* minimum signal to light l.e.d.; test frequency 6MHz.

Table 4.1: Unmodified Signal Strength Indication

Further Scope

So far in this article I've attempted to find easy-to-implement solutions to the main problems inherent in the design of the 2001D. If serious consideration is given to these points then this receiver will really shine, easily outperforming some receivers at over twice the price.

Naturally I could only tackle the easiest to fix problems and there are still some areas of the design that could benefit from further attention. These are listed below but in fairness I've balanced the weaknesses against the strengths lest anyone think that there are only negative comments.

For

Balanced f.e.t. design used in first mixer is less prone to even order distortion effects.
Dual-loop digital p.l.l. synthesiser is less prone to phase noise and permits faster scanning.
Up conversion to 55MHz first i.f. reduces image problems.
Synchronous a.m. detector gives good audio from weak, fading or distorted a.m. signals.
Voltage step-up circuit provides higher voltage for tuning Varicap diodes, reducing phase-modulation or distortion problems.

Against

Low supply voltage (3V or less) means small signal voltage swings, hence limited dynamic range of amplifiers.
Synchronous detector is unduly susceptible to phase/frequency modulation; reacts to supposedly inaudible phase modulated data signals carried by some a.m. transmitters.
Local oscillator has wide tuning range (50-90MHz) so is more prone to phase noise effects.
Diodes used for band switching and filter switching have low forward currents (100-250μA) when on, and low reverse voltages (0-600mV) when off, so could cause distortion or capacitive feed-through problems.
Audio performance is rather poor and the three-position audio tone switch is not very effective. An external audio filter or processor unit is recommended for the serious listener.

That just about wraps up the do-it-yourself guide to hot-rodding the 2001D and all that you need now are some "go-faster stripes" to complete the picture! □

Recommended Reading

[4]"The W-Q MW Loop" by G.S Maynard; *Practical Wireless* November 1985.
[5]*RDI Evaluates the Sony ICF2010/ICF-2001D Receiver* - by Lawrence Magne; pub Radio Database International March 1987.
[6]"Angus McKenzie Tests Sony ICF-2001D"; *Amateur Radio* May 1986.

Useful Addresses

Sony UK Ltd., Sony House, South Street, Staines, Middlesex TW18 4PF. Tel: (0784) 467000
Radio West, 850 Anns Way Drive, Vista, California 92083, USA. Tel: (619) 726-3910
Radio Database Int., IBS Ltd., PO Box 300, Penns Park, PA 18943, USA.
Specialised Electronic Services (Sony Service Centre), Unit 4, Goose Green Trading Estate, 47 East Dulwich Road, London SE22 9BS. Tel: 01-693-9622.

Abbreviations

a.m.	amplitude modulation
f.e.t.	field effect transistor
i.f.	intermediate frequency
kΩ	kilohms
l.e.d.	light emitting diode
MHz	megahertz
mV	millivolts
p.l.l.	phase locked loop
V	volts
μA	microamps
μV	microvolts

When you are ready to graduate to real listening Look to Lowe

The R-2000 from Kenwood
150kHz-30MHz. SSB/AM/CW/FM
VC-10 converter 118-174 MHz
R-2000 . . . . £595
VC-10 . . . . £162

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VC-10 converter 118-174 MHz
R-5000 . . . . £875
VC-20 . . . . £167

The NRD-525 from JRC
Simply the best receiver you could buy . . . **£1095**

What do I mean by "When you are ready to graduate"? Well, like all hobbies or pastimes, short wave listening is a progressive hobby, and many people come to it almost by accident when they hear an unusual broadcast station on their ordinary domestic radio, particularly if the radio has a short wave band. Interest is aroused, and before long the listener begins to wonder why there are some signals he cannot resolve. He may well turn to the pages of Short Wave Magazine for advice, and become familiar with terms such as SSB, RTTY, selectivity, propagation, and so on.

It is at this point that our worthy listener takes his first step in upgrading his equipment, and comes out of primary education into more advanced listening. Many people at this same point rush along to their nearest High Street multiple retail store and buy what they are told is a "Short Wave Radio", bristling with push buttons and coloured knobs. Sadly, the so-called "Short Wave Radio" is often no more than a domestic portable with a fancy front panel, and the performance when used for anything other than casual listening is no better than the old radio with which he started — in fact it's often worse.

So — these push button portables are excellent for taking on holiday, or carrying to the river bank during a fishing trip, but for real listening — no, no, no.

Our listener is about to graduate from the University of Short Wave Listening, and armed with the knowledge of what he really needs for his hobby will proceed to find a suitable receiver for his purposes. Now it is true that the cost of a properly designed short wave receiver will be higher than the domestic portables; but not so much higher as to be prohibitive, and by going to a specialist (and I mean a true specialist, not someone who talks about "Tranny Radios"), the listener will get good advice based on years of experience in the field, and access to not only new receivers but usually a range of guaranteed second hand units as well. The specialist will also stock and sell a full range of necessary accessories, ranging from simple aerial insulators to complex morse and RTTY decoders for more advanced enthusiasts.

You may get the impression that I am referring to Lowe Electronics when I talk about a specialist dealer, and of course I am. After 25 years of specialising, it is generally accepted that we are without equal, and this is re-inforced by the fact that we have been appointed by so many leading manufacturers to represent their products. As a final point, how many other companies in the UK have designed, built, and sold a real short wave receiver to 17 countries around the world. WE HAVE.

The receivers shown on this page are representative of the best in the world, and are on show at all our branches and at selected dealers throughout the UK. For full information on how to choose your short wave radio, just send off for our "Listeners Guide" (details below), or call and ask. We are happy to help, and we know what we are talking about.

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The best known, most respected scanner, in the world. The AR-2002 offers continuous coverage from 25-550MHz and 800 – 1300MHz, and all mode (AM, FM(W), FM(N)). This scanner has consistently been the leader in the field, and has yet to be equalled. Scanning, searching, just enjoying listening; it's all there with the AR-2002.

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ANTENNAS

F. C. Judd G2BCX
Part 10

Fred Judd continues this month with some more information on beams before moving onto the helical antenna.

Parasitic Beams with Two Driven Elements

Whilst a multi-element, long Yagi can provide a high degree of directivity gain, the physical length and additional weight - even for 144MHz operation - could prove too much for small rotators and present a large area to high winds. By employing two driven elements in either endfire or broadside configuration (see Part 7) with close spacing between the directors, parasitic beams only two-thirds the length of a long Yagi can be constructed to provide the same directivity gain.

The G2BCX 16-element beam, designed for operation on 144MHz, has a forward directivity gain of 16dBd. The measured horizontal radiation pattern is shown in Fig.10.1. It uses two driven elements phased 180 degrees and is less than two-thirds the length of a well-known, commercially made Yagi with the same forward gain. Another example is a parasitic beam for the 28MHz band - the ZL5-10, shown in Fig.10.2. It employs two driven elements phased 135 degrees, and with three directors has a directivity gain of 9dBd. It is about two-thirds the length of a Yagi with the same gain factor and horizontal radiation pattern. For constructional details of the G2BCX 16-element beam refer to that indispensable book *Out of Thin Air* (available from the *SWM* Book Service) and for the ZL5-10 see the March 1986 issue of *Practical Wireless*.

Crossed Linear and Parasitic Beams

A half-wave dipole radiates a linearly polarised wave and the polarisation mode

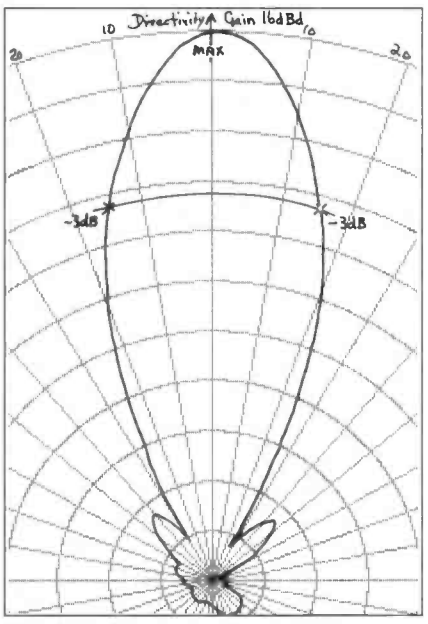


Fig. 10.1. Measured horizontal radiation of the G2BCX 16-element beam for 144MHz, see text.

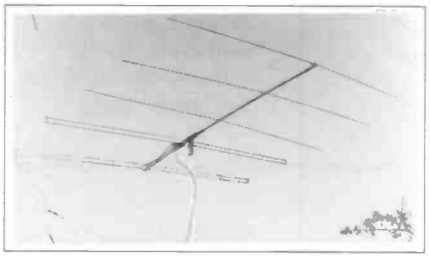


Fig. 10.2. The ZL5-10 5-element beam for the 28MHz band employing two driven elements and three parasitic directors; no reflector is necessary for this configuration.

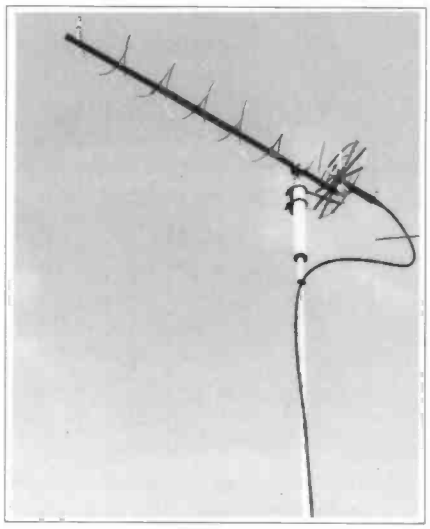
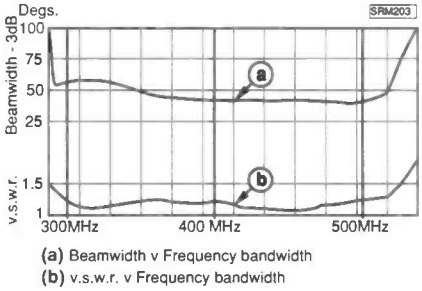


Fig. 10.3. A 6-turn helical antenna for 430MHz with a 400MHz centre frequency; see text and Figs. 10.4 and 10.5.

is determined by orientation, i.e. radiation is vertically polarised with the antenna vertical and vice-versa when the antenna is horizontal; refer to the combined radiation pattern Fig.1.4, Part 1. If the radiation from two dipoles, one vertical and one horizontal, is combined and the currents in each radiator have a 90 degree phase difference, the result is "circular" polarisation. However, as the radiated fields are identical in magnitude, power from the transmitter is equally divided between the two dipoles. The overall directivity gain for circular polarisation is therefore 3dB less than that for a single dipole.

The same applies to an identical pair of Yagi beams, crossed at right angles to each other and which may be switched to operate individually to obtain either horizontal or vertical polarisation with directivity gain as for a single antenna. If they are driven together, as described above, the combined radiation will be circularly polarised but the overall directivity gain will be 3dB less than that obtained with a single antenna.

With a suitable phasing system a crossed Yagi pair can also be made to



(a) Beamwidth v Frequency bandwidth
(b) v.s.w.r. v Frequency bandwidth

Fig. 10.4. Bandwidth versus v.s.w.r. of the 6-turn helical shown in Fig. 10.3.

provide "slant" polarisation at either 45 or 135 degrees and circular polarisation in a "right" or "left" hand direction - although for these modes there will still be the 3dB loss in directivity gain for reasons already explained.

The Helical Antenna

Circular polarisation, in a left or right hand direction, is one of the features of the helical antenna, the others being reasonably constant maximum radiation and a low v.s.w.r. over a wide frequency range. The helical antenna can be made to operate in a number of modes, but the most commonly used is the "axial" mode in which maximum radiation is in the

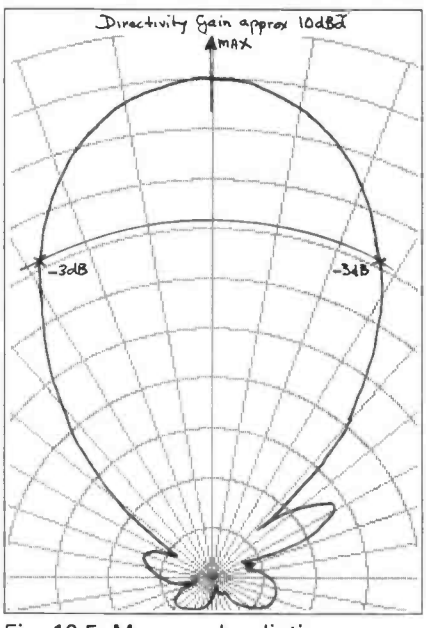


Fig. 10.5. Measured radiation pattern of the 6-turn helical shown in Fig. 10.3.

direction of the helix axis and is circularly polarised. The rotation direction of polarisation depends on whether the helix is wound with the turns going left or right handed (like a screw thread). This mode of radiation occurs when the circumference of the helix is approximately one wavelength diameter at the centre frequency of the chosen operational band.

Axial mode helicals are not difficult to construct and can be matched directly with a 50Ω coaxial transmission line. The broadband function, forward directivity gain, feed impedance etc., remain almost constant over a frequency range of 2:1. For example, a 6-turn helix with a 14 degree pitch and a diameter of one wavelength, as shown in Fig. 10.3, has a bandwidth from about 300 to 500MHz based on a centre frequency of 400MHz. Maximum forward directivity gain is on average 10dBd, and the v.s.w.r. as in Fig. 10.4 remains below 1.5:1 over the whole of the functional frequency band.

The forward radiation pattern for a multiple-turn helical antenna does vary somewhat over a 2:1 frequency range with the beamwidth at -3dB being a little narrower at the highest frequency and a little wider at the lowest. The "measured" radiation pattern for the 6-turn helical, as above, is shown in Fig. 10.5. Helicals are frequently used for communication via satellite repeater stations from which wave polarisation changes during orbit.

Beam Antenna Coverage

A beam antenna with a fairly high directivity gain - say 10 to 16dBd - is an asset when v.h.f. and u.h.f. tropospheric "lift" conditions prevail and working distances are often extended to several hundred miles. At distances of this order the arc of "coverage" based on the angles at which radiation is 3dB down from maximum can be quite wide. The print-out, Fig. 10.6, from a computer program devised by the writer, gives some idea of how wide the arc of coverage can be. The radiation pattern shown is that of a 12-element beam for the 144MHz band with the -3dB points marked "X". The computer program will produce a v.d.u. graphic, as Fig. 10.6, of the radiation pattern of an antenna located at any place on the map. The magnitude of the pattern can be chosen as required and the direction of maximum radiation set to any angle over 360 degrees. It is quite a simple job to obtain a similar presentation by drawing the horizontal radiation pattern of an antenna on tracing paper, with the angles related to -3dB for the main lobe, or lobes, and use it as a rotatable overlay on a map. □

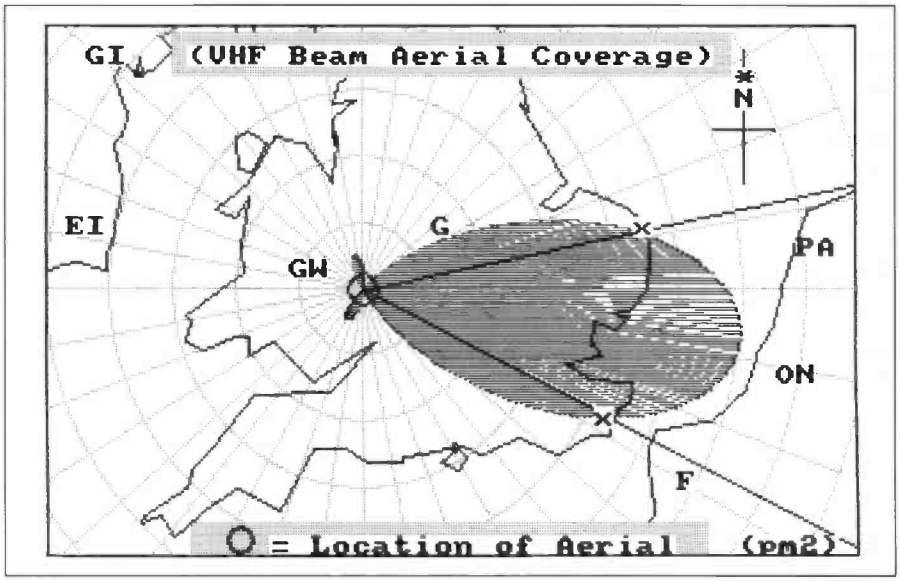


Fig. 10.6. v.h.f./u.h.f. beam antenna "coverage" relative to the angles of radiation at -3dB and either side of maximum.

Abbreviations	
dB	decibel
dBd	gain relative to a half-wave dipole
MHz	megahertz
m	metre
u.h.f.	ultra-high frequency
v.h.f.	very high frequency
v.d.u.	visual display unit
v.s.w.r.	voltage standing wave ratio
Ω	ohms

Next time we will look at the log-periodic dipole array and some special antennas.

BANDSCAN

Peter Laughton

The French company is planning to install three high-power short wave transmitters and to lease airtime to interested international broadcasters. "Bandscan" called up the company, Media Connection International in Paris.

Cape Verde

They told us the project is to build a transmitter site in Cape Verde. Three 500kW transmitters will be built on the island of Santo Domingo, near Praia, the capital of Cape Verde. They have no plans to make any programmes themselves. Instead, they intend to lease the transmitters to international short wave stations, such as Radio France International, the Voice of America or Japan's NHK, which are already using relay transmitters to cover their target areas. Radio France, for example, rents air time on Africa No. 1 in Gabon to cover the African continent. So, this new transmitter site will be available for hire by any major international broadcaster.

The three transmitters on Cape Verde will be able to cover all of Africa, as well as the Americas. The site is strategically located in the middle of the Atlantic Ocean, and studies carried out by MCI indicate that propagation for South America is excellent. Besides the strategic location, the French company chose Cape Verde because the islands' government was willing to grant a permit. In turn, MCI will pay taxes on the islands and turn over 5 per cent of its revenues to the Cape Verdian government.

Media Connection International is a private group based in Paris. This project is a commercial venture, and they have carried out feasibility studies that show the project could generate around £6 million a year. So far, Radio France International has shown a strong interest in the project, as have NHK Radio Japan and the Voice of the America. Although MCI haven't yet signed any contracts, they do have letters of intent. As things stand now, they plan to start broadcasting in 18 months, so that's in mid 1991. The name of the station will be "Onda Verde".

Since the station is located off the West African coast, it could be a serious competitor to Africa Number One, the commercial station in Gabon which is doing very well, especially in Francophone Africa. But, MCI has contacted Africa Number One and a joint venture is not being excluded. Under the agreement signed between MCI and Cape Verde, the transmitters will be turned over to the island's government in 25 years.

Radio Phone Lines

In the past few weeks several new radio related telephone lines have opened up,

In the last 18 months we've carried several reports about how international short wave stations are swapping air time with others. There has been a relative lull lately in these swapping agreements. But, now a French company has come up with a new project to be realised just off the coast of West Africa.

BBC 648 which is a regional radio service within BBC World Service has started a Club 648 designed to get young Europeans together. Tel: 01-257 2648 for a curious message. The Club 648 programme runs at 1815UTC on 648kHz only. If listening to the amateur bands is more your style there's a voicebank full of listening tips on (0426) 925240. You need to understand ham radio jargon to follow the messages though.

Radio Netherlands has just changed the number of its answerline. It is open round the clock for comments and feedback on their programmes. The number is 010 31 35 724 222.

Last March, Radio Netherlands stopped broadcasting to the UK at 1830UTC. The 6.020MHz was only fair at best they say, and they didn't feel it was worth continuing the interference battle on the 49m band. It seems a deluge of complaints have reached the station asking them to re-consider. The current schedule shows that this hasn't happened yet, ideally they should get airtime on the 747 or 1008kHz m.w transmitters on the Flevo polder near Lelystad. That would certainly give them good UK coverage.

Albanian Insight

Radio Tirana is the source of much comment in short wave circles. Their programmes have a highly political content and don't tell you much about daily life in the country. Currently they mainly interest political scientists but is a new era round the corner. In their excellent German language "KW Panorama", Radio Austria International's Wolf Harranth rang up Werner Schmidt. He's West German listener who's taken a tour of Radio Tirana recently. Here's a translation of that interview.

"Radio Tirana's interval signal comes from a patriotic song written in the 1960's. Its called 'With pick axe in one hand and rifle in the other', and it tells how the Albanians managed to throw the Soviets out of their country. Last year Radio Tirana's German service had a listener contest. I entered for the fun of it, and ended up winning the first prize. Which was a trip to Albania.

It was certainly amazing, and it turned out to be very different to what I had expected. I took it to be similar to North Korea or parts of Rumania - where everything runs to a strict schedule and criticism is not possible. In contrast I found the people at Radio Tirana quite open. I told them that although they have a strong signal, at least in Europe, their tranmsmissions are so political that they can never appeal to a large audience. They seemed to accept that comment. All the news and features are made in a central newsroom in broadcasting house, and are then translated by the various language departments. Since last year producers in the various language sections have been allowed to make some programmes themselves, for example the mailbag programme.

The power of the transmitters is quite modest, on short wave the maximum power is 100kW. The facilities seem to be a mixture of Chinese and Soviet equipment and it is very old indeed. The studios are very simple with giant tape recorders. The studio technician sits in front of a large panel of rotatary knobs which resembles the control centre of an electric power station rather than a radio studio, but it all seems to be in working order.

In the course of last year a new director was appointed. Napolean Rochi wants to modernise the station, for example by introducing more voices into the programmes and finding ways to liven things up. However, I was surprised at how isolated many of the radio people were. I talked to people in the German service who had never listened to foreign radio stations and had no idea what their colleagues overseas were doing. May be that's why they sound the way they do. They asked me to send them examples of QSL cards and programme schedules from other stations so they could find out what other broadcasters were doing".

SRI Lankan Mystery

After a period of just playing patriotic songs, a clandestine station apparently on the island of Sri Lanka now identifies itself in Singhala as "The Independent Voice" or "the Voice of Freedom". The transmission is daily at 0100-0130, 1300-1330UTC on 4.360MHz. They have also introduced a Sunday morning broadcast at 0330-0410UTC on 7.010MHz, that's in the 7MHz amateur radio band! The

BANDSCAN

programmes of this station strongly attack the rebel JVP party and its guerrilla activities. There is no mention of the station in government communique or in the Sri Lankan newspapers. Signal strength indicates it is at least 10kW and the station is unjammed. All these facts seem to point to a "black clandestine". In other words, it is probably run by the Sri Lankan government to confuse listeners. The secret British operation in Woburn Abbey during the Second World War did a similar job, creating the anti-Nazi station "Der Chef".

Cambodia

The Cambodian media scene is in turmoil, what with the recent withdrawl of the last Vietnamese army units. A recently inaugurated joint Vietnamese-Australian satellite ground station in Ho-Chi-Min city has been making a fortune transmitting footage from hundreds of journalists covering the withdrawal. On the radio front, changes have been afoot for some time. The Voice of the People of Cambodia is currently on 4.910 and 6.090MHz with the "official" external service. But, in addition, there are three unofficial voices.

There's the "Voice of Democratic Kampuchea", supporting the Pohl Pot regime. The transmitters are thought to be in Kunming China. The station disappeared earlier this year before the Chinese crackdown in June. But as the hardline returned in Beijing, so the Voice of Democratic Kampuchea has re-remerged. Transmissions have been noted 0400-0500UTC on 17.680 and 15.110MHz, 0900-1000 on 17.533, 11.870 and 11.780MHz, 1300-1400 on 9.440 and 6.025 and the final broadcast is 2330-0030 on 9.440 and 7.350MHz, all in the Cambodian language. During the winter months, the last broadcast may propagate to Europe.

Then there's the "Voice of the Khmer", used by the Kampuchean Peoples National Liberation Front. This is the voice of Prince Sianoek. The frequency is 6.325MHz with transmission times that include 0430-0700, 1100-1400, and 2300-2400UTC. That station is thought to be in the liberation zone near the Thai border.

The "Voice of the National Army of Democratic Kampuchea" on 5.408MHz has an extended transmission by an hour, so it's now 1000-1630UTC. They're using Vietnamese and Cambodian. The transmitter is also believed to be in the Thai-Cambodian border area.

Cable None

In Holland, the Dutch commission for the media, appointed by the government, has ruled that Cable One is not a foreign station and doesn't fall under the current media law. This operation has studios in Hilversum, and hired a satellite channel on the communications satellite ECS. So as from October 1 cable companies were being advised to remove it from their systems or face £15 000 a day fines. Earlier in October, Cable One lost a court case in which it objected to the ruling that even though it had a holding company in England, most of the disk jockeys, programming and commercials were Dutch. Since Cable One has no terrestrial transmitters, its fate appears to have been sealed. Just before they were deemed illegal though, Radio Broadland bought a major share in Cable One.

Receiver News

We have had several letters asking what has happened to the new super receiver announced by Grove Enterprises, a company in Brasstown North Carolina USA. Their SR-1000 should have been on the market by now, but so far nothing. It seems the newly projected date is March 1990.

Another Capital

Capital Radio is not unique to London. There is one in the Transkei, in Southern Africa and one in the Middle East too. In the past few weeks we noted the English service from Abu Dhabi on 13.605MHz at 2230UTC has a relay of this Middle Eastern "Capital Radio". The DJs were wondering whether anyone was listening to them on short wave.

Hurricane Hugo

Hurricane Hugo caused considerable havoc across a wide area of the Caribbean. Conventional communication links to many of the Windward Islands were broken before the full force of the hurricane struck. The BBC-Deutsche Welle short wave relay station on the island of Antigua suffered some damage, although not too severe. On another part of Antigua, the Voice of America m.w. relay had more material damage.

In their desperate attempt for news from the region, some of the US radio and TV stations have been misusing the amateur bands. It is one thing to listen to the traffic out of the region, quite another to start recording interviews with amateurs in the affected area.

It looks like one of the most important regional broadcasters in the Eastern Caribbean has been badly hit. Radio Antilles on Monserrat normally has a strong signal on 930kHz. In fact the transmitter is hired by several international broadcasters because of its wide coverage area. It could be at least six months before Radio Antilles on Monserrat is operational again. Staff have been laid off for the time being. You may recall that the current owner, Radio Deutsche Welle in Germany, was trying to sell it. Indeed the Organisation of East Caribbean states was interested in buying. Just what the hurricane damage will mean now is still not clear. Radio Antilles is an important outlet for many international broadcasters, including VOA, RCI and the BBC.

BBC and Radio Netherlands Build Relay

Earlier this year we mentioned that Radio Netherlands had spent some £80 000 on an extensive feasibility study into ways to improve reception, especially in South-East Asia and the Far East. The report was submitted to Mr Brinkman, the Dutch Minister for Culture. The station has been looking around for partners, and found one in the form of the BBC World Service. But meanwhile at Radio Netherlands' Bonaire relay station, a new 250kW short wave transmitter is being phased into service, being used for daily operation.

Italian Changes

There is currently no law regulating radio and TV in Italy, private stations are operating there because of a supreme court ruling back in 1975, but after several false starts, it seems that a communications bill, now before the Italian parliament may introduce regulation. We've examined the bill, and it makes no provisions for any private short wave broadcasting. Two classes of licence will be issued, national and local. The authorities are going to divide Italy into sectors, the size of the sector being related to the population.

A city like Milan may consist of one or more sectors, whilst a sector in a sparsely populated part of the country may include several villages. Those with a local licence will have to restrict their coverage to one sector, those with a national licence will be able to set up a network of transmitters across the country and serve many sectors at the same time. Radio stations must operate at least eight hours a day to qualify for a licence. However, the new bill makes no provision for community radio or frequency sharing within a sector. Just how the current 4000 commercial radio stations in Italy will react to this legislation is still unknown, and where does this leave the commercial short wave operations like Italian Radio Relay Service, or the religious station at Forli owned by Adventist World Radio?

Japan: Goodbye to DX Corner?

It's been announced that Kas Matsuda, producer of Radio Japan's popular *DX*

☞23

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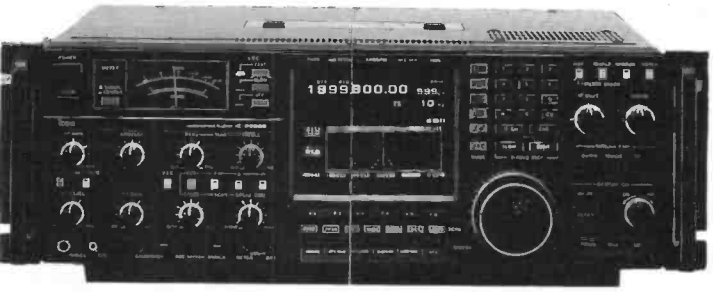

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ICOM IC-R7000HF SCANNER

Mike Richards

There are modified versions of some well-known v.h.f./u.h.f. scanners available on the market which have built-in h.f. converters, saving the cost of a separate h.f. receiver. This month Mike Richards looks at the latest of these, the Icom IC-R7000HF, to see how well it performs.

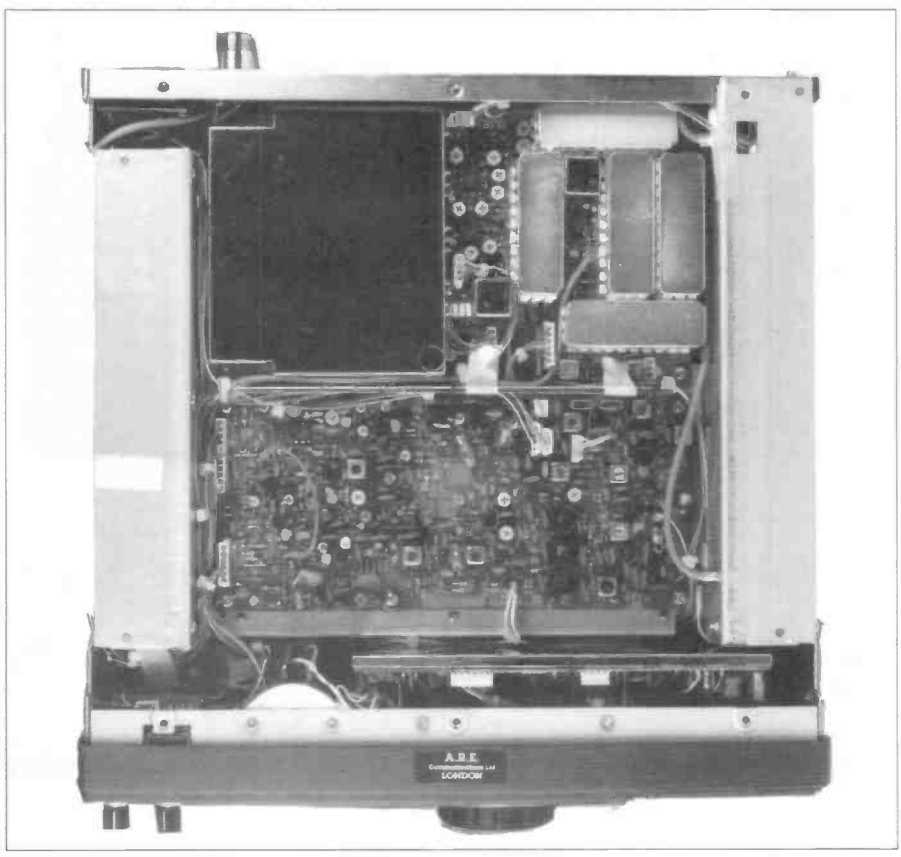
The Icom IC-R7000 is a very sophisticated v.h.f./u.h.f. scanning receiver offering continuous coverage from 25MHz through to 2GHz in standard form. In addition, the IC-R7000 is equipped with demodulators for a.m., f.m., narrow band f.m. and s.s.b. The model reviewed here was supplied by ARE Communications Ltd and was fitted with their h.f. converter giving extended coverage down to 500kHz. This obviously converts the IC-R7000 into a potentially very powerful receiver.

Connecting Up

The first thing to do with a receiver as complex as the IC-R7000HF is to read the operating manual. Fortunately this is a very well presented, easy-to-read A4 book comprising some 36 pages. The presentation style is up to Icom's usual high standard and good use is made of charts and diagrams to simplify the descriptions. In addition to the manual, there is a full circuit diagram which, as you can imagine, is quite complicated and occupies both sides of a 300 x 820mm sheet!

Obviously the first task is to sort out the connections, starting with the power supply. As opposed to amateur transceivers which use external power supplies the IC-R7000HF uses its own built-in power unit which can be set for either 110V, 117V or 230V a.c. mains. The power lead consisted of an IEC plug and socket combination at the receiver end and a moulded 2-pin plug on the other.

Moving to the antenna connections, there are two sockets provided. The main v.h.f./u.h.f. antenna socket is a good quality N-type socket mounted on the rear panel. I must say I was pleased to see a good quality socket fitted here as so many receivers seem to use a variety of totally inappropriate and lossy connectors.



As the ARE modification allows h.f. reception, a separate socket is required. Rather than drill any of the panels ARE have taken over the spare socket on the rear panel for the h.f. antenna connection. Although this is a phono socket, which is not really ideal for r.f. use, the losses at h.f. are minimal so it does not represent a problem. To simplify the antenna connection a PL-259 to phono socket adaptor is provided with the h.f. conversion.

In addition to these basic connections the IC-R7000HF offers a range of features designed to make life easy for the operator.

Although the internal speaker is very good, a 3.5mm jack is provided on the rear panel for the connection of an external speaker. The impedance driving capabilities of this output are 4 to 8 ohms and the internal speaker is disabled when the external speaker is in use.

If you prefer headphone listening there is a standard 6.3mm jack on the front panel which is very convenient. As with the external speaker socket the internal speaker is disabled when this is in use.

For recording signals off air the IC-R7000HF is well equiped with a 3.5mm fixed low level audio output on the front panel. Additional recording facilities are provided on the rear panel in the form of

ICOM IC-R7000HF SCANNER

a remote phono socket which is linked to the squelch line. This can be used to remotely control a tape recorder so that recordings are only made when the squelch is lifted - a very novel feature. Just to finish off the recording facilities, a button on the rear panel can be operated to include the output from the optional speech synthesiser with the recorded signal. Very handy if you are recording a selection of frequencies using one of the scan modes.

Another potentially very useful signal output is the 10.7MHz second i.f. signal which is available via a phono jack on the rear panel. This wideband output is particularly useful for those who want to add additional features to the already comprehensive specification. An example might be to add a high quality f.m. i.f. strip and stereo decoder for stereo broadcast reception. One point to watch if using this output, though, is that the signal is superimposed on a 9V d.c. voltage.

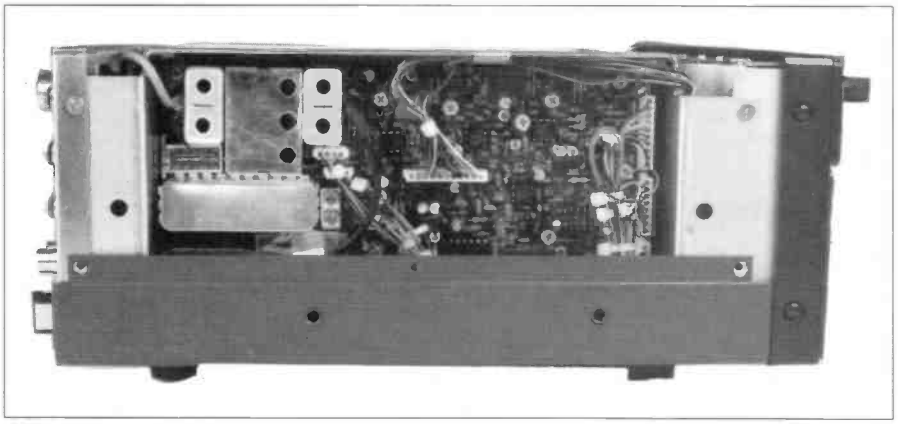
For those interested in computer control an Icom CI-V serial communications port is also provided. There is also an optional CT-17 level converter available allowing this port to be connected to a standard RS-232 interface.

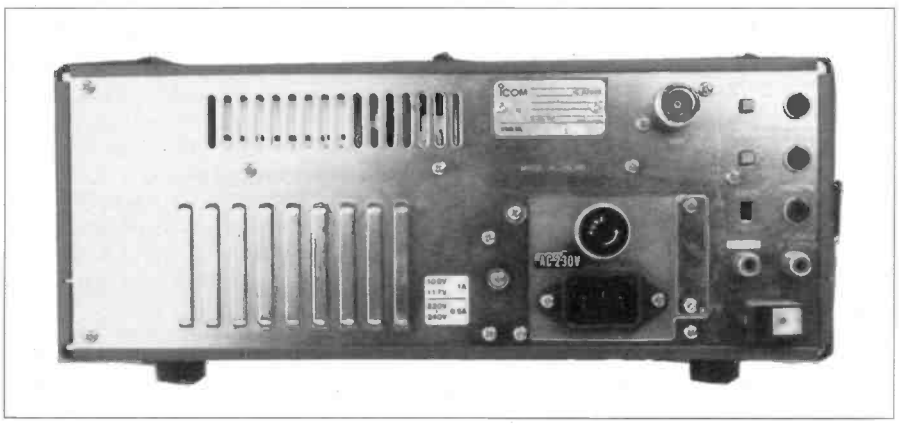
As you can see the IC-R7000HF is very well equipped for its v.h.f./u.h.f. monitoring role.

Facilities

Probably one of the most important operational features of a receiver of this type is the frequency selection methods. In this area the IC-R7000HF includes a combination of the techniques used in conventional h.f. receivers and v.h.f. scanners. The first and most obvious is to use the large tuning knob which dominates the front panel. This knob is fitted with a finger indent to aid rapid tuning and had a very pleasant feel with just the right amount of weight. The feel of this control can be adjusted by a screw located on the bottom panel immediately below the tuning control. As with most modern rotary controls the Icom uses a digital shaft encoder with a stepped output of fifty steps per revolution. The frequency steps associated with the rotary control can be selected using another rotary control on the front panel. The options are 25, 12.5, 10 and 5kHz, 1 and 100Hz - quite impressive! Another useful feature associated with this control is the lock button on the front panel which, when depressed, disables the rotary control - handy for preventing accidental frequency changes! Another feature associated with frequency selection is the optional IC-EX310 voice synthesiser which, when fitted, will speak the frequency whenever the SPEECH button is pressed. This is obviously a great boon for the visually handicapped listener and, as I mentioned earlier when discussing the connections, can also be fed to a tape recorder.

In addition to using the main tuning knob, a keypad is provided for the direct entry of frequency. This is obviously very useful for rapid frequency changes which with a range of nearly 2000MHz is essential! The logic used for direct frequency entry is very comprehensive and automatically handled trailing zeros, thus saving operator time.





As you would expect from a receiver of this type there are plenty of memories provided for storing your favourite frequencies - 99 in total. These are not arranged in banks like many other scanning receivers, but are nevertheless very versatile.

The required channel number can be selected in one of two ways. Either by using the twelve way rotary knob on the front panel, or by direct entry using the keypad. In both cases the channel number is clearly indicated on the far right of the display.

The rotary switch is in effect a motion detector with each clockwise click incrementing the channel number by one and vice versa. Direct channel number entry also utilised the rotary switch which in addition to its rotary movement acted as a push switch. Once the required channel number had been entered via the keypad a single press of the rotary control activated that channel. I thought this was quite a novel way of minimising the number of controls on the front panel.

Once a memory channel had been selected, the main rotary tuning control remained active and can be used to check adjacent frequencies for activity or just for tuning around. Of course some of the memories can be set to particular band edges and used as a quick method of selecting those bands. For example if you are interested in amateur transmissions you can store 144MHz in one memory and 432MHz in another, selecting those memories would instantly set the receiver to the required band whereupon the main tuning control can be used to check the band for activity.

Associated with this is a button marked M-SET which, when pressed, returned operation to that stored in the memory which is very useful for checking memory contents whilst tuning around.

For receiving frequencies above 1GHz the button on the front panel marked appropriately 1GHz has to be pressed, this then gave access to the frequecy range 1025MHz through to 1999MHz.

ICOM IC-R7000HF SCANNER

Specifications

Frequency Range
25MHz - 999.999MHz
1025MHz - 1999.999MHz

Modes A3E (a.m.), F3E (f.m.) and J3E (s.s.b.)

Sensitivity 25MHz - 999.999MHz
n.b.f.m. > 0.5µV for 12dB SINAD
f.m. > 1.0µV for 12dB SINAD
a.m. > 1.0µV for 10dB S:N
s.s.b. >0.3µV for 10dB S:N

Selectivity f.m.,a.m. 7.5kHz at -6dB
n.b.f.m. 3kHz at -6dB
f.m. 75kHz at -6dB
s.s.b. 1.4kHz at -6dB

Spurious and Image rejection
<60dB

Frequency Stability
below 1GHz 5ppm 0-50°C
above 1GHz 10ppm 0-50°C

Intermediate Frequencies
1st 778.7MHz or 266.7MHz
2nd 10.7MHz
3rd 455kHz except wide f.m.

Power Supply
110V, 220V or 234V a.c. 50/60Hz

Current drain
1.7A maximum

Audio Output
2.5 watts into 8Ω at 10% distortion

Dimensions 286 x 110 x 276mm

Weight 8.0kg

Operation of the 1GHz button is indicated on the display by a red 1GHz symbol rather than inserting an extra digit at the front of the displayed frequency.

As I mentioned earlier the IC-R7000HF is a real multi-mode receiver with a.m., f.m., n.b.f.m. and s.s.b. included as standard. All the modes are selected by a single press of the appropriate button adjacent to the direct entry keypad. Of course just selecting s.s.b. is not always good enough as the transmission can be upper or lower sideband! The normal mode at v.h.f./u.h.f. is upper sideband but the IC-R7000HF can be set to receive lower sideband by operating a small slide switch on the rear panel.

An unusual feature of the IC-R7000HF is the inclusion of three switched f.m. i.f. bandwidths - 6, 15 and 150kHz. These are selected using a combination of the FM and FMN buttons on the front panel and the FM 1 and 2 switch on the rear panel.

When receiving a.m. or s.s.b. it is quite common to be troubled by impulsive noise from vehicles, etc., and to counter this the IC-R7000HF is fitted with a fixed noise blanker which can be switched in via the front panel.

With the very high signal levels often encountered at some locations, an r.f. attenuator can be very useful to reduce distortions caused by overload of the front end. The IC-R7000HF is fitted with a switchable 20dB attenuator for this purpose.

Scanning

The scanning facilities are a very important part of any v.h.f./u.h.f. receiver as they allow the operator to monitor a large number of low activity channels with minimum effort. The IC-R7000, as you would expect, is set up with some very comprehensive and novel scanning options.

As with most scanners, it is the memory channels that are scanned and this can be achieved in a number of ways.

The first and most straightforward is a simple memory scan which monitored each programmed channel in turn, stopping whenever a signal is encountered which is strong enough to lift the squelch. The action taken by the IC-R7000HF logic on detecting a signal is determined by the setting of the SCAN DELAY switch on the front panel. There are four options available:

1) Wait for squelch to close before continuing the scan.

2) Continue the scan after a 5 second pause.

3) Continue the scan after a 15 second pause.

4) Stop the scan when the squelch is lifted.

Another useful extra is the VSC button which stands for Voice Scan Control. When enabled this prevented the scan from stopping on silent carriers which is obviously a great advantage.

The scan speed can also be altered over a fairly wide range of approximately 2 to 7 channels/second using another rotary control.

Getting back to the subject of scanning modes the IC-R7000HF included a mode scan which scanned all the memories stored in the same mode as that indicated at the start of the scan. This can be a very efficient way of looking at certain types of transmision only.

It is often handy to be able to scan a particular selection of memory channels and the IC-R7000HF achieves this with its Selected Memory Scan. In order to use this facility the operator first has to manually mark the required channels using the SET key. It is also possible to delete individual channels or all channels by simple single key operations. Channels included in the scan are indicated on the display by a decimal point between the first and second digit.

I think all scanners have a priority scan mode and the IC-R7000HF is no exception. Once set the receiver monitors the priority channel in accordance with the setting of the scan delay control mentioned earlier.

A search facility where the receiver searches a user programmed frequency range is another common feature of scanners and in the Icom this is called Programmed Scan. The procedure is to set a high and low frequency limit and mode and the receiver scans from l.f. to h.f. using the frequency step set by the tuning step control. This mode is primarily of use when searching for new stations. An interesting and effective adjunct to this mode is the Auto Write Memory Scan. When activated this scan operated between the frequency limits stored for the programmed scan, but every time a signal strong enough to lift the squelch is encountered that frequency is stored in one of the nineteen auto write memory

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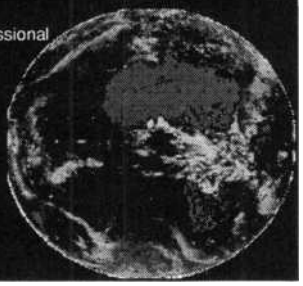

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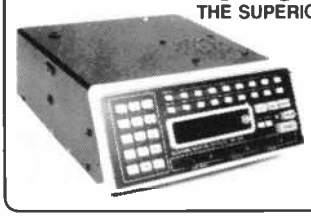

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Access

ICOM IC-R7000HF SCANNER

channels (CH 80 to 99). Obviously a very powerful feature!

On The Air

Although a very complex receiver I found the layout and general operation to be surprisingly straightforward proving that Icom have done their homework on the ergonomics. The main tuning control had a very pleasant feel which is essential if fine tuning is to be comfortable. The wide selection of tuning steps also contributed greatly to the ease of tuning.

I also liked the ability to set the meter to read signal strength or centre tuning. The centre tuning being a particularly useful aid for f.m. DXing.

The direct entry keypad is very positive in operation as are all the push-button controls. I found the frequency entry logic to be fool-proof yet still allowing rapid entry of frequencies.

A common area of complaint with v.h.f./u.h.f. scanners is the quality of the a.m. demodulator but, in the case of the IC-R7000, this is certainly not true, the received quality being very good indeed. The audio balance is an excellent compromise between that required for a.m. broadcast reception and communication use such as air band.

The s.s.b. (and c.w.) audio is unfortunately not quite up to that high standard with weak signals in particular suffering a degree of warbling and roughness. This is caused primarily by the synthisiser which is known to be rather noisy. Despite this criticism the performance is usable.

The n.b.f.m. audio quality is very acceptable but the wideband performance, whilst fine for a receiver of this type and expected use, is a long way from hi-fi standards, with the bottom end being particularly light. The IC-R7000HF can probably be used for high quality reception by using an external i.f. and demodulator fed from the 10.7MHz i.f. output.

The scanning modes are particularly good, being very quick and easy to use. The auto memory write scan is a particular favourite of mine as it allowed me to leave the receiver to find and store active frequencies. All I had to do is move any particularly interesting frequencies from the auto write section into the normal memory range, i.e. below channel 80. The transfer of frequencies from memory to display and then on to another memory is also made easy by the M-SET function.

The ability to vary the scan delay and speed combined with the Voice Scan Control meant that the scan parameters can easily be optimised to suit the required type of transmission.

Although at first I thought the provision of a mode scan to be a little odd, I soon found it to be very useful. An example being to set the mode to f.m. wide and start the scan. The receiver would then effectively be scanning all f.m. broadcast stations stored in memory.

I thought the 1GHz indication on the frequency display could have been improved by actually displaying the real received frequency i.e. adding "1" to the left of the display. I is caught out once or twice with the 1GHz button depressed especially when the receiver is below eye level which tended to obscure the top line of the display.

Whilst I had the IC-R7000HF on review I took the opportunity to check out the performance in the *PW/SWM* lab. I'm pleased to be able to report that the review model exceeded the specification on all counts which, if you examine the specification, is pretty impressive in itself.

Because the h.f. limit of the available test equipment is 1040MHz this is the highest frequency I can test. The sensitivity varied throughout the measured range with maximum sensitivity occuring at around 100MHz. At all frequencies s.s.b. is the most sensitive followed by f.m.(narrow), f.m. (wide) and a.m.

The frequency stability is very good and perfectly statisfactory for use with s.s.b. or c.w., the most critical modes.

Under The Bonnet

The IC-R7000HF is such a good performer I thought it would be quite interesting to take a look inside.

With a sophisticated receiver such as the IC-R7000HF it's not practical to give a full circuit description, so I will confine myself basically to a "block diagram" approach.

The 25 to 999MHz coverage is handled by four diode switched r.f. amplifiers before being applied to the first mixer. The first i.f. is 778.7MHz for frequencies between 25 and 512MHz chanaging to 266.7MHz for 512 to 1000MHz. The reception of frequencies above 1GHz is achieved using a relay switched amplifier and mixer which subtracts 1GHz from the incoming signal.

The second i.f. uses the standard 10.7MHz and is the final i.f. for the f.m. wide mode. All the other modes are demodulated at the final i.f. of 455kHz which is also where the main filtering took place. The noise blanker is, in fact, a noise gate and operated within the 10.7MHz second i.f.

The demodulated audio is processed by integrated circuit pre-amplifier and power amplifier.

All the variable frequency requirements of the IC-R7000HF are met by the phase locked loop module which is controlled by the logic module.

The power supply utilised a d.c. to d.c. converter to generate the wide range of voltages required.

HF Conversion

As the review model is fitted with the ARE h.f. conversion I took the opportunity to examine its performance.

The h.f. converter comprised a separate p.c.b. which occupied the position normally reserved for the IC-EX310 voice synthesiser. There is another space to the side of this which is reserved for the remote controller unit - so you may be able to have the synthesiser or remote control, but not both.

Technically the converter is quite straightforward using the well established SBL-1 double balanced mixer fed with a 100MHz crystal controlled local oscillator. This combination being used to effectively add 100MHz to the incoming h.f. signal, so that it fell within the tuning range of the IC-R7000.

In addition to the r.f. circuitry, there is some logic provided to interface with the Icom's logic and display functions. In fact the logic interfacing is one of the big plus points of this conversion as it made the h.f. converter feel part of the receiver as opposed to an add-on. All the facilities of the IC-R7000HF remain available when in h.f. with the only complication being that when using the direct entry keypad you have to add 100MHz to the required frequency - not really a problem. The display however indicates the actual frequency as the 100MHz digit is suppressed.

The only odd point is the operation of the HF switch on the front panel (ex-dimmer switch) which brought the converter into operation. Although marked HF it had to be depressed for v.h.f. and released for h.f., to my mind this is the reverse of what I would expect.

The performance is actually very good achieving a sensitivity of 0.32µV for 10dB S/N at 14MHz. This sensitivity is maintained throughout the main part of the h.f. spectrum, though, as expected, the sensitivity dropped quite dramatically as the 500kHz lower limit is reached. The use of the SBL-1 double balanced mixer meant that the overload performance of h.f. remained very good - an important factor with some of the very high signal levels to be found on todays bands.

One bonus with the logic interfacing between the Icom and the h.f. converter is that when switched to h.f. an additional 99 memory channels are available. For convenience the conversion is supplied with the first 25 of them set for 1 to 25MHz for use as a MHz band switch.

It is important to realise that the design requirements of h.f. and v.h.f. receivers are really quite different - you only have to compare the facilities of the IC-R7000 with its h.f sister, the IC-R71, to realise this. As a result the IC-R7000HF suffers a few short-comings in its h.f. role. The first concerns the tuning steps which are restricted to a minimum of 100Hz,

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ICOM IC-R7000HF SCANNER

whereas a good h.f. receiver needs 10Hz or 15Hz steps. These small steps are required when resolving some of the narrow-shift data modes such as 170Hz shift RTTY or 200Hz shift Packet. The small steps also allow better audio quality from s.s.b. signals.

Another area of difference is the i.f. filtering, where facilities such as pass-band tuning and bandwidths down to 300Hz are common place among h.f. receivers.

The point I am trying to make is that although as a v.h.f. scanning receiver the IC-R7000HF is clearly in a class of its own, the h.f. performance, albeit very good, is in a different league.

Overall I was very pleased with the h.f. conversion, the performance is good and the installation quality is excellent. The logic interfacing is also well thought out, making it very easy to operate.

Summary

What can I say? The IC-R7000HF is clearly a very competent v.h.f./u.h.f. scanning receiver with the performance and handling to put it in a class of its own. I thoroughly enjoyed using the IC-R7000HF and found the scanning facilities to be very powerful indeed.

I have no hesitation in recommending the IC-R7000HF to anyone who is seriously interested in the v.h.f./u.h.f. bands and the ARE h.f. conversion is an excellent bonus for those who like to keep an interest in h.f. □

Abbreviations

a.c.	alternating current	kHz	kilohertz
a.m.	amplitude modulation	l.f.	low frequency
c.w.	continuous wave (Morse)	MHz	megahertz
		mm	millimetre
d.c.	direct current	p.c.b.	printed circuit board
dB	decibel	r.f.	radio frequency
f.m.	frequency modulation	s.s.b.	single sideband
GHz	gigahertz	S/N	signal to noise
h.f.	high frequency	u.h.f.	ultra high frequency
Hz	hertz	V	volts
i.f.	intermediate frequency	v.h.f.	very high frequency
		μV	microvolt
kg	kilogram	Ω	ohms

The IC-R7000HF is available from: **ARE Communications Ltd., 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. Tel: 01-997 4476.**
The price is £989 inc. VAT. They can also retro-fit the h.f. converter to your existing IC-R7000 receiver for £139 inc. VAT. My thanks to ARE Communications for the loan of the review model.

BANDSCAN

☞13

Corner, is leaving Tokyo to take up a new career in Australia. His last broadcast will be in November. We'd like to take this opportunity to wish Kas all the best for the future, and congratulate him on the hard work he's put into establishing Radio Japan's media programme. He attended a successful meeting of short wave listeners in Virginia USA back in September, in which he passed on the news that the Japanese government has launched a feasibility study into short wave broadcasting via satellite on 26MHz. The idea proposed is to put two satellites into a non-geosynchronous orbit, which would upload programmes as they flew over Japan and replay them over chosen target areas. The scheme could be ready by the end of the next decade. However, Voice of America, who have already made such a study concluded that it is difficult to generate enough radio frequency power at 26MHz from an orbiting satellite to give an acceptable signal on earth, and the costs to develop the special technology are very high indeed.

Abbreviations

kW	kilowatt
m	metre
MHz	megahertz
m.w.	medium wave
UTC	Co-ordinated Universal Time (=GMT)

Consumer Protection Unit

We continue to receive a stream of complaints from people who have ordered publications from Bernd Friedewald, also trading under the firm of Peacewood Publications of Homberg West Germany. Several former agents for the company have written to us to say that they are fed up with complaints and now want nothing more to do with the scheme. Everyone claims to have sent money, and received nothing. A fax from the company has been sent to several radio stations, claiming that because of a change in the computer database software the summer edition was not published but that a winter edition is on the way in September. It had not materialised by the time we went to press. A letter from the publisher in an Italian DX magazine claimed that another project called the *International Broadcasting Handbook* had also been published, but that due to a computer error, some copies of the book had not yet been sent out. It appears to be more the case that no books were sent out.

The *International Listening Guide* seems to be a classic example of a hobby project turned sour. If you send money to a company for a product, you don't expect to wait a year while software is developed to make it, especially when letters are not answered to explain what's going on, and money is not returned to those who don't want to wait. We don't think ILG should rely on other print media to relay news of its progress to paying customers, and for the moment at least, you'd be well advised to stop sending any money until a real product emerges on time.

Let me close by wishing all readers of this column all the best radio conditions over the Christmas and New Year Holiday period. Let's start the new decade with a bumper crop of news! □

AIRBAND

Godfrey Manning G4GLM

Anne Reed RS87871/G-20126 (Cheltenham, Gloucestershire) keeps a North Atlantic Route Chart in her shack which is a very sensible way to improve your understanding of navigation. This is best coupled with an en route radio navigation chart for overland sectors. Although beacons and inertial navigation don't sound like the most exciting things in aviation, the simple truth is that without them, one can't know where an aircraft is - and that goes for the pilot too! Glad you use an earpiece if you take any radio out and about with you, Anne. Lastly, Anne speaks highly of Stan Stewart's *From the Flightdeck 1: Heathrow to Chicago* (Ian Allen). In the same series is No. 3: *BAe 146 in Europe* by Leo Marriott. I've yet to see No. 2 - what's its title? Apparently, one on Concorde is due out in the spring, too.

Those mysterious callsigns are sorted out by Godfrey - with your help, of course. Also, you too can glow in the dark!

Some further details come from **Robert Biggart** (Deputy Flight Operations Manager, Novair International Airways, Gatwick Airport) to whom my thanks go for sending various useful documents - always welcome. A new callsign is first checked by the state's air traffic control service for suitability when read over the radio, and to avoid clashes with similar existing callsigns. The International Civil Aviation Organisation (ICAO) disseminates the agreed callsign worldwide. Here's Novair's story. British Caledonian owned 50 per cent of Calair (a charter operation, CALJET), the rest being owned by Rank. British Airways took over British Caledonian and Calair then became wholly owned by Rank. Part of the agreement was the name change by which Calair became Novair. Sometimes the 3-letter ICAO designator is used as a callsign, e.g. NGK256 instead of STARJET 256.

If you really want a complete list of callsigns you need ICAO Document 8585 *Designators for Aircraft Operating Agencies, Aeronautical Authorities and Services*. This will set you back £18.15 including postage from **David Fairbotham** (Flightdeck - The Airband Shop, 58-62 Lower Hillgate, Stockport, Cheshire SK1 3AN. Tel: 061-480 8080 or (check price before ordering) from Civil Aviation Authority (CAA) Printing and Publication Services, Greville House, 37 Gratton Road, Cheltenham, Gloucestershire GL50 2BN. Tel: (0242) 235151.

Other credits for contributing to the above list go to: **Mike Bennett** (Slough, Berkshire); **Steve Birchall** (RAF Coningsby, Lincolnshire); **Chris Coates** (North Walsham); **Peter J. Cooke** (Liverpool, Merseyside); **J.F. Coulter** (Winchester); **Ian Doyle** (Manchester); **A.G. Halligey** (Bridgend, Mid-Glamorgan); **Dennis Hardingham** (Glasgow); **Ken Holliday** (Norwich) and **Dave Wright** (Sheffield).

Callsigns

This subject has generated more correspondence than anything else so far! Here goes with a complete listing of queried callsigns, plus a couple of extras:

AIRWISE	No information - may be AIRWIGHT (Ellan Vannin) or AIRWEST
ASPRO	Inter European Airways
BIRMEX	Birmingham European Airways (BEA!)
BROADWAY	Fleet Requirements Unit
CITY	NLM City Hopper, Holland
CLIPPER	Pan American World Airways Inc.
EASTEX	Eastern Air Executive Ltd. (Sturgate, Lincs.)
EXPRESS	Federal Express & Flying Tigers merged cargo airline
FORDAIR	Ford Motor Co. Ltd. private airline
GRANITE	Business Air Ltd.
JETSET	Air 2000 Ltd. (Manchester) B737s & 757s
LEISURE	Air UK (Leisure) Ltd.
LION	British International Helicopters Ltd.
LORD	US Army
MACLINE	McAlpine Aviation / Helicopters Ltd, mainly executive charter
MAGEC	McAlpine/GEC, formed when the McAlpine group split up
NEATAX	Northern Executive Aviation Ltd. (Manchester), air taxi
RIOZINC	RTZ Services Ltd.
ROSENBALM	See ROSIE
ROSIE	Rosenbalm Aviation Inc. on behalf of Emery Worldwide and CF Airfreight, cargo, DC-8s to Manchester & Maastricht
SHAMROCK	Aer Lingus
SKYGUARD	Securicor freight
STARJET	Novair, formed when British Caledonian split up (was CALJET)
TEATEA	Belgium
TEASTAR	TEA (UK), a new charter offshoot of TEA Belgium (Birmingham)
TESTER	Empire Test Pilots' School, Boscombe Down
TRANSAT	Air Transat (Quebec), holiday charters to Prestwick, Manchester, Stansted, Gatwick, L1011s (=Transatlantique?)
VICKERS	Vickers Shipbuilding Group Ltd. (Walney Island), single aircraft flying executives to/from London
VIKING	Scanair Ltd, Stockholm (associated with SAS), charters to Stansted and UK overflights using SAS aircraft; also, Viking International Air Freight, Minneapolis which may have ceased operations

Follow-Ups

In October I asked for the location of Wigtown. There is more than one - but the Baldoon variety is to be found at 54°51'N 4°26'W. Originally this was a war-time RAF airfield but is now CAA licenced; its use requires prior permission from its operator, Baldoon Flying Group. Location is 3km south-west of Wigtown, just inland from Wigtown Sands, in south-west Scotland, just 6m above sea level (see *Ordnance Survey Sheet 83 First Series* 1:50000, runways intersect at NX434536). With thanks for the information to J.F. Coulter; **K. Heath** (Winchester, Hampshire); Ken Holliday and **Alan Jarvis** (Cardiff).

Alan Jarvis is still unsure about the new 111.95MHz facility (see October's issue); whereas it could be a new channel 56Y TACAN I await whatever confirmation readers can come up with. Unfortunately I can't relate the relay station frequencies that you query, Alan; my RAF *En Route Supplement* does not give any of the u.h.f. relay frequencies quoted in the *Lowe Airband Guide* as belonging to the airfields that you suggest. Can you confirm where this information came from?

Back now to **Steve Foster** (Burton-

SPECIAL NOTICE TO READERS

Although the proprietors and staff of *SHORT WAVE MAGAZINE* take reasonable precautions to protect the interests of readers by ensuring as far as practicable that advertisements in *SHORT WAVE MAGAZINE* are *bona fide,* the magazine and its Publishers cannot give any undertakings in respect of claims made by advertisers, whether these advertisements are printed as part of the magazine, or are in the form of inserts.

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on-Trent) and his request in the August issue for information on the Cromer radar head beside the B1159 road at Overstrand, Norfolk. Chris Coates reports this to belong to Anglia Radar which is actually operated from Stansted; with a radar view of the southern North Sea, gas platform service traffic can be monitored. Now Chris asks about the radar head at Trimmingham on the same road. As previously noted here, there is a communications relay at Trimmingham, but who can advise on the radar?

The Sony ICF2001D and its propensity to pick up short/medium wave breakthrough whilst tuned to v.h.f. is a recurring topic. **Bert Balmforth** (Paisley, Renfrewshire) received simple advise from Sony: don't overload the receiver with short wave signals, but instead disconnect the external a.m. antenna. Bert built the *Practical Wireless* chicken-wire discone (February 1989) and experiences good v.h.f. reception (including broadcasters) but gives a timely warning about the sharp points on the chicken-wire!

Ian Doyle is surprised how few relays transmit the North Atlantic Organised Track Broadcast, but I have no further information on this; presumably, as you suggest, Ian, the coverage is already good enough - especially if received by aircraft at reasonable altitudes. Can anyone tell Ian the location of Brest Radar's transmitters? Yours truly flew to that part of the world for this year's holidays - but when you're up there, you have no idea of the precise location of the people you're talking to down there! Do I have any readers in France?

Museum Piece

A while back I reported how one reader used an ultra-violet (u.v.) source to make the dial faces of certain aircraft instruments fluorescent orange in the dark (a minority glow with other colours, notably green). A readily available source is one intended for reading "invisible" security marking pens: the TLPM901 (£10.95) which includes a 4W u.v. tube (spare tube TL902R, £6.20) from Topline International, Topline House, Bartlow Road, Linton, Cambridge CB1 6LY. Tel: (0223) 893913. Add £2 postage to orders. You will also need four AA alkaline batteries. Try it. It works!

Frequency & Operational News

The *General Aviation Safety Information Leaflet* 9/89 from the CAA reports that the n.d.b. on 377kHz at Aberdeen has a new ident. of AOS (di-dah, dah-dah-dah, di-di-dit). NOTAM A553 introduces a d.m.e. at Barrow/Walney Island. Warton Aerodrome (operated by British Aerospace) may not be overflown without clearance; if there's no reply on Warton's frequency then Blackpool must be contacted. The CAA's *Aeronautical Information Circular* 91/1989 suggests that one of the Humberside n.d.b.s has a new ident of KIM (dah-di-dah, di-dit, dah-dah) - but which one? At Islay/Port Ellen runway 14/32 is withdrawn. Now on to accidents and the *AAIB Bulletin* 9/89. During a problem involving a DC-10 at Gatwick the Aerodrome Fire Service-to-Aircraft frequency of 121.6MHz was used.

Alan Jarvis reports a new a.t.i.s. at Cardiff on 119.47MHz. Ian Doyle offers his frequency list to anyone who sends him a reply envelope to 114 Barton Lane, Eccles, Manchester M30 0FG, should appeal to **Geoffrey Powell** among others. Two other published lists are suggested by **Evan Murray** (Auckland, New Zealand). International Telecommunication Union (ITU) *Appendix 27 Aer 2 to the Radio Regulations* is the "Frequency Allotment Plan for the Aeronautical Mobile (R) Service and Related Information." Obtainable from ITU, Geneva. Also: *Confidential Frequency List*, Gilfer Associates Inc., PO Box 239, 52 Park Avenue, Park Ridge, NJ 07656, USA; covers 4-27MHz.

Simon Lucas (location not stated) notes the world-wide primary distress frequency of 5680kHz, used by Edinburgh and Plymouth Rescue. I expect that very varied procedures tend to be used in the heat of a real emergency and it's quite possible that one aircraft could guide others to the scene of an incident. For example, maritime reconnaissance Nimrods carry liferafts which can be dropped from the bomb bay to help survivors.

K. Heath would like to know the Southampton (Eastleigh) frequencies; they are as follows: a.t.i.s. 113.35; Southampton zone 121.3; Approach 128.85; Tower 118.2; Radar 131.0 all MHz.

Time to "call finals" for this month, but don't miss another mind-bending Xmas Quiz in the next issue! The prize is a Victor Tanker fuel contents gauge, and if you win it, you can try out the u.v. fluorescence for yourself.

The next three deadlines (for topical information) are December 1, January 5 and February 2. □

Abbreviations

a.m.	amplitude modulation
a.t.i.s.	automatic terminal information service
CAA	Civil Aviation Authority
d.m.e.	distance measuring equipment
h.f.	high frequency
kHz	kilohertz
km	kilometre
MHz	megahertz
n.d.b.	non-directional beacon
TACAN	Tactical Air Navigation
u.h.f.	ultra high frequency
v.h.f.	very high frequency
u.v.	ultra-violet

The photo of the Lancaster that appeared in the "Airband" section of October *SWM*, should have been credited to Chris Mlynek. Apologies for this omission.

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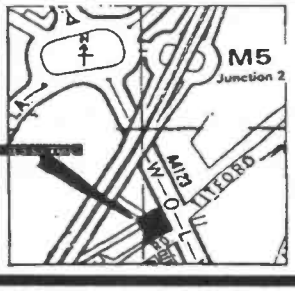

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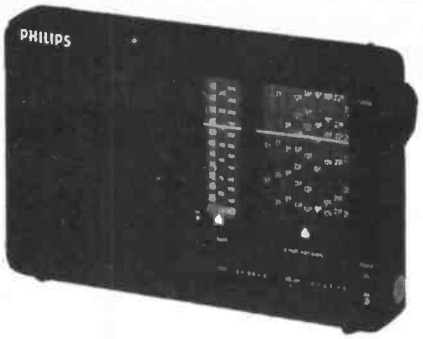

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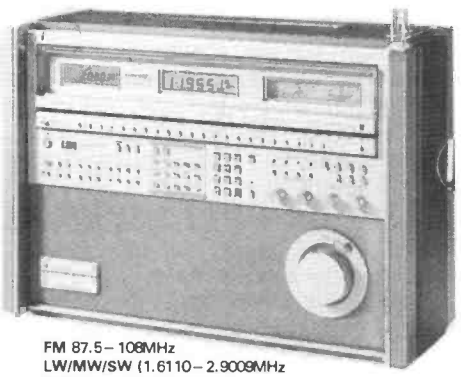

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VHF WEATHER SATELLITE ANTENNA

John Hickin G3PXL

Receiving weather satellite pictures is becoming more and more popular. Several systems are available using a specially designed decoder memory board, or by the use of various computers to achieve the same result.

No matter which system is to be used, the end result can only be as good as the signal fed to the receiver. The starting point for a good signal is the antenna itself. Adding a preamplifier to a poor antenna will only result in more noise in an already weak signal.

The answer, then, has to be to increase the signal at the antenna. After trying different designs, the author found that the antenna described gives the best results.

Referring to Fig. 1 you will see that the design is basically two horizontal, half wave dipoles mounted at at right angles to each other, with a multi-element reflector mounted below. An old BBC 405-line TV antenna or a v.h.f. f.m. radio antenna may be used as the start point. The overall length of each dipole, including the centre insulator, is 1035mm (see Fig.1). This is the optimum length for the centre of the 137MHz weather satellite band.

Mount the two dipoles close together and at right angles to each other on a piece of tubing. Using low-loss 75Ω coaxial, connect a half wave (1035mm) length to each dipole. Using 50Ω coaxial cable for the receiver down-lead, connect the three end braids together. Now join the three inner wires together taking great care to keep braid and inner connections apart. These two connections, as in Fig. 2, must now be sealed from the weather. Self-amalgamating tape can be used to form a good weather-proof seal around the joins. If this tape is not available, then pvc electrical tape may be used to do the job, although it is not quite as good as the self-amalgamating type as it deteriorates in sunlight.

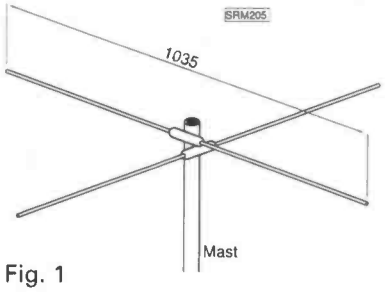


Fig. 1

YOU WILL NEED

2 off v.h.f. TV dipoles; 1 off 16 or 18 s.w.g. aluminium plate 100mm square; 1 off antenna mast 750mm long minimum; 1 off vertical capacitor mounting clip; 2 lengths 75Ω low-loss coaxial cable (1035mm); 1 length of 50Ω coaxial (as required to receiver); Self-amalgamating tape; Nuts, bolts and screws, as required.

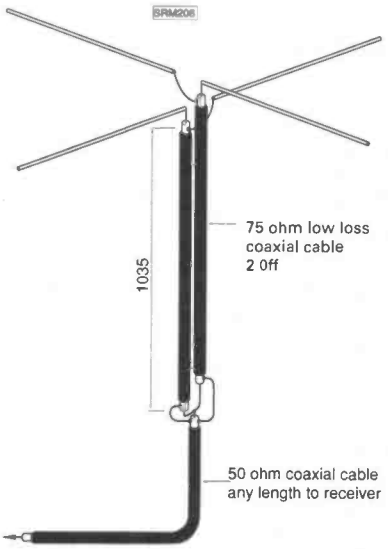


Fig. 2

Reflector

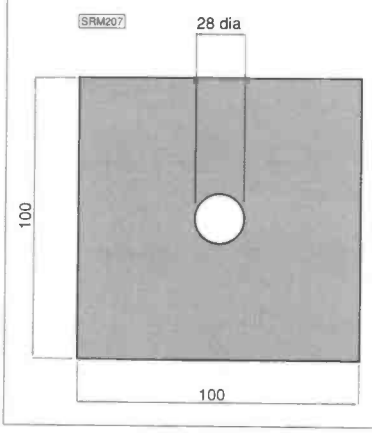
To construct the reflector, start with a piece of 16 or 18s.w.g. aluminium plate of 100mm diameter or square. Cut a hole of 28mm diameter, or to suit the tubing used, in the centre of the disc as shown in Fig. 3. Mount a capacitor clip, to grip the tubing tightly, over the central hole in the plate. Taking eight 500mm lengths of aluminium tubing of about 6mm diameter, fix them on the plate as shown in Fig. 4. Two self-tapping screws or bolts should be used to secure each one to the plate such that the overall distance between each pair of ends is 1035mm.

To complete the construction, slide the reflector plate up the tubing to a distance of 560mm from the vertical mid-point of the two crossed dipoles and clamp the capacitor clip to secure the reflector to the tube.

For best results mount the antenna as high as possible away from buildings and trees. If it is accessible, the reflector may be adjusted up or down for best results up to a maximum of 25mm in either direction.

Using the above antenna I can receive pictures from as far south as the Canary Islands near the Tropic of Cancer, as far east as Syria, Cyprus and Turkey, and as far north as Iceland and Greenland. Signals are steady and may last as long as 13 to 14 minutes between acquisition (a.o.s.) and loss of signal (l.o.s.).

Fig. 3



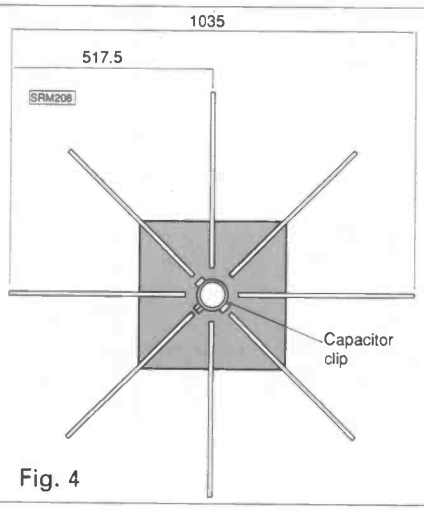


Fig. 4

Abbreviations

a.o.s.	acquisition of signal
f.m.	frequency modulation
l.o.s.	loss of signal
mm	millimetres
pvc	polyvinylchloride
s.w.g.	standard wire gauge
TV	television
v.h.f	very high frequency
Ω	ohms

SONY ICF-7601L

Peter Shore

Pocket sized s.w. radios are, it seems, all the rage at present, and the new Sony ICF-7601L travel portable fits nicely into this group. Of traditional analogue design, the new Sony, in its European guise, boasts 12 bands, including nine s.w. bands, together with f.m., m.w. and l.w. This set, which replaces the earlier ICF-7600, offers much improved s.w. coverage, an area in which the previous set had serious shortcomings.

Whilst s.w. is not covered continuously, it does provide the broadcast bands from 21MHz (13m) through to 4.7MHz (60m), including the 13MHz (21m) band, now increasingly used by a number of international broadcasters, in advance of its official release by the International Telecommunication Union. The 25MHz (11m) band is excluded from the 7601's range, but despite the increase in activity on this band as we head towards the sunspot maximum, this is of less importance on a set of this type. As will be seen from the specifications, out-of-band frequencies are well covered.

It should be noted that sets sold outside Europe do not have l.w., but instead offer the 75, 90 and 120m bands in one tuning scale. This may be seen by some potential purchasers in Europe as a disadvantage since it precludes listening to stations on the 75m band which is used by some European broadcasters, and the tropical bands for African stations in particular.

Operation

Operating the radio is simplicity itself. The four band-select buttons (f.m., m.w., l.w., s.w.1-9) act as "power on" controls, and an l.e.d. shines in the appropriate button to indicate which band is selected. Selection of the individual s.w. bands is by means of a sliding control beneath the large and clearly marked tuning dial. A light blue indicator at the bottom of the dial shows which band has been chosen and a rotary knob on the right-hand side of the set tunes in the frequency with the dial, calibrated in 5kHz steps, is reasonably accurate and allows easy tuning of stations on known frequencies, and can assist the user in identifying the frequency of catches made. One disappointment with the tuning knob is that only 50 per cent of the circumference is exposed, which makes quick sweeps across a band less than easy.

Are you already confused by Sony's receiver designations? Well, here's news of another new radio with a remarkably similar name to others on the market.

A "hold" facility locks the set to whichever band (f.m., l.w., m.w., s.w.1-9) is selected, but not to the individual frequency, so the radio could be knocked off channel accidentally even when the "hold" button had been used. However, this control does act as a main power control, useful when travelling to ensure that the set is not switched on unintentionally.

Audio Quality

Audio quality is good - a reasonably sized speaker next to the tuning dial offers ample output for table-top use and a 3.5mm socket gives scope for the use of an earpiece (included with the set) or headphones. Volume and tone controls are beneath the tuning knob on the right side of the radio, although the two position tone control (news or music) seems to have very limited affect on the audio output, but may be of some use when trying to reduce whistles on s.w..

There is only one bandwidth for s.w. which at the -6dB point appears to be marginally over 5kHz. This is fine for general broadcast listening, but may prove less suitable for DX work when trying to listen to weak stations next to "powerhouse" signals. However, selectivity is judged overall to be good, and sensitivity is also good, with few signs of the overloading which occurs on some similar sized receivers. The six section telescopic antenna provides, on the whole, adequate reception, although a compact long-wire antenna is included with the radio. This is housed in a small box around 50mm square by 10mm deep, looking rather like a steel tape measure at first glance. It contains a long length of wire with a sleeve at one end to slip over the telescopic antenna, and is useful when travelling as it can be hung out of windows or draped around curtains.

The ICF-7601L does suffer from some spurious signals generated by the set itself, and indeed the handbook mentions that 5.903, 6.207, 11.503, 11.958 and 21.870MHz may be difficult to receive for this very reason.

SONY ICF-7601L

The radio is powered by four AA cells, and these will last for around 26 hours on s.w. An optional 6V d.c. adaptor is available (included in some markets).

Summary

The Sony ICF-7601 is, overall, a good s.w. receiver for general use, offering good all-round performance, with sensitivity and selectivity at least as good as any of the other comparable sets available today. A reasonably accurate analogue dial all but does away with the need for a digital frequency display. The radio being well built and pleasantly designed, offers good audio quality for s.w. listening. An ideal travelling companion, or simply as a set to listen to at home, the ICF-7601 will set you back £79.95. **Sony (UK) Ltd, Sony House, South Street, Staines, Middlesex TW18 4PF** □

Specifications

Frequency range	
f.m.	87.6-108MHz
m.w.	525-1610kHz (to 1750kHz in N. America)
l.w.	145-285kHz (excluded in some markets)
s.w.1	4.60-5.20MHz
s.w.2	5.80-6.40MHz
s.w.3	6.90-7.50MHz
s.w.4	9.40-10.00MHz
s.w.5	11.55-12.15MHz
s.w.6	13.45-14.05MHz
s.w.7	15.00-15.65MHz
s.w.8	17.50-18.15MHz
s.w.9	21.35-21.95MHz
	(2.20-4.20MHz replaces l.w. in some markets)
Power Source	Battery 6V (4xAA cells)
	Optional 6V d.c. adaptor (Sony a.c.-D4M)
Power Output	450mW
Dimensions	192.5x122x35mm

THE SECRET LISTENER

By Mikhail Drakov (s.w.l.)

A tale of haunting intrigue and ingenuity on the part of a youthful radio enthusiast.

In my youth I was fascinated by the new science of radio. Alas, my father was not sympathetic to my desires to build a broadcast receiver and forbade any such activity, which he deemed to be fit for the devil. True to say few folk did not fear the unknown.

I resolved that if I could do so, I would contrive a secret set. Thus upon the toilet seat a ploy was formed from the basic learning I had scrounged from library articles.

My chosen design was for a one-valve regenerative set. One valve was as much as I needed and costly at that. The capacitor was a very nice variable type. However, it seemed that such an item was all too rare at that time, so I decided on a fixed capacitance and a variable inductance.

Where on earth was it to go? It had to be practical and efficient, yet needed to be as discreet as possible. We had moved into an old manse, my father taking over from a minister whose fate had been impending madness followed by a tormented death.

Father ignored this story as idle speculation. Meanwhile, I was investigating the premises for a possible location for the secret set and antenna wires. It took a week on painfully careful contrivance but success was achieved!

The set was built as a false brick which replaced the original. This was the same height as the light switch to which I wired the set in parallel! The feeder was cemented between bricks and then the window with great care taken to paint and fill the evidence.

On the roof, the feeder terminated in a rotatable loop disguised as a weather vane! Subsequently, father was none the wiser despite the vane turning without wind! The rotation was facilitated by a rope and pulleys which were well hidden under the wall creeping plants!

The water pipe gave a most useful earth to improve on the simple loop. My next concern was to wire up a loudspeaker. This was in fact a high resistance headphone earpiece glued to a cone, albeit a flat-ish sort of cone behind the picture of some stern woman with a cat in her arms.

Whenever I wanted to use the set, I would go to the false brick radio with the light switch on and adjust a screw for the advancement and withdrawal of an iron core within the tuning coil. The station would be heard faintly from the picture on the wall!

This went on for many weeks. One night when I was watching the stars outside, I heard an unearthly scream followed by strange incomphrehensible chanting. I ran indoors and up the stairs. It was in my room that I discovered my father contesting with a restless spirit of evil which uttered loud unfathomable moans to the pulsing of the bedroom light. As he held up the silver cross and attempted exorcism I realised by father had come face to face with non other than the dark and evil energy form known as RADIO MOSCOW!

RIGHT THE FIRST TIME

Rev. George Dobbs G3RJV
Part 3

Using The Crystal Set

The Crystal Set tunes the Medium Wave Band (often called the "a.m. band") and should receive broadcast stations on this band including local radio stations and some of the national networked stations like Radio 1, 2 and 3. Whatever is received loudly on domestic radio sets in the home ought to be capable of reception on the set. A good antenna and probably an earth connection will be required to operate the crystal set. Ideally an external antenna wire should be used but this may depend upon where the set is being used. In some areas the signal strength of medium wave broadcast stations is higher than in others.

My prototype crystal set, operated north of Manchester, received several stations on a very modest antenna. My amateur radio antenna (a lot of wire, over 20m in the air) gave a large number of very loud stations, but I received several stations very well by using a makeshift antenna from the television set antenna cable. Remove the antenna from the television set (switch off first) and connect a wire to the outer metal of the coaxial plug and push the other end of the wire into the board at the antenna connection point. This alone gave me quite good results. There was a slight improvement when I connected a makeshift earth which was a piece of wire connected to a central heating pipe. The connection must be to bare metal.

The tuning range of the radio is limited and additional stations may be obtained by sliding the coil towards one end of the ferrite rod and retuning C1. The tuning range of C1 may be increased a little by joining together the two outer tags. Variable capacitor C1 is, in fact, two tuning capacitors rotated by one shaft, i.e. a dual-gang, variable capacitor. Joining the two outer tags uses both capacitors, but do not let the joining wire touch the central tag.

Congratulations! You have built a radio. Not only that, but it is self-powered, so never needs switching off and you have shared in the thrill of the first radios (crystal sets) of the early 1920s.

Improving the Crystal Set

The crystal radio of Fig. 2.1. is a very basic radio receiver, as are all crystal sets, but it is possible to add a little electronic sophistication. Fig. 3.1. shows an improved version which uses only four extra components. These are: a resistor (R1), two capacitors (C2 & C3) and another diode (D2). These modifications will not turn the radio into a super receiver but should improve the overall performance.

The resistor provides a better termination for the audio output signal.

Now that you have built your first radio George Dobbs tells you how to improve and use it. He also explains all about resonance.

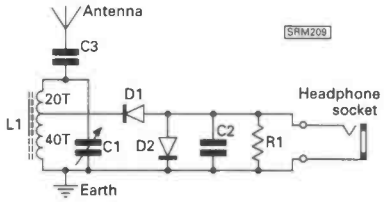


Fig. 3.1

The crystal earpiece is a cheap and simple solution to obtaining an audio signal from a crystal set but it has a high resistance. What is more important it also has a high IMPEDANCE. The term impedance is used for resistance to an a.c. voltage or signal. To put it simply: impedance is to a.c. (alternating current) what resistance is to d.c. (direct current). The correct impedance at the end of the crystal set is in the order of several thousand ohms and a crystal earpiece may have an impedance of more than a million ohms. The 47kΩ resistor (R1) is added in parallel to the earpiece to provide a better impedance matching for the circuit.

Also in parallel with the earpiece and the resistor is a capacitor with a value of 470pF. The correct term for what this capacitor does is called r.f. DECOUPLING. The rectifying action of the diode in the crystal set detects the a.f. (audio frequency) signal from the r.f. signal. However, the resulting audio signal still contains part of the radio frequency signal.

Capacitors can pass a.c. but not d.c. signals, so placing the capacitor across the audio signal, as we do in this circuit, may seem a silly thing to do. Surely the capacitor will allow the audio signal (a.c.) to pass from its output at D1 straight to ground. That would be an a.c. short circuit and the signal will be lost. What saves this situation is the fact that passage of an a.c. signal through a capacitor depends upon the frequency of the signal and the value of capacitance. If the capacitance is small then higher frequency signals have a good path, but to pass low frequency signals the capacitance has to be high. If we choose a low value of capacitance the r.f. signals will pass but very little of the audio signal will pass to ground. The value here allows residual r.f. signals to pass to ground without an adverse effect on the required audio signals. This process of allowing to unwanted signals to be conducted to ground (short circuited) is called DECOUPLING.

Another diode (D2) has been added to the circuit. This forms another type of rectifier circuit. In addition to the r.f. signal at the antenna side of the tuned circuit being rectified and detected, the r.f. signal at the ground (earth) end of the tuned circuit is also rectified. This is called a voltage doubler circuit and provides a more effective detection of the signals.

A capacitor has also been added at the antenna input point of the circuit. This is a COUPLING capacitor to prevent DAMPING of the tuned circuit by the antenna.

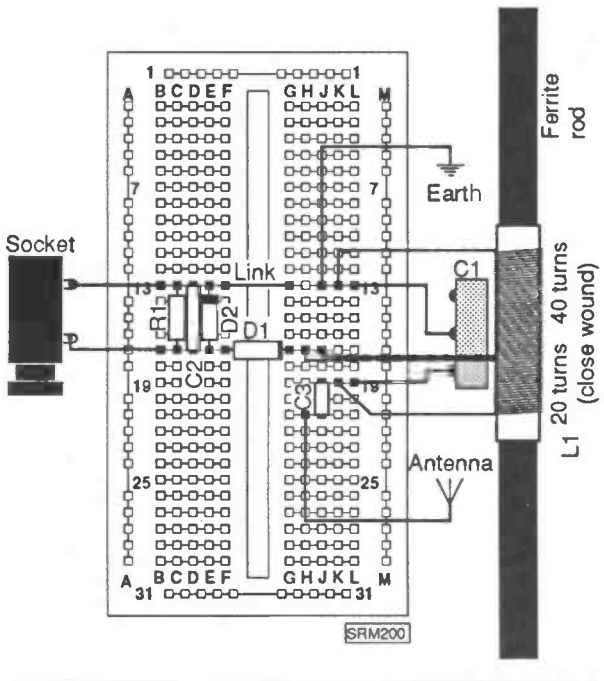


Fig. 3.2

For the reasons explained above, this 470pF capacitor will allow the r.f. signals to pass. So we say it "couples" the signals from the antenna to the tuned circuit. But surely a direct wire would couple the signals just as well, in fact better because there are slight losses through the capacitor? A directly coupled antenna can have adverse effects on the tuned circuit. The effectiveness of a tuned circuit depends upon a "pure" inductance and capacitance. The antenna and earth appear to the tuned circuit as an extra capacitance and can spoil the effectiveness of the tuned circuit: this is called DAMPING.

The crystal set is a very simple radio receiver and only has one tuned circuit to select the required radio signal frequency. The ability of a receiver to tune (or select) the required signal and not to have other adjacent signals receive, is called the SELECTIVITY. With only one tuned circuit, the crystal set is not very selective and sometimes more than one signal can be heard at once. A simple way to improve the slectivity is to reduce the damping of the tuned circuit by the antenna and this is the function of C3. In the same way that is why the coil has a

RESONANCE

Even musically illiterate people like me, know that stringed instruments rely upon strings having a resonant frequency. The vibrations of the string produce a required note (frequency of vibration) depending upon their length, thickness and tension. In the same way an electronic circuit can resonate at a chosen frequency. We use such circuits in our radio receivers to choose (or tune) the required station.

The circuit is very simple and has two components: a capacitor and an inductor (coil) usually represented in circuits by the designations L and C as shown in (a). This is called a PARALLEL TUNED CIRCUIT because of the way it is connected.

To put it simply, a tuned circuit relies upon a property called REACTANCE. Reactance resists the flow of a.c. current. Capacitive Reactance works in the opposite way to Inductive Reactance. The reactance of an inductor increases as the frequency gets higher, the reactance of a capacitor increases as the frequency goes lower. So for any given values of a capacitor and inductor there will be a frequency when both are the same and cancel out. This is the resonant frequency of that tuned circuit.

Since reactance tries to stop the flow of an a.c. current, the resonant frequency, at which the two types of reactance cancel out, is the point at which the circuit will allow a high current to flow. Other frequencies, above and below the tuned frequency, produce a state in which a.c. current flow is resisted or reduced. So we can see how a tuned circuit is able to accept or tune a required frequency.

The values of L and C are designed for the required frequency. More commonly in radio receivers, the value of C is variable (variable capacitor) enabling a range of frequencies to be chosen. This is shown in (b) where C1 becomes a variable tuning knob of a radio receiver.

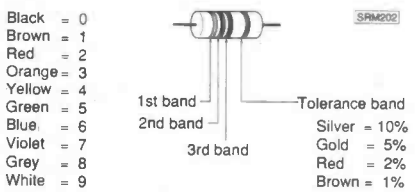


Fig.1

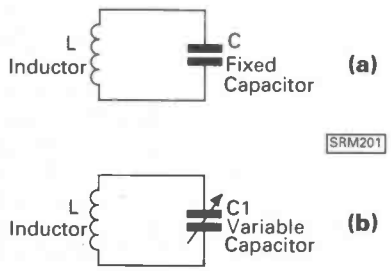


Fig.2

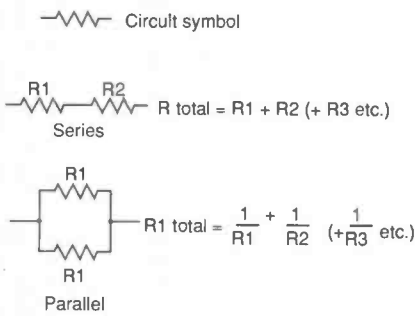


Fig.3

RESISTORS

Resistors are frequently used in electronic circuits and come in all shapes and sizes but all do the same basic job: they limit (or resist) the flow of an electric current. Fixed resistors are usually small cylinders with a wire issuing from each end and have a series of coloured stripes to indicate their value. This value is expressed in OHMS with the symbol Ω. Perhaps you remember Ohm's Law from school? Many of the resistors in radio work have high values in Thousands of Ohms (kΩ) or Millions of Ohms (MΩ). The cylinder contains powdered carbon mixed with a binder, or has a thin metal film on the surface which limits the flow of current.

The markings are the RESISTOR COLOUR CODE to indicate the value of resistance in ohms. Each colour represents a number and three coloured bands indicate the value. The coloured bands read from the end of the resistor body. The first band shows the first number the second the second number and the third the multiplier, or the number of noughts required to make up the full value.

As an example, take a resistor marked: YELLOW - VIOLET - RED. The first number is 4, the second 7 and the multiplier 2 (or 00). The total value is 4700Ω (four thousand, seven hundred ohms) written more often as 4.7kΩ or sometimes 4k7 because it is so easy to miss the decimal point on a circuit diagram.

Resistors may be used in combinations to produce a required value. The two combinations are series (in line) and parallel (across each other). In series the values simply add together but in parallel the reciprocals of the values are added to give the reciprocal of the total. Parallel combinations are more difficult to calculate but mathematicians will spot that two equal value resistors in parallel give half of their value. That is, two 100Ω resistors in parallel total 50Ω.

Resistors may also have a fourth coloured band which indicates their tolerance: that is how close you might expect the value to be. The commonest types these days have a gold band, which indicates the value will be ±5% of the stated value. The size of the resistor governs how much power it can handle. The commonest types used in radio work are 0.25 watt are quite small, there are even smaller, but less common, 0.125 watt resistors. For higher powered circuits there are resistors rated at 0.5, 1, 2 and 5W and even higher.

☞37

SCANNING

Alan Gardener

New Products

As promised, the base station version of the Jupiter II hand-held I previewed in the October column is now available. Called the Jupiter 6000 it has all the features of the hand-held, but is in a very compact form measuring approximately 419 x 117 x 38mm - ideal for installation within the confines of a modern car. The specification is basically the same as the Jupiter II, the main differences being the front panel layout which is angled to assist the operator when used as a base station. The l.c.d. display is the same as the hand-held and the keyboard, which is arranged horizontally to the right of the display, is also similar. Both the display and keyboard are illuminated with a soft green light making night-time operation easy. The rear panel has an external 12V power socket, 3.5mm loudspeaker jack, BNC r.f. connector and an attenuator switch to help under strong signal conditions.

In operation I found the unit very easy to use. Its compact size permitted it to sit on top of the car dashboard giving good display and controls visibility. Sensitivity was excellent but I did find a few problems with reception when driving in areas where u.h.f. TV channel 21 was in use. This manifested itself as vision buzz and made reception on certain bands difficult up to 15 miles away from the transmitter site. Switching in the attenuator helped, but reduced the sensitivity - therefore I would not recommend using any form of pre-amplifier or active antenna with the receiver.

Priced at £379, it may have a difficult time competing against the Tandy PRO-2005, although its compact size is a strong selling feature. For further details contact: Waters & Stanton, 18-20 Main Rd, Hockley, Essex SS5 4QS. Tel: (0702) 206835.

The second new scanner is from AOR. Called the AR-950 it is a base/mobile version of the AR-900 hand-held and features a frequency coverage of 60-88, 108-136, 220-280, 300-380, 406-470 and 830-950MHz. One hundred memory channels are available in five banks of 20, with an extra five available for temporary storage of frequencies found using the search function. Manual selection of a.m. or f.m. is possible and the most common search step sizes are available. The unit measures 50x152x178mm approximately and has the the rubber keyboard mounted to the right of the l.c.d. display.

In operation, sensitivity is good with a first i.f. frequency of 21.4MHz limiting, but not totally eliminating image response problems. One annoying feature is the scan delay function which halts the scan for six seconds when a transmission is detected, but then resumes scanning.

This month Alan takes a look at a couple of interesting new receivers and continues his climb up the u.h.f. radio spectrum.

This is a real nuisance if you can't find the correct button to manually stop the scan within such a short time period. The price is expected to be around the £250 mark which should ensure it's popularity. Write to Lowe Electronics, Chesterfield Road, Matlock, Derbyshire DE4 5LE for further details or alternatively you can ring them on (0629) 580800.

Tandy PRO-38 /Uniden 50XL Modifications

Reader **T. Galt** of Glasgow has written to me asking if I know any way of providing a search function on the Tandy PRO-38 scanner. I must say that I have not heard of any modification that will provide the missing function but that doesn't mean that it can't be done. Many scanners use similar controllers (the Tandy PRO-38 and the Uniden Bearcat 50XL are practically identical) so it may prove possible to trick the receiver into thinking it is the next model up in the range - the 100XL which has a search facility. Unfortunately, I don't have copies of the service handbooks for these two models, but I bet someone out there has! So if that someone is you, or if you have experimented with either of these two models why not drop me a line?

This question does highlight a common theme in many of the letters I receive - that is how can I add extra facilities or extend the frequency coverage of my scanner? My answer in most cases has to be "by selling it and buying a more sophisticated model". This is particularly true at the moment because so many new models are being introduced and many people are selling their old (or not so old in some cases) scanners off at reasonable prices. The general rule-of-thumb when buying a scanner is "you get what you pay for". Most manufacturers produce several models ranging from a budget model aimed at the newcomer, right up to a top-of-the-range model for the person who must have the best.

However, the cheaper models usually only have limited frequency coverage and are in many cases primarily designed for the American market. The most common problem users experience with these models is the inability to manually select a.m. reception which is usually only available on the v.h.f. airband range of 108-136MHz. This is not a problem in America where a.m. is rarely found outside this band, but in Britain many important services still use a.m. - so beware!

The moral of the story is simple, make sure the scanner you buy is capable of receiving the transmissions you want to listen to. This may sound obvious but it is quite easy for a newcomer to the hobby (or old hands for that matter) to be tempted by low prices. Remember, it is always worthwhile spending time looking at what is available before spending money - and consider buying secondhand!

Low Cost Monitor Receiver

So having bought your expensive 1000 memory channel, all-mode, all-singing all-dancing, tea and coffee dispensing scanner you find it spends 99 per cent of its life monitoring your favourite local frequency. Doesn't that seem a little wasteful? Well, how about a cheap alternative receiver that you can leave running all the time whilst freeing the main receiver for more exciting things. What's the catch you ask? Well, you do have to do a little work - but you can learn a lot in the process.

The solution is to re-tune one of the many Ex-Private Mobile Radio (p.m.r.) tranceivers now available on the surplus market to the frequency of your choice. With a little luck the whole project should cost less than £20 although I must admit that in the past, by very careful selection, I have been able to find hand-held u.h.f. receivers already working on suitable frequencies for under £1 each. Revised specifications for p.m.r. equipment came into force in the New Year making a lot of existing equipment obsolete. When taken out of service a lot of equipment re-appears on the amateur market at very reasonable prices so keep an eye out for bargains later on in the year.

The key to all this is in a new book called *Surplus 2-Way Radio Conversion Handbook* written by a near neighbour (and r.f. interference source) of mine, Chris Lorek and published by Argus, ISBN 0 85242 946 0. The book covers nearly every aspect of converting commercial equipment to operate on other frequencies including good quality circuit diagrams and component layouts of the most commonly available equipment.

Highly recommended if you enjoy experimenting and not a bad suggestion for a Christmas gift!

What Can I Hear? Part 9

This month we continue our examination of the u.h.f. spectrum starting with the band 410-425MHz. This is allocated to the government and is used for a variety of purposes including fixed links and

radiolocation. In fact the government is the primary user of most of the u.h.f. spectrum. However, it does permit other services to operate on a non-interference basis. This is only practicable because much of the spectrum is held in reserve "just in case".

The main use of the remaining spectrum between 425-470MHz is for p.m.r. The propogation characteristics of radio waves at u.h.f. make this range of frequencies ideal for localised communications. Well sited base stations can give city wide coverage, whilst on the other hand a simple antenna system can provide communications just within a small area - a factory or goods yard for example. By limiting the range of a system it is possible to reuse the same frequency many times, making good use of the available spectrum. However, extra frequencies still have to be provided to cope with the demand for radio communication in major cities. In order to help with this problem some of the bands normally set aside for government use are pressed into service, but only within certain geographical areas.

Another way of meeting the demand in cities is by some p.m.r. operators making use of shared base stations generally referred to as Community Base Stations or Community Repeaters. Most of these transmit in the band 440-443.5MHz and receive on paired frequencies in the range 425.5-429MHz. However, extra allocations are available in London. The base stations are generally situated on high buildings or hills in order to give city wide coverage. They are configured so that they can receive a low power transmission from a mobile and at the same time re-transmit it at a much higher power level, thus increasing the operating range of the mobile. By several users sharing the same base station, equipment costs and site rentals are made more economical.

In order to prevent confusion occurring between operators sharing the system use is made of a technique called Continuous Tone Coded Squelch System (CTCSS). In this system one of 37 specially chosen low frequency tones is transmitted along with the speech. This is detected in the base station and only when the correct tone is received does the system re-transmit the signal. CTCSS gives privacy to groups of users and at the same time prevents any one of the operators from making excessive use of the system by the base station control circuit "locking out" the user for a period of time. This type of system is very popular in London with businesses such as dispatch services, delivery firms and bus/taxi operators.

Another major block of the u.h.f. spectrum lies between 430-440MHz. This is commonly referred to as the 70cm Amateur Band, although in fact the amateur service only has secondary user status and has to share parts of the band with government services, p.m.r. and radiolocation This is particularly true of the bottom segment, 430-432MHz. This may seem like a recipe for disaster but by careful co-ordination most of the users are unaware of each others existence. Because of the relatively large bandwidth available to amateur stations many different modes of transmissions can be heard. These include s.s.b. and Morse at around 432-432.5MHz; digital packet stations between 432.5-433MHz; f.m. simplex and repeater traffic between 433-434MHz; Amateur satellite up and down-links using Morse and s.s.b.

Frequency Allocations 410 - 470 MHz

Frequency (MHz)	Service	
410.000		
	Government (Fixed & Mobile Services)	425.000
445.500		
	PMR Base Transmit Paired with	
		446.000
425.500		
		440.000
	PMR Mobile Transmit Paired with	
429.000		443.500
	Government & Radiolocation	
431.000		448.000
	PMR Mobile Transmit (London only) paired with	
		449.000
430.000		
	70cm Amateur Band & Government/Radiolocation	
440.000		425.500
	PMR Base Transmit (Community Repeaters) paired with	
443.500		429.000
	Government & Radiolocation	
445.500		425.000
	PMR Base Transmit Paired with	
446.000		425.500
	PMR (Simplex operation)	
446.500		
	Government & Radiolocation	
448.000		431.000
	PMR Base Transmit (London only) Paired with	
449.000		432.000
	Government	
450.000		464.000
	BT Fixed Links paired with	
451.000		465.000
	HO Emergency Services Base transmit Paired with	
		467.000
453.000		459.500
	PMR Base Transmit paired with	
454.000		460.500
	Wide Area Paging	
455.000		
	PMR (Limited use)	
456.000		461.500
	PMR Base Transmit Paired with	
457.000		462.500
	PMR Fixed Links / Telemetry paired with	
458.500		464.000
	UHF Model Control / Local Paging	
459.500		
	Low Power Telemetry / Local Paging	
459.500		453.000
	PMR Mobile Transmit Paired with	
460.500		454.000
	PMR Fixed Links	
461.500		456.000
	PMR Mobile Transmit paired with	
462.500		457.000
	PMR Fixed Links paired with	
		458.500
464.000		450.000
	BT Fixed Links paired with	
465.000		451.000
	HO Emergency Services Mobile transmit paired with	
467.000		453.000
	PMR Fixed Links & Future Allocation	
470.000		

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SCANNING

between 434-436MHz; finally amateur TV transmissions between 435-440MHz. Despite the large selection of transmission modes, the 70cm band tends to be very quiet outside large urban areas so be patient when listening.

Moving a little higher in frequency the band 451-453MHz is allocated to the Home Office for use by the emergency services. This choice of frequency makes it ideal for short range communications or with well-sited base stations slightly larger areas such as a town centres.

Two of the most popular allocations for p.m.r. services in the u.h.f. spectrum are 453-454 and 456-457MHz. Many large companies who operate their own base stations tend to use these bands for on-site communications.

Moving up to 457MHz, we reach another p.m.r. allocation - this time the frequencies are used for fixed links. A typical application for such a link would be to provide a speech circuit and control path to a remotely sited base station. However, pressure on the u.h.f. spectrum has now made most links move up to the microwave bands, leaving the main use for scanning telemetry. This is mainly used by the Power, Gas and Water companies to provide remote control of and indications from remote sites such as pumping stations or switching centres. One master station interrogates each out-station in sequence, building up a complete picture of the system status back at the control centre. There are many thousands of these out-stations around the country, so keep an eye open for the twin u.h.f. link antennas next time you pass a pumping or electricity sub-station.

Abbreviations

a.m.	amplitude modulation
BNC	r.f. coaxial connector, bayonet coupling
f.m.	frequency modulation
i.f.	intermediate frequency
l.c.d.	liquid crystal display
MHz	megahertz
p.m.r.	private mobile radio
r.f.	radio frequency
s.s.b.	single sideband
u.h.f.	ultra high frequency
v.h.f.	very high frequency
V	volt

Finally, one of the forgotten segments of the u.h.f. spectrum at 458MHz is the u.h.f. model control band - I bet you didn't know there was one! Although not secret, this band has never been that popular with radio modellers. The main reason being that when it was introduced as a solution to the problems associated with the poor quality 27MHz model control band, no other country had such a high frequency allocation (at that time). As a consequence very few manufacturers produced equipment for the band, and that which was available was very expensive. Now that other bands have been made available for model control it is very likely that the allocation will become filled with the low power local paging and telemetry systems which already share the band.

More next time when we explore the region of the spectrum leading up the microwave bands.

In the meantime keep those letters coming to the same address: PO Box 1000, Eastleigh, Hants SO5 5HB. Until next month - Good Listening and Happy Christmas! □

RIGHT THE FIRST TIME

☞33

tapping to feed D1. This helps to reduce the resistive damping of the earpiece circuit.

Adding the New Components

The layout for the improved crystal set is shown in Fig. 3.1. The positions of the components of the basic crystal set have been retained with the extra components merely added in the positions shown.

The resistor (R1) is a standard 0.25W component marked with YELLOW-VIOLET-ORANGE bands. The tolerance is unimportant in this application. The two capacitors can be the inexpensive miniature ceramic plate types, in which case they will probably be marked as "n47". For this application any type of 470pF (or 500pF) capacitor would do the job. The diode is the same type as used in the original circuit. Take care to get the diodes the correct way round. The ends of both D2 and D1 not marked with the coloured band go to the "top" of C2/R1.

Check the positions of the new components against both the layout and the circuit diagrams of Fig. 3.1. The crystal set may well be louder and it will certainly have less annoying high pitched hiss on the signals. You may also note that the selectivity has improved a little. Try using it with or without the earth connection to see if the earth makes any difference: in some cases it may not. □

Abbreviations

a.c.	alternating current
a.f.	audio frequency
a.m.	amplitude modulation
d.c.	direct current
kΩ	kilohms
m	metre
pF	picofarads
r.f.	radio frequency

Parts List for Improvements (Fig. 3.1.)

R1	47kΩ	0.25W Resistor (YELLOW-VIOLET-ORANGE)
C2, C3	470pF	Miniature Ceramic Plate Capacitor
D2	AA119	Germanium Diode (Maplin QB00A or Electrovalue AA118)

Notes:

1: R1, C2 & C3 are available from any electronic component dealer
2: C2 and C3 can be any type of 470 or 500pF capacitor
3: Any Germanium Signal Diode will serve for D2 but it is best to use the same type as D1 in the original circuit.

AMATEUR BANDS ROUND-UP

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

Not every letter that fails to reach me can be blamed on the Post Office! I have one in my hand here which was postmarked in mid-July, and reached here in good time; however, it has since clearly led a hard life as a tea-cup mat until it fell into the hands of a local amateur who realised it was for me and forwarded it! And would you believe, when we opened it, there was no signature on it anyway. Murphy strikes again!.

Antenna Height

Those of you who have read the textbooks on antennas will have seen various charts and drawings which indicate that there are certain "preferred" heights for a horizontal antenna. These arise from measurements made with scaled models which are carried out over a sheet of metal which simulates a perfect earth. Older readers will recall those delightful lectures by G6CJ - the famous Aerial Circus - in which he demonstrated antenna patterns with models

Now, up to 30MHz the practical case is that we are in fact sited closely over less than perfect earth on the one hand, while on the other our incoming signals are not all arriving at very low angles of incidence. Indeed, it is often the case that an incoming signal will vary its angle of incidence during the course of a complete QSO. At v.h.f., we know that signals aren't reflected from the ionosphere, and also that they are several or many wavelengths above ground. Is there, then, any rule we can apply to the question of how high the antenna should be?

The answer has to be, for several reasons, to advise that whatever the band you get the antenna up as high as you can whatever the band. With the best will in the world, our garden is scarcely likely to have the conductivity of a sheet of brass. The modern home has enormous electrical noise output to upset our listening. If you use a design which calls for coaxial cable or twin feeder down to the shack, so much the better. Getting the antenna up in the air out of this noise is a good start to improvements, while the twin feeder or coaxial cable helps to make sure the signal doesn't become, as it were, polluted on the way down. So, even if there were no other gain, height would be worth while. Secondly, of course, the higher antenna can "see over" the local buildings and obstructions. As to the business of preferring the antenna to be a half-wavelength (or multiples of this) high for preference, all we can say is that the practical chap who experiments always seems to find that any gain in height is worth while; obviously our less than perfect ground beneath the antenna is upsetting the theoretical applecart.

Turning to v.h.f., under normal flat-band conditions, one can reasonably say that range is directly related to antenna height. This is because of the curvature of the earth. One can say that, roughly the situation is akin to the business of the sailor approaching a distant lighthouse. He can look in his *Nautical Almanac*, either *Reeds* or the *Macmillan*, and find a table which relates height to horizon distance. If the lighthouse is, say 60m high, and the navigator on the bridge is say 10m high, then he can find the horizon distance for each height, add these two together, and at that distance the light should just be visible over the horizon. Of course, he will have spotted it before that most likely, because he usually will see the "loom" of the light across the sky before he comes close enough for the light to rise above the horizon. On land, of course there are hills to get in the way and swallow the signal. In radio terms, we can take the distance so found and add one third, to allow for the wave "dragging its feet" around the earth's curvature, as a rough guide to range. Thus locally, the v.h.f. range is about 6.5km in most directions simply because of the hills. Of course, come a v.h.f. "lift" then one may see mighty extensions of this distance, but this effect is somewhat akin to the mirage of the desert, where you see the far distant place long before you should, shimmering, maybe even inverted, and disappearing without warning.

In sum, the higher the better where antennas are!

Anyway, if you have enough ingenuity to get an antenna up to 20m or so, you can certainly arrange some sort of wangle to reduce the height of the antenna if and when when you want to! There are some amateurs who have a super-high antenna who lower it part-way down the tower should they wish to maximise signals to a more local area. This might occur if, say, an SM station was trying to raise an OH0.

RIP

While this offering was in the cooking-pot, the death was announced of Kurt Carlsen, W2ZXM. Readers of an earlier generation will vividly recall how he was Captain of a ship, the *Flying Enterprise* which was hit by a Force 12 storm in the Western Approaches on December 29, 1951, which crippled his ship. He saw his 45 crew and ten passengers to safety, and stayed on for fourteen days while attempts were made to get the ship to safety. For six of those days W2ZXM was joined by the mate of the tug *Turmoil*, Ken Dancy. The ship's radio was out of action due to loss of power, but W2ZXM had a "full gallon" maritime mobile amateur radio station aboard, from which bits were cannibalised to get a low-power rig on the air and so maintain communications, using as an antenna a bit of wire dangled from a porthole. It was all in vain as another storm blew up and the ship sank minutes after Carlsen and Dancy left her, taking the W2ZXM/MM station with it. There was a large amount of amateur radio involvement and it is more than likely that this episode, and the later East Coast flooding, were the catalysts in the formation of RAEN, the forbear of the modern RAYNET. Certainly the papers had a field day over it, as the progress of the recovery occupied the front pages of the world's Press for fourteen days, until Carlsen and Dancy dived into the sea using the ship's funnel as a diving-board. Captain Carlsen was 38 at this time, and 75 when he died.

Make a Dipole!

Something for all you folk who are interested in antennas. First of all, you need to be sure you have the makings. Let's assume you are going to use coaxial feeder. Guesstimate the cable length needed for the coaxial feeder, and go out and scrounge or even buy (dirty word!) some. Buy rather more than you need. While you are at it, buy a suitable connector to fit the receiver or a.t.u. socket. If you buy a longer length than you actually need, then you won't have the mortification of finding, in due accordance with Murphy's Law, that you are 25mm too short! If you have a short length of coaxial cable left over it can always go in the "come-in-handy" box. Select the cable to be. preferably, of 50Ω impedance, and of the kind where the inner conductor is twisted. If you try to use the solid centre-conductor stuff, it'll break in a matter of hours as the wind works on it. Solid-core cable - we won't even give house-room to here.

Now, we must cut two pieces of wire to the appropriate dimensions. This dimension is from the centre connection when the job is finished out to the farthest point. Thus, if you loop your wire round an insulator, measure your bit of wire from the centre right to the far side of the insulator; and solder the "tail" that has gone round the insulator back to the main wire. Thus if you imagine the wire it has a loop going round the insulator at one end, and nothing at t'other. You are making two identical. If you lack insulators, see further on. Now we must make something to support the centre so we can join the wires we have made to the coaxial cable. The usual ploy is a scrap of wood or Perspex about 75 x 50mm. (Wood? Yes, 'cos even if the wood was really soggy-damp one doubts it would measure less than 1kΩ, which would lie in shunt across the antenna's 50Ω - think on it!) Find a couple of 2BA screws washers and nuts. Now, drill a couple of 2BA clear holes or thereabouts, with centres about 25mm apart. Drill a couple of holes on each end to trap the wire, and another one to carry the fixing for a P-clip or staple to lock the cable into place. Instal 2BA screws to grip the wires of the span and the coaxial cable. Connect up and solder. Drown everything in some water-proofing muckite; you DON'T want water down the coaxial cable! I swear by Denso Tape from the builders' suppliers, but other people use silicone rubber, Bostik or whatever. If you use silicone rubber, AVOID the grades which smell of acetic acid as they come from the tube; these grades are corrosive and they eat coaxial connectors or copper for dinner.

Wot! No insulators for the ends? If the string is the right sort and a reasonable length just forget it. Make the loop at the ends smaller though. I use fisherman's Nylon monofilament, or for something stronger the braided Terylene line that used to be used for shark fishing. The point here is that you have got rid of the weight of a brace of insulators by using the plastics line as the insulator in itself; and if you can take a proportion of the weight of the coaxial cable you lighten the load even more.

Formula

Given that the antenna is reasonably well out in the clear, you won't go far wrong if you say that length L in metres equals 143/F where F is frequency in MHz; L and F both in units and decimals. Conveniently F can be chosen to be the middle of the bit of band of interest or even just mid-band. Consider the 14MHz band. We can say that 143/14.2MHz equals 10.07m; so our dipole, cut for mid-band, will be 10m long, comprising two equal lengths each 5m overall as described earlier. Note that an eighty-metre or Top Band dipole needs to be "cut" for the section of the band in which you are interested - it is incapable of covering the whole band at a reasonable s.w.r..

Hanging it

There are three ways to consider. If you can manage it, try and put it horizontal, with the wires running north-south, so it "looks" east-west, to give you coverage of Asia, Europe, the Americas, and Australia/New Zealand.

Another possibility is to have the wires vertical, for all-round reception. If you choose this, then the coaxial braid should be connected to the lower leg of the span.

The third option is to either make the dipole slope, or to have one leg vertical and one horizontal; if you select the latter the feed can either be at lower level or up in the air, depending on your site, though it is preferable to have the feedpoint high.

In any case, if you can measure the s.w.r., do so, and adjust the length to get the best s.w.r. at mid-band. If you can't measure s.w.r., forget it. Dipoles don't generally go wildly astray unless they are VERY close to buildings or ground, say mounted in the loft.

Multiband

Some people have had success on, say 14, 21 & 28MHz by making dipole wires for each band and connecting them in the centre to a common coaxial cable. If you try this, the shorter elements can hang below the longest. To get on lower bands yet, you can try shorting both legs of the coaxial cable together at the bottom, and connecting the shorted legs to the antenna terminal of the receiver or a.t.u., with the best obtainable earth on the earth terminal. This ploy can also sometimes be used as a good bodge to fill in areas not covered by the antenna as properly connected.

Letters

A short note and a picture from **A. G. Duck** (Birchington) who uses the Matsui receiver, At the time he wrote he was, as it were in combat with a home-brew a.t.u. - three falls and a

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SEEN & HEARD

submission - but this particular a.t.u. was fighting back quite strongly! Doubtless by the time you read this, reader Duck will have cracked it.**Ron Pearce** (Bungay) uses 14MHz mainly, and prefers to listen using a one-valver. This combination netted, during the month, signals from, most notably, BZ1FB (one of the new individual as against "club" calls in China), V31BB, VK5BC, PY5EG, TK5EP, VE3PT, FV9NDX, 9H4E on Gozo, and VK3HF.

Our very next letter comes in from **F. W. Lee** of Houghton-le-Spring, who has become hooked on short-wave listening since his retirement. This arose after he fished an old Cossor *Melody Maker* someone had put out as rubbish. The idea was to use it for bits, but lo! when a plug was put on the mains lead, the beastie played (Naturally, yours truly comments, having worked for that firm for years before retirement!!). However, emboldened by this triumph, reader Lee is going to tackle a home-brew one-valver next and see just what can be heard with such a device. So, we have put him in touch with Ron Pearce.

Now to **Robert Watters** of St Austell. Robert has been an s.w.l. for five years now, and belongs to RSGB and ILA. Nowadays Robert runs an FRG7700 into the matching a.t.u., from an end-fed wire some 20m long and 8m high, which runs NE/SW and fed at the latter end. Robert is a shift worker so he manages to get on at different times. Not surprisingly, Robert wasn't too active during the summer, but the listing makes up for lost time during the week before his letter! On 28MHz we see HI3JH, HL4SF, HP6AYV, HZ1AB, JA2KSI, JA4XIV, JA6YG, JA7JHT, JA8UZ, JF8TET, JH0BBE, JH3JUZ, JI6KVR, JR1XIS, JW7FD, KH0AC, OD5VT, PT7WX, P43WLP, VK1PJ, VK2BJL, VK5XW, VK9NS, VU2JX, XE2HWH, and W4/VS6CT. Turning to 21MHz yielded A61AC, CE1HIK, CI1ASJ, HK4OIG, HV3SJ, JA1KYM, JY5RBM, J88AQ, KL7GY, KP4AW, LY2WW, LU9DRT, T77C, VE7DGI, VE8RCS, VP9IM, XE1XRC, YV1TPT, ZF1HJ, and 5N29BHA for a "special". On to 14MHz where HC2AGT, LU7DMI, and 9K2EC were logged.

Next we come to the delayed letter, from *John*, who hails from central England and has an Eddystone EC10. John notes that he heard a station on the island of Alderney one evning about 2200, with a king-sized pile-up calling him. On Forty, G3XTT was noted as QSL Manager for GB0SK on St Kilda, and on both these bands around 0100 there were lots of Russians about. Turning to more DX'y 7MHz signals, we see 4Z4DX, TA2DO, 5L0CB, C6AZY, HK1HHX under a pile-up, F89/F2YT, 4N4CX 4X4ML, UA9UPC, UY9ILK, UV3GW, UZ4FXI for Oblast 148, FD7DZZ with QRP and a dipole, CN6OFK, UI8LAD, UL7VV, UO4OF, FG5FC(QSL direct to F6FDU), CT1UP, CT1UX, and T77T in San Marino.

On the Isle of Wight, *D. Nicoll* notes that at the times he could get on - usually after 2100Z, the bands were usually not too good. Derek has a trapped dipole at 7m, running approximately E-W, implying N-S as the favoured directions. On 28MHz s.s.b. signals were noted from K4XS and VK6CI, while on 18MHz JA8BWV, JA9BFN, JA9FCB, LU9DJD, OA4BUX, W5SAL, KA7MCX, K6LL/7, VE2AJS, VE3NYT, and VP8BXL at Rothera Base, Antarctica were all copied, leaving 9N1MM to adorn 14MHz s.s.b..

E. H. Trowell operates from the Isle of Sheppey, and covers most bands. The s.s.b. signals noted included ON7BW on Top Band, HZ1AB and ZS8MI (Marion Island) on 18MHz, and ZS8MI again on 24MHz. Turning to the CW stuff, Ted logged ON4CW on Top Band, VK3AUC, VK5FE, ZL4HB, and FY/F30A all on 10MHz. On 18MHz this mode yielded KB4T, I6BQI, JA4AO, HB0/HB9NL, WA4SNI; 0on 21MHz there were HK3RQ, UZ9AWZ, UL7BX, KE8CF, UJ8JA, JA4YJA, N3RD, LU1EWL, UA9XFJ, PP2WV, LU1HNL, OH6NTO/CE3, W2BAI. That left 28MHz to be scoured, yielding UZ9SWW, RL9PYL, RA9JX, 5B4ES, UA9YNC, HL5BDS, W6TZD and HK3RQ.

On now to N. Dawkins who is a strictly c.w. man. On 7MHz he dug out UL7AM/UT9UQ from under a mighty pile-up and wonders just why this one was so popular? On 28MHz there were LU2EPN and PU2LOK; on 14MHz JA0DWY and PY2PAR. Most of the time was on 18MHz, where the signals from LU6YPA(Tierra Del Fuego), VK3MR, ZD8VJ, VE5DC, KP4BJ, D44BS, LU3HAN, TA2AU, JR4GPA, JG6MQI, JA6HW, JA4AO, LZ2DX, OH6GL, JA1IFP, EA5FNL, K2LV, LU9HGW, N3GZV, JA4CSH, JA2FJP, and JQ1QKK were all entered into the log.

D. L. McLean has been in trouble with the gear since the end of August, by way of that most annoying animal, the intermittent fault. However, on 14MHz, he managed J37Y, P40MA, VU2SMN and ZS1IS in Walvis Bay. on 18MHz Don manaaged CU1AC, D44BS, EL2E, J52US, V31BB, VK2GA, VK3CKL, VP2EHF, ZL1PZ and 9Y4DG. Turning to 21MHz we find CI3XN, CI7RG, HL5FEE, KB0NL in N. Dakota for a rare State, UA0BDU/UA1O, UW0LAP, VK8NUE, and 3D2RJ. That left Ten, where BY8AC, P43WLP, TL8RM, XX9SW, and ZS1IS. All were s.s.b. signals.

Ladder

Given enough support, we'll run a nine-band (160-10 metres) Countries Heard Table in the next-but-one piece. So let us have your entries with the letters, to give the writer time for checking. In subsequent months, updates as necessary. List your countries on a band-by band basis, and of course we will accept single band or a few band entries if you operate that way. All we ask is that you list, for each band, the countries heard, by their prefixes. Obviously the same country can be heard and claimed on each of the nine bands. For the "modern" countries, use Geoff Watts' Countries List. You old-timers who go back further can include older countries provided that they appeared in the *DXCC List*. Put 'em in, and the writer will wave the Blue Pencil as required.

Have Fun!

DECODE

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

I should first say thank you to all the people who write into "Decode" every month. The kind comments about the column are much appreciated, with your help I hope I can continue to make the column interesting to read. Frequency lists are being sent out as fast as we can, unfortunately our annual holiday followed by the radio rallies we have attended has slowed down the despatch.

It has been really good to meet some of *SWM*'s regular readers and, for me it has been especially interesting to meet some of the readers who regularly supply me with information for this column.

If you would like a frequency list just send me three first or second class stamps and your name and address and it will be despatched as soon as possible. If you can include some details of your station and a few loggings, so much the better. As I only keep stations in the list that have been heard in the last three months, I do need a regular supply of stations heard or the frequency list just dries up.

By the time you read this, I will have finished attending rallies for this year. When the 1990 Rally Calender has been worked out I will publish the list of rallies I will be at. If you can, come along and say hello, it would be good to put faces to the names in the letters. I am always pleased to hear your comments about the column - good or bad!

Regulatory

I recently had cause to contact the Met. Office in Bracknell and the DTI in London regarding the current situation with licences for the reception of weather broadcasts. Due to the constraints of the *Wireless Telegraphy Act* you are only allowed to receive signals for which you have authority so to do. For the likes of you and I, that means that we can only legally monitor broadcast stations and amateurs! To gain authority to receive weather signals the procedure used to be to send an application to the DTI along with £10.00 whereupon a licence would be granted.

During my enquiries into this I discovered that the situation has recently changed to our advantage - you are now free to monitor weather transmissions without any additional licence. This represents a major change of policy within the DTI and is to be applauded. The reasoning behind the change is simply that it was impossible to police this aspect of the Act so why waste everybody's valuable time and money on a fruitless exercise.

Having said all that, you are only allowed to use any information received for amateur or self-education purposes. Should you use the information for profit, then you can expect to have a charge levied by the Met. Office.

If you come across any little gems like this, please drop me a line with the details and I will investigate the matter.

Readers' Letters

It's some time since I did a run down of readers' equipment.

Mr Gore-Thorne, a near neighbour of mine, uses a Tandy DX160 and a Sigma 4X 3λ/4 27MHz CB antenna to receive his data signals.

Judging by your letters, you don't need to own an "all-singing, all-dancing" radio for data comunications - a lot seems to depend on the listener. **Keith Heselton** in Swindon uses a Bearcat DX1000 and finds it works well for his needs.

Up in Halifax, **K. Roberts** is using a Kenwood R5000 with a 23m random wire antenna. The day before he wrote the letter he had purchased an ERA Microreader. So far he seems to have been copying amateur transmissions, which can be a good way of getting used to using new equipment. In common with many readers, he has found that some of the most unlikely sounding signals have produced the best copy.

A system based on the Spectrum 48K computer is used by **S.F. Bond** in Morecambe. The receiver is a Trio R1000 as well as a Mizuho KX-3 antenna tuner, 15m end-fed antenna and J&P Electronics filter and software.

I received a very unusual letter from **Pete Rayer** in Bournemouth. His letter heading includes a colour photograph of him and his station. The station equipment is listed on the back of his QSL card and comprises a Sony ICF-2001D plus TCM-818 tape back-up, a Sony AN-1 active antenna and a DSH active antenna, a Realistic PRO-2004 scanner with two discones, an AR-900 with an ARA-500 active antenna and finally an ERA Microreader. He is now awaiting delivery of an AR3000.

Lester Jones in West Kirby uses a Kenwood R5000 with a home-brew a.t.u., the computer side of his station at the moment comprises a BBC Master 128 and G3WHO software with a borrowed home-made decoder. He is in the process of deciding which decoder he wants for himself.

"Since receiving a copy of the Spectrum RX4 software from Technical Software, I have discovered how addictive this hobby is and it really is taking up all my spare time!" says **A.C. Knox** from Largs. I think many readers would echo his thoughts on the addictive aspect of data listening. He uses a Realistic DX440 and 60m long wire antenna

with the RX4 software. Mr Knox is having one or two problems decoding SITOR at the moment, but as he says, he thinks the main problem is deciding which signals are SITOR!

Norman Pilgrim from Leicester writes in with a tip for Icom R71/ERA Microreader combination users like hiself. Don't use the RTTY button on the Icom, instead use the u.s.b. or l.s.b. mode depending on whether the transmission is "normal" or "reversed". He has has considerable success with this combination and says that although practice is required to get used to the Microreader, once you have mastered it there is no holding you back! Norman also has a stand-by receiver, the Yaesu FRG-7 which is coupled to a Datong v.l.f. converter that can be switched in as necessary. He uses a well-insulated wire just thrown over the ridge of the house which forms an inverted V for the Yaesu. The main antenna for the Icom is a fan vertical, consisting of a number of λ/4 wires commoned to a coaxial feed. A number of radial wires are buried in the lawn to help give a good "earth".

"Is there anyway to modify the Sony ICF2001D for fine tuning as I find it very difficult to tune 170Hz shifts as the Sony only tunes in 100Hz steps?", says **Geoff Nichol**. The terminal unit Geoff uses is a Maplin type as well as an Amstrad 464.

Another reader using the ERA Microreader is Roy Baskett from Shotton. His receiver is a Trio R-600.

Paul Davies uses a Spectrum +3 and a Sony 2001D with his J&P Electronics software. He has picked up a few RTTY transmissions, but as yet no FAX. The frequency list might help him find a few.

A mechanical set up is used in the station of **Ian Burns** of Frizinghall. There's a Sony ICF-2001, 75B Teleprinter and a Rediphone TT10 terminal unit/decoder. An ST5 terminal unit is on the cards for the near future though.

P. Pendlebury in Bridgend has been receiving the 5-digit groups transmitted by weather stations so far using his Yaesu FRG-7, Dragon 32 and BMK RTTY software. If you do find these stations and would like to know more, then there are a few places you can look. Back in the April, May and July issues of *Practical Wireless* in 1986, there was a three-part series called "Weather Watch" by Jeff Maynard. In the article he mentions that the instructions necessary for decoding these number transmissions is available in the *Admiralty List of Radio Signals Volume 3* from HMSO, also in the *Air and Meteo Code Manual* by Joerg Klingenfuss.

A modified FRG-7, FT101ZD, ST5, Maplin TU1000, Dragon 32 and a mixture of software from G4BMK and GW4WRD is used by **R.A. Ratcliffe** in Wokingham.

Ian Wye has aquired his first computer, a Spectrum +2, and is searching for sources of software. The best source that I can think of is the Spectrum Amateur Radio Users Group, who seem to have an abundance of software and sources available. So far he has purchased the log book and RAE programs from Technical Software and a couple of HR Antenna programs from HRT and the G-QRP Club. The latter one has set him a few problems as it needs to be adapted to run on his Spectrum! He's resorted to the local library for suitable books to help him.

Gary Franklin is looking either to write his own software for the Atari ST or for sources to buy from. Some time ago I heard from a group in Europe that supported the Atari ST computer, ASTUR (Atari ST Users on Radio). Founded in March 1987 by Michel Geeraert and Lambert Derenette, the Atari ST Users on Radio group exists to encourage and where possible to co-ordinate the activities of Atari ST users on the amateur radio hobby scene. ASTUR is a non-profit making group and is run by its members on a voluntary unpaid basis. More information can be had by sending 2 IRCs to ASTUR, W. Elsschotlaan 21, B-8460 Koksijde, Belgium. I think the subscription rate is two disks and 2IRCs, one disk is returned to you with the information on it, the other goes to cover admin costs. I've been sent some useful information by Arthur Owen from Altrincham. He says that the best supplier of any sort of publication, periodical, chart, official notice, and so on, covering the entire marine world that he has found is Warsash Nautical Bookshop, 31 Newtown Road, Warsash, Southampton SO3 6FY. They also publish an annual *Bibliography of Nautical Books* plus two supplements - the current issue of which has over 17000 entries, listed by title, author and subject. They have a free catalogue of new and secondhand books and Arthur says they are very helpful on the phone and will take telephone orders.

Norman Hartford of Telford has a question. He has heard a c.w. station either EC3Y or E-C3Y on 9.136, 8.160 and 13.630MHz but can't find it listed in Klingenfuss. Does anyone have any more information?

A month or so ago I mentioned the *SWM Radio Information Cassette*, well **Ted Rickett** recommends the tape he's had since 1985. It's the *Tone Recognition Tape* from Klingenfuss, its correct name is *Magnetic Tape Recording of Modulation Tones*. The thirty minute cassette comes complete with a double-sided A4 sheet describing the high tones of each of the twenty-six classes of emissions on the tape.

QSL Information

The Wellington Meteo ZKLF FAX frequencies are: 5.807, 9.459, 9.459, 13.550 and 16.3401MHz. The transmissions are 24 hours with schedules at 0445 and 1645. The QSL address is: New Zealand Meteorological Service, Salaanca Road, PO Box 722, Wellington 1, New Zealand.

On now to Guam and the Naval Oceanography Centre there. They have three sites and the frequencies they use are: Apra Harbour (Guam) NPN 7.894, 10.255, 16.020 and 18.441MHz. Subic Bay (Philippines) NPO 10.966 and 15.925MHz. Totsuka (Japan) NDT 4.965, 12.777 and 22.3245MHz. The transmissions are 24 hour with schedules at 1245 (part 1) and 1300 (part 2). The address you need is Naval Oceanography Coand Center, c/o Box 12, FPO San Francisco, CA 96630, USA.

Staying with Californian addresses, I also have details on the NOAA National Weather Service. The FAX frequencies are: (daytime) 8.682, 12.730 and 17.151MHz (nightime) 4.346, 8.682 and 12.730MHz. To convert these frequencies to the carrier frequency, you need to subtract 1.9kHz from the one given. The transmissions are at: 0145, 0149, 0200, 0300, 0304, 0315, 0326, 0500, 0504, 0515, 0526, 1500, 1503, 1515, 1715, 1719, 1730, 1741, 2015, 2019 (schedule), 2030, 2041, 2330, 2334 and 2345. Their QSL address is: NOAA National Weather Service, 660 Prince Avenue, Redwood City, CA 94063, USA.

Finally for this month, Chile. Playa Ancha Radio CBV transmits FAX on 4.228, 8.677 and 17.1464MHz at 1130 (schedule0, 1920, 1940, 2310 and 2330. The address you need is: Valparaiso-Playa Ancha Radio, Centro de Telecounicaciones Maritimas, Direccion General del Territorio Maritimo y de arinna Mercante (DGTMMM), Attn. Jefe Departemento Telecomunicaciones, Valparaiso, Chile.

Frequencies

The frequencies I have for you this month have been sent in by **Chris Norfolk, Peter Starling** and **Jan Nieuwenhuis**. The format is frequency, mode, speed, shift, callsign, time and notes.

6.830MHz, RTTY, 50, ?, ?, 1716UTC, PETRA Amman.

11.0275MHz, RTTY, 50, ?, ?, 2034UTC, Kinshasa Air.

13.524MHz, RTTY, 50, ?, ?, 1512UTC, INA Baghdad.

19.529MHz, RTTY, 50, ?, ?, 1449UTC, Tokyo Meteo SYNOP.

8.609MHz, RTTY, 50, 170, ?, 2100UTC, Rostock Ruegen Radio.

19.171MHz, RTTY, 50, 425, ?, 1330UTC, AP Morocco.

13.826MHz, RTTY, 40, 425, ?, 0815UTC, Prensa Latina Cuba.

5.7775MHz, FAX, 60, 288, ?, 0035UTC, Buenos Aires.

9.398MHz, 120, 576, ?, 1217UTC, Pearl Harbour.

16.340MHz, 120, 576, ?, 1209UTC, Auckland.

3.898MHz, 96, 250, TNL, ?, Brazzaville.

10.605MHz, 96, 850, RFTJ, ?, Dakar.

INFO IN ORBIT

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

Pre-amps

Continuing with the series about the principle sections of a satellite receiving station, we now take a look at pre-amplifiers.

The idea of having a pre-amp is to provide sufficient gain for the weak satellite signal received by your antenna system to be able to travel down several metres of cable without excessive losses. This means that it must be directly connected to the antenna.

For your home-designed polar orbiting receiver and antenna system your pre-amp need only provide enough gain to overcome the down lead losses. These will be about 8 to 10dB for an average 15 to 20m of cable so your pre-amp should provide this sort of gain. Avoid excessive gain or you may start pulling in unwanted out-of-band signals.

The pre-amp should have a properly designed pass band so that the gain drops off rapidly both below 136MHz and above 138MHz. Average prices range from £10 to £20. You should try to run your system without one at first - you may be pleasantly surprised.

Pre-amps that are included when you buy a complete satellite system for Meteosat/GOES will have been designed for that specific system and so should work well. See also the later section on "Future Projects". I am very cautious about high-gain units for use on polar orbiter systems because experience shows that all sorts of unwanted signals can be pulled in along with the satellite signal.

If you are constructing your pre-amp from one of the many kits available, remember that it will have to take the worst of the weather so protect it accordingly. I mounted mine in a small box fitted with N-type sockets to take cables fitted with N-type plugs. I then sealed the whole unit in a tightly wrapped piece of cut car cover.

Before having it installed on the roof I tested it thoroughly in all weathers until I was happy with it, and then up it went. When it eventually came down (due to other antenna problems) the pre-amp was fine.

Multiple Launches

The Russians recently launched six satellites from the same rocket, a Tsiklon booster. They are all Cosmos satellites and numbered from 2038 to 2043. They were put into similar orbits, almost circular at 1400km and with inclinations of about 83 degrees. The description "have radio systems for precise measuring of orbital elements." means, I think, that they are probably all navigation satellites. I am building up a database on my computer of every satellite that I locate and it will be interesting to see what launch patterns emerge.

MIR

I was pleased to hear the cosmonauts back on the 143.625MHz transmitter after the long break. The noises and

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voices that I heard sounded most intriguing and I wondered whether they were doing an outside excursion - otherwise known as an EVA (extra-vehicular activity). The cosmonauts are Alexander Viktorenko and Alexander Serebrov and are continuing to do much scientific study, and have an automatic transport vehicle with them for the EVAs. My thanks to the Novosti Press Agency for all this information.

Assorted Signals

Various signals other than APT (picture) satellites are frequently heard in the 137MHz band, as I have mentioned in previous columns. A most interesting letter from **Brian Coupe** G4RHZ of Doncaster listed many of the frequencies together with his ideas about which satellites are responsible. Brian mentions the navigation satellites heard in the 150MHz band i.e., 149.91, 149.94, 149.97 and 150.03MHz which are heard every few minutes. On 150.00MHz there is a civil navsat system as well. Brian tells me that this data is decodable. I have asked Brian for more details and look forward to saying a bit more about this system in a future column.

Also on Brian's long list is the musical sounding Transit 5B-5 which he also has heard on 136.65MHz. The signal on 137.08MHz which I hear sometimes may be 1971-100C if Brian is right. He describes it as a Ferret.

Other frequencies mentioned are 136.23MHz which may be Tiros 7,8 or 9. I am still trying to obtain Kepler elements for these to identify which it is.

Brian mentions that two satellites came on in the 430MHz amateur band, one called Hilat which transmits on 137.676MHz as well as at 435.974MHz and 413.028MHz, and one called Polar Bear on both 435.978MHz and at about 149.98MHz. Brian tells me that these satellites were identified by experienced amateurs after much data analysis.

Another correspondent, **Geoffrey Falworth,** has written to me about his research into the mystery signals in the 137MHz band. He has been collecting records of the various published satellite frequencies and comments that 137.40MHz was not only used by the Russian Meteor satellites but also by some Indian spacecraft. Also on his list is 136.47MHz which he writes was once used by OV5 3 and Isis 1 but apparently these are not known to be transmitting now. On 10th October I heard 4 minutes of bleeps on 136.47MHz at about 0955UTC which I am fairly certain were of satellite origin.

Geoffrey has kindly volunteered to obtain some Kepler elements for me so with his welcome co-operation I should be able to identify some of these signals in due course.

I have had some welcome telephone calls from readers of this column giving or asking for data on satellite frequencies. **Graham Smith** G1JVZ has been studying a book called *Communication Satellites* and he tells me that its a mine of information on all of the various transmissions so I shall have an early Christmas this year!

Finally, I was surprised to hear what I think is called Mirrorball on 136.11MHz on October 10. I haven't heard this one for many months. Apparently it may be a Japanese beacon trailing one of their amateur satellites.

UoSAT-1 Decays

This amateur satellite operated by the University of Surrey was launched 8 years ago on 6th October 1981 by NASA and covered over 44,600 orbits before it finally decayed on Friday 13th October. Many of us have been tuning in and recording its data for computer processing, over a long period of time. UoSAT-1 transmitted easy to decode data containing space-related measurements and it was this data that persuaded many people to take up satellite monitoring.

The last measurements of its orbital period that I saw on the UoSAT-2 bulletin board gave its Mean Motion as 16.1269 orbits per day as it dropped rapidly into the earth's upper atmosphere.

We will all miss UoSAT-1 (also known as Oscar 9) but there are more spacecraft on the way - UoSATs D and E and the four Microsats, all involving the pioneering work of the University of Surrey under the expert direction of Dr Martin Sweeting. Details of these craft are published in *Practical Wireless* in the Amateur Satellites section. Current launch date is planned for January 19th 1990.

Professional-Amateur Cooperation

Last month I mentioned the free exchange of information between professionals and amateurs, in particular the need of amateurs to have Kepler elements in order to track satellites. Some years ago my wife Marion was employed to respond to requests from the public for scientific and other information.

I was therefore very disappointed to receive a letter from an institution refusing to send me elements for the few satellites that I wished to correlate with my own observations. One reason given implied that this column would have published the data "without due credit".

Some years ago I spent many hours obtaining visual satellite observations made with my friend Pierre, one of the keenest satellite observers ever known. Meanwhile I have found other sources for this innocuous data and will publish the results in a later column.

NOAA Weather Satellites

During early October the APT (picture) transmission on NOAA 9 was switched off for a few days because the satellite passes were coinciding with NOAA 11 which takes priority. During a routine monitoring session (playing with the kids while the scanner looks around!) I suddenly heard the NOAA 9 beacon. It hadn't occurred to me that the beacon would be left on even though the APT was off but of course it makes sense. It is interesting to hear these signals when you don't expect them.

Transmissions continue regularly from NOAAs 9, 10 and 11 with APT on 137.62, 137.50 and 137.62MHz respectively and beacons on 136.77 and 137.77MHz.

Okean 1

The prize for detecting signals from Okean 1 goes to Reverend James Brown who heard a single transmission in mid-September. Okean uses 137.40MHz but none of the many people that I talk satellites with had heard Okean 1 for months. The view is that Okean 2 may be launched at any time.

The Russian Meteors have been off and on again. Met 2/16 uses 137.40MHz and has continued to transmit visible-light pictures in sunlight and slow scan infra-red pictures in darkness, though, as mentioned in previous months, these are not of comparable quality to the usual NOAA or Met 3/2 quality or format. While writing this, Met 2/16 is off completely while it passes through a twilight phase. Within a couple of weeks I would expect it to be back on.

Met 2/17 is also using 137.40MHz but isn't now transmitting the SSIR format picture so it just switches off in darkness. Both 2/16 and 2/17 were above the UK horizon on October 1st at 1227UTC causing interference with each other. The professional ground stations have directional antennas so they won't suffer from this effect. Met 2/18 which uses 137.30MHz was probably switched off around mid-September so I didn't hear it for a month. It only transmits visible-light pictures and was off during its passage through the twilight phase but was back on from October 10th.

Met 3/2 is still on 137.85MHz but not transmitting every day or on every pass. It is occasionally transmitting infra-red pictures.

Meteosat-4 and GOES-E

Both of these geostationary weather satellites continue to transmit good quality pictures and the fading during the early hours noticed by many observers seems to have gone. The Japanese (GMS) pictures seem to have improved as well even though their new GMS-4 satellite wasn't yet online.

Pictures

Both of the pictures are from the GOES-E satellite. Fig 1 is a composite of pictures taken by the NOAA 11 polar orbiter and re-transmitted by GOES-E on August 10th. It shows the region around Saudi Arabia and the Gulf. The grid lines are superimposed by the satellite controllers.

Fig 2 is a composite from NOAA 11 of the North Atlantic on 4th July showing a vigorous weather system.

Future Projects

An interesting development is happening on the more advanced side of our hobby. Amateur publications are publishing circuits

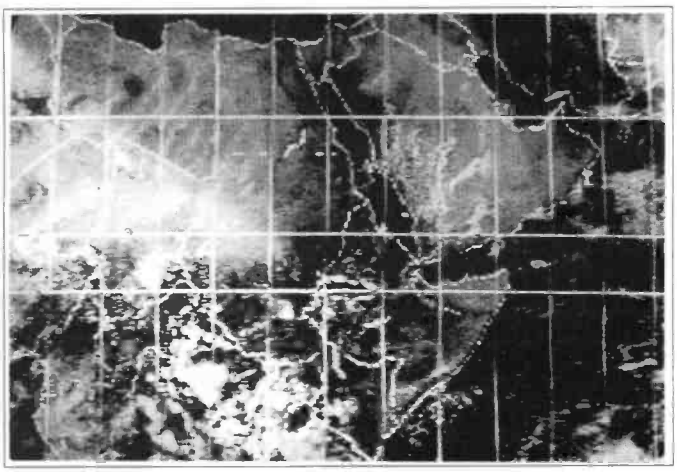


Fig. 1: GOES-E N11 Saudi Region, 10 August 89

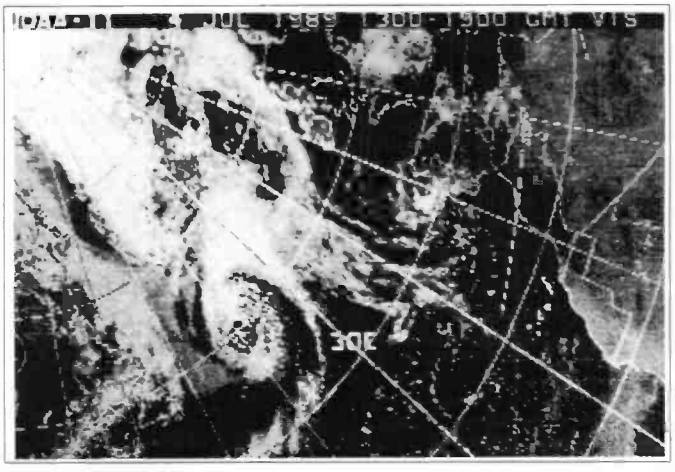


Fig. 2: GOES-E N11 Composite N. Atlantic, 4 July 89

SEEN & HEARD

for construction using advanced components that are falling in price. I have recently seen an article for a very low noise, high gain, wide-band preamp - a dream specification! - for use with the geostationary satellites and high resolution picture transmissions. I propose to construct this unit because I do need one for looking at GOES pictures.

Media Involvement

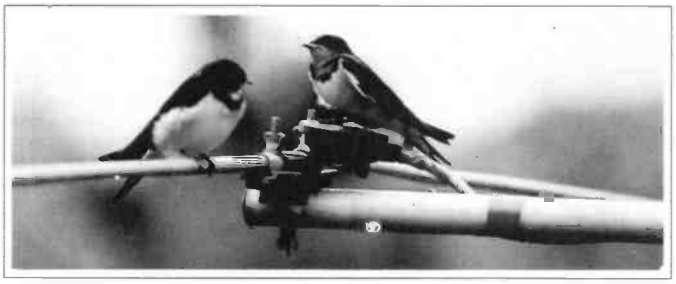
Finally, be cautious if you are asked to provide any sort of weather forecasting for the press. Satellite enthusiasts monitoring the planet can forecast the weather quite accurately for at least a day or so in advance. I reluctantly agreed to do this for one month when asked by a national daily and was one of several people involved. At the end of it they told me that I had "done very well" and arranged a photographic session. Nothing was ever published and my enquiries of the paper fell on deaf ears. Be careful if you are approached!

Stop Press...

In late October a new Russian Meteor weather satellite, probably Met 3/3, appeared on the scene, transmitting visible pictures in daylight and good-quality infra-red at night on 137.85MHz. Full details next month.

BAND II DX

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



It was a sure sign that summer was ending when Joan and I watched baby swallows being fed on her Band II dipole, Fig. 1, before making their long journey to warmer parts. Who knows, those same birds may well be back next year to nest in the eaves of our house and feed their youngsters sat on the same antenna.

The swallows' departure prompted me to remind our overseas readers that I am always pleased to include their reports in my columns because these can give us in the UK, a chance to learn how signals in different latitudes and temperatures behave while an opening is in progress. For instance, in Botswana, **P.R. Guruprasad** (Molepolole) keeps an eye on his barometer and when the pressure is varying, he looks for DX in Band II and at 0625 on July 29 his Sony ICF700 OD receiver was overloaded at times by a transmission on 89.55MHz which "seemed to be in SeSotho or in Setswana", plus weaker transmissions of a commercial and a chorus in Afrikaans on 89.9, 94.2 and 94.4MHz. In August he heard news and weather from Radio South Africa, on 105.2MHz, on the 12th and "very strong signals" again from RRSA on the 29th. PRG also logged several stations, stemming from one broadcaster, in Afrikaans early on the 26th, various programmes from Radios Botswana (89.9MHz) and Setswana (89.55MHz) and more strong signals in English/Afrikaans on 94.8, 95.6 and 95.8MHz, on the 30th. "It gives me extreme pleasure to hear Band II even at times when the complete s.w. range gets faded out," said PRG.

Tropospheric

While on holiday in Great Yarmouth in September **Roy Patrick** (Mackworth), using a Vega 215 portable, heard BBC Radios 1 (London), Kent and Norfolk on most days and excellent signals from Belgium (BRT1 & 2), "lovely signal on September 21," said Roy, and Holland (Hilversum 1 and 3). On the 20th and 21st, **Simon Hamer** (New Radnor) logged signals from the Benelux countries, Denmark, Eire, France, East and West Germany, Norway and Sweden and said that there were "too many to itemise."

I counted at least a dozen strong continental voices, plus BBC Radios Bristol and WM while the prevailing high pressure system of 30.6in (1036mb) was falling during the evening of Saturday September 30 and early on October 1. Conditions were good over most of Great Britain throughout that weekend as **David Edwardson** (Wallsend) found when he heard rugby commentaries from Radios Wales (in Welsh) and Scotland (Cumbria transmitter) and football from BBC Radios Humberside, Lancashire, Nottingham and York and ILR Pennine Radio between 1400 and 1500 on the 30th and, next morning added BBC Radio Leeds and ILR HALLAM FM to his weekend's score. "In Newcastle there are only 2 local stations above 100MHz, BBC Radio Newcastle on 104.4MHz (low power) and ILR Metro on 103MHz, so there are a lot of channel spacings to be filled up when a lift is on, surprisingly as you can see from my log that quite a few appear around 103-104MHz, particularly from Yorkshire 150-240km away," said David. Also on the 30th, **Leo Barr** (Sunderland), using a Matsui MR4099 receiver, logged BBC Radios 1, 2 and 3 from Holme Moss in West Yorkshire and BBC Radio Scotland, somtimes in stereo, from their transmitters at Ashkirk, Blackhill (Strathclyde), Knockmore (Grampians), Oban and Sandale (Cumbria).

"On the 29th and 30th of September, the weather was mostly sunny and warm," wrote **Barry Bowman** (Prestwich) who logged Capital Radio and Century Radio above 100MHz and RTE Radio 2 (91.8MHz) and Radio Na Gaeltachta (94MHz) during the evening of the 29th. The following evening he heard Capital and Century again "with remarkable signal strength", but his best came early on October 1 when he added Radios Gloucestershire, Leicester, York and Mercia Sound to his log. Finally on the 2nd, Barry found a short opening toward Ireland and again received Century Radio, Radio Na Gaeltachta and RTE2.

George Garden (Edinburgh) went to his favourite DX spot high on Cairn O' Mounth on the 30th and, in addition to many foreign stations in "strong clear stereo", he heard BBC Radios Cumbria, Lancashire and Leicester, ILR Beacon Radio serving Wolverhampton and the Black Country and Tees and Metro both "unbeievably strong". "It is interesting to note that Beacon Radio is transmitted from a site on top of a hill, but never received here before now," said George who likes Saturday afternoon openings for DXing because many local radio stations are broadcasting commentaries of football matches in their area which provides a good indication as to where transmissions are coming from. However he always waits for a station announcement to confirm it. In Arbroath, David Glenday heard f.m. stereo from Radio Century and Radio 2 FM from Eire, Radios Cleveland, Cumbria and York from England and Manx Radio from the Isle of Man on the 30th and added West Sound to the list on October 3.

I counted at least 10 very strong continental programmes spread throughout the band around 0845 on October 16 and again at 2000 on the 17th and while **Rob Mannion**, Editor of our sister magazine *Practical Wireless*, was travelling between Winchester and Poole at 0640 on the 17th he identified French and Italian stations, plus one Spanish on his Panasonic car radio. Frequently while out during the first half of October, I used my Plustron TVR5D, with its own rod antenna, from the rear seat of my car and heard a variety of continental stations at good strength and not always from high ground.

I see from a QSL card received by David from Sender Freies Berlin (SFB) that their f.m. transmissions are SFB1 -88.8, 2 -92.4, 3 -96.3 and 4 -98.2MHz.

TELEVISION

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

Band I

Sporadic-E addicts will be interested to learn that in India, **Lt. Col. Rana Roy** (Meerut) received pictures from the USSR on Ch. R1 (49.75MHz) during such disturbances on July 5, 6, 7, 11, 12, 20, 21, 24 and 25, August 2, 3, 5, 7, 12, 16, 21, 23, 25 and 28 and September 3, 5 and 6. In addition he logged pictures from Dubai on Ch. E2 (48.25MHz) on July 16, 17 and 20 and August 5. Among the programmes he saw were cartoons, documentaries, news, Figs. 1 and 2, films, the "TCCP" caption and a test card from the USSR and, a pre-programme caption, Fig. 3, prayers and teletext in Arabic. Rana also found typical 'F2' pictures from Malaysia on Ch. E2 and Bancock on Ch. E3 (55.25MHz) between 1930 and 2230, almost daily, from August 19 to 31 and on September 2, 3, 8, 9 and 10. "During these hours there was strong interference on Ch. E4 [62.25MHz] from Delhi," said Rana.

Although our Sporadic-E season is over **Edwina** and **Tony Mancini** (Belper) saw an 'F2' type picture on Ch. R1 at 2020 on October 1 and logged a test card from Czechoslovakia (CST ISR-P) on Ch. R1 on the 5th. Edwina, Tony, Joan and I had the pleasure of meeting Igor Khrustalev UA3QJC at the Chalk Pits Museum, (Amberley, Sussex) on October 8. Igor was on holiday from Voronezh and, after a tour of the museum's vintage wireless collection, he was delighted to see the Mancini's photographs of Soviet TV which they had received during various Sporadic-E openings. Igor said that he cannot listen on the 50MHz amateur band because of the hefty signal from a nearby TV transmitter on Ch. R1.

Neil Purling (Hull) saw a Soviet clock on Ch. R1 at 1759 (showing 2059) on August 1, followed by their BPEMR (news) logo at 1800 and at 1830 he added the Polish news caption 'dt' 'DZIENNIK TELEWIZYINY'. He received an Italian test-card (RAI1) at 1951 on the 2nd and an item about Moscow' trams at 1851 on the 9th. During the mornings of the 10th and 11th he identified test transmissions from Estonia, Sweden and Switzerland and Czechoslovakia,

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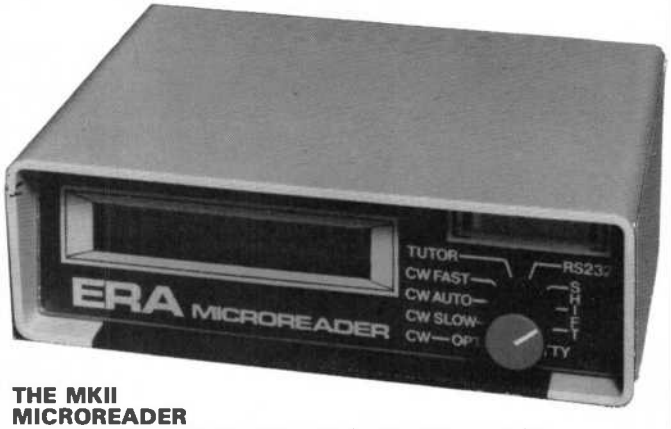

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The Microreader is a small compact unit that allows anyone, equipped with a suitable SW receiver, to read Morse and radio teletype signals simply and without fuss. No computers, interfaces or program tapes are needed. Just connect the Microreader into the ear or speaker socket and switch on. It really is that easy. The decoded words appear on the built in 16 character LCD display.

The Microreader has all the necessary filtering and noise blanking included to allow reception even under bad conditions. This makes it suitable for use with lower cost or home made sets. Receivers such as the Lowe HF125/225 with their smooth tuning are ideal. Even the Sony 2001D with its 100Hz step size will still give very good results. A three colour bargraph tuning indicator makes precise station tuning simple, while shift indicators take the guess work out of RTTY.

The main processor in the Microreader is an Intel 8032 running at 12MHz. This makes it fast enough to not only decode and display the text but also to measure and diplay the frequency a few thousand times each second. It's even fast enough to use its own dictionary to check and correct the text even down to punctuation. The RS232 port in the Microreader can if you wish be used to send decoded messages directly to the screen of a terminal unit or suitable computer. If a permanent record (hard copy) is needed, then just connect it direcly to a compatible serial printer.

The Morse tutor can send and receive Morse. No more guessing what was sent at which speed. You see exactly what is being sent as it's sent and you may repeat it as many times as you like. The random characters are sent as ten groups of five characters with precise digital control over speed, spacing and type. Plug in a Morse key and see what your sending is really like. Even experienced CW operators find this feature extremely useful for showing up embarrassing keying faults (especially own name and callsign).

ERA Ltd. is a manufacturing facility and as such has no showroom. We do however accept personal callers who may like to find out more about the Microreader or try one on their own equipment without obligation. Due to limited parking during the week we must restrict this to Saturdays only, but please do ring us first.

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Fig. 1: USSR

Fig. 2: USSR

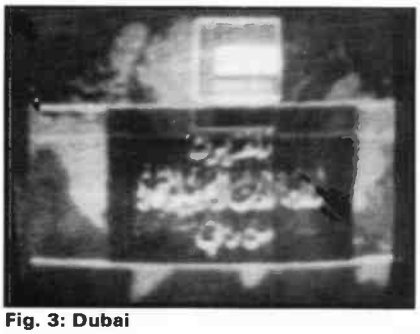

Fig. 3: Dubai

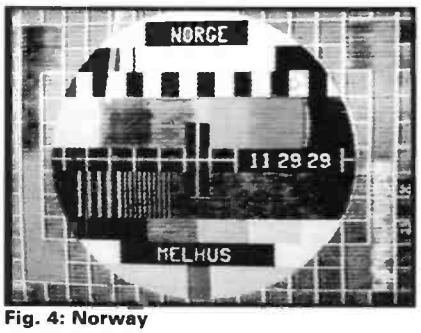

Fig. 4: Norway

Fig. 5: Sweden

Fig. 6: Spain

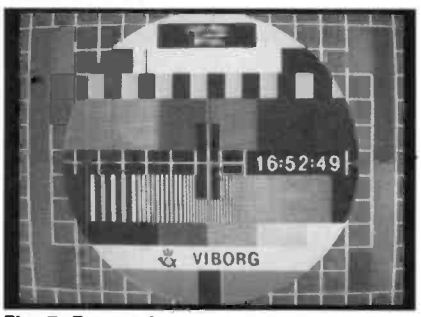

Fig. 7: Denmark

Fig. 8: Denmark

Fig. 9: Rawalpindi

Fig. 10: Andrew Jackson's UHF arrays

Fig. 11: Sat 1

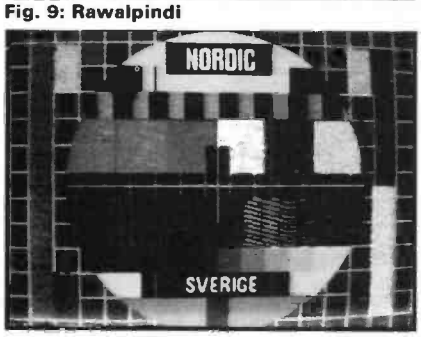

Fig. 12: Sat 1

Poland and the USSR, respectively. Neil again caught Russian news, around 1800 on the 10th and watched a report about a Mexican train crash with the caption 'TACC COO6WAET' (Tass report). Finally at midday on the 22nd he noted a caption in cyrillic, another saying "INTERMECO" and an Ochestra on Ch. E3.

Simon Hamer (New Radnor) received pictures from Poland and the USSR on September 21, Finland and Scandinavia on the 22nd, Spain on the 23rd and Czechoslovakia, Hungary, Poland, Sweden and the USSR on October 7.

Among the smeary "F2" pictures identified by Simon on Ch. E2 were Arabic Teletext from Dubai on October 8, a test pattern from Iran on the 9th and the 'ZBC' test card from Zimbabwe on the 10th. I received strong sync.-pulses, with my ex-military R216 v.h.f. receiver and a mixture of unlockable television signals, typical 'F2', on Ch. R1 between 0845 and 0930 on the 16th.

Picture Archives

During the openings between June and August **David Hunt** (Brighton) received colour pictures from Scandinavia, Figs. 4 and 5 and toward the end of July **Malcolm Hince** (Hereford) logged strong signals from Spain's TVE1, Fig. 6. On June 19 and July 22, **David Glenday** (Arbroath) received a test card and a programme caption, Figs. 7 and 8, from Denmark on the u.h.f. Channels E56 and E40 respectively.

Tropospheric

During various morning and evening tropo-openings on July 5, 6, 20 and 26, August 12 and 31 and September 4, 9 and 10, Rana Roy watched Breakfast TV and some evening programmes from Agra, Bhatinda, Jalandhar, Kasauli, Lahore and Rawalpindi, Fig. 9, in Band III.

Andrew Jackson (Birkenhead) took advantage of the good conditions between September 3 and 10 for a spot of u.h.f. DXing and received pictures, at varying strengths, from BBC1 East, Midlands, North East, Northern Ireland, North West, South and Scotland, BBC2 from Winter Hill and the IBA stations Anglia TV from Sandy Heath, Border from Caldbeck, Central and Central TV East Midlands from Sutton Coldfield and Waltham respectively, HTV West Mendip, Scottish from Black Hill, S4C from Moel y Parc, Tyne Tees from Bilsdale and Pontop Pike, TVS from Hannington and Ulster fom Divis. Andrew's u.h.f. antennas can be seen in Fig. 10.

While the very high pressure system (30.6in) was moving in early October, I received negative pictures from France at 0830 on the 1st, news and sport, in colour from RTE at 1830 on several channels in Band III on the 2nd and varying degrees of co-channel interference on u.h.f. signals on both days.

Among the DX logged in a super haul by Simon Hamer, in Bands III, IV and V, during the openings on September 20 and 21 and October 3

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and 4, were stations in Austria (ORF1&2), Belgium (BRT1&2 and RTBF1&2), Czechoslovakia (CST1&2), Denmark (DR and TV2 DANMARK), France (TDF), East and West Germany (DFF1&2, ARD1, BFBS, BR1, HESSEN3, HR1, NDR1&3, SWF1, "SSVC GERMANY", WEST3 and ZDF), Holland (AFRTS and NED1, 2&3) Ireland (RTE1 and Network-2), Luxembourg (RTL PLUS), Norway (NRK), Poland (TVP1), Sweden (SVT1&2) and Switzerland (+PTT-SRG1 and +PTT-TSI (Swiss/Italian)).

Mike Bennett (Slough) received test cards from Belgium (RTBF1) on Ch. E3 at 1342 on September 29 and at 0955 on October 1. In addition he logged RTBF1 on Ch. E8 at 0953 on the 1st and both networks of RTE in Band III during the morning of the 2nd. This was the first tropo-opening in 6 years that Mike has received pictures from RTE.

Between September 26 and October 1 the Mancinis received signals in Band III from France (CANAL+) and cartoons, church service, test-cards and teletext from RTE 1 and 2. This tropo-opening produced two u.h.f. first-timers for David Glenday, RTE on Ch. E29 on September 30 and Poland, for a brief period at "snowstorm" level, on Ch. R35 on October 4. David told me that at 1305 he saw the East German (DDR F2) test card from Brocken on Ch. E34 rise out of the noise and was quite strong until around 1645. Although little other DX was about, he detected this weak signal on Ch. 35 and first thought it was Czechoslovakia, however, when it finally locked at 1620 there was no doubt that it came from Poland. His u.h.f. DX haul included programmes from Holland (NED1,2&3) and from the UK transmitters at Crystal Palace, Emley Moor, Moel y Parc and Sutton Coldfield on September 30 and added Sandy Heath on October 1, Denmark and France on the 3rd and Belgium (BRT1&2) and West Germany's WDR1 on the 4th.

"Things have been rather flat here over the last month on Bands I and III," wrote **John Woodcock** (Basingstoke) on October 11. However, he did log pictures, at varying strengths in Band III, from France on September 20 and 29 and possibly Germany at 1430 on October 2 and during the evening of the 17th, I received strong negative pictures from France and one German station in Band III and a fair bit of co-channel interference on several u.h.f. channels.

Satellite TV

During a tropospheric opening on July 6, David Glenday received pictures of an announcer, Fig. 11, on Ch. E52, from a SAT-1 relay in West Germany and the Mancinis recently logged a Nordic test-card, Fig. 12, direct from EUTELSAT 1.

SSTV

"A new country, JA1HHL answered my CQ call, very pleased to work Japan on s.s.t.v. for the first time," wrote **Les Hobson G0CUI** (Rotherham) on September 29. In addition to exchanging 24 and 48 seconds colour pictures with stations in Hungary and Switzerland, Les gave UP1BZB his first s.s.t.v. contact and in bringing his own score to 303 he worked stations in Czechoslovakia, East and West Germany, Italy, Poland, Spain and Yugoslavia. During the first 14 days of October Les received pictures from CR0AFN and DL7AGI, exchanged 8 seconds pictures on 14MHz with several Europeans, gave HA1DRV his first slow scan contact, worked the special event station C30LEC and increased his tally to 317. Although 14.230MHz is the popular channel for slow scan work, Les suggests that users give the other slots in the 3.5, 7, 21 and 28MHz bands a try and he feels that the allocation for this mode on 14MHz would be better if it was moved to the far end of the band.

During the month prior to October 7, **Max Wustrau G7BLH** (Houghton Conquest) copied slow scan pictures from stations in Hungary, Italy, Spain (EA2JO calling "CQ PACIFICO") and Switzerland, plus four photographs of, most likely, operators, a scan of a house and the captions, "BUONA SERA GRAZIE DELLA", "MY NAME IS RAFFAELE MY QTH GENOVA" and "PSE QSL VIA BUREAU".

THE NEXT THREE DEADLINES ARE DECEMBER 18, JANUARY 15 & FEBRUARY 19

LONG MEDIUM & SHORT

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

As another year of broadcasting draws to a close I would like to thank all those who have contributed to the success of this section of "Seen & Heard", by sending along regular and interesting reports. May I take this opportunity to wish you all a very happy Christmas and good listening in the New Year. I look forward to your continuing support in 1990. Keep those reports rolling in!

DX Report

Note: LW & MW frequencies in kHz; SW in MHz; Time in UTC.

Long Wave DX

The third and final stage of the three part plan affecting stations in the long wave band will be implemented on 1 February 1990. The object of the plan is to alter the spacing between the stations so that they are at 9kHz intervals starting at 153kHz. Stations below 200kHz were affected by the first stage, which was introduced on 1 February 1986. The second stage, which involved the stations below 245kHz, took place on 1 February 1988. The final stage will bring the remainder of the stations into line and will change the upper band limit from 281 to 279kHz.

The final stage of the plan will affect many stations including "Atlantic 252" in Clarkestown, S.Ireland, which will move from 254 to 252kHz. Whilst monitoring the band in Macclesfield, **Philip Rambaut** noticed that the frequency of the 1500kW transmitter in Topolna, Czechoslovakia has been changed from 272 to 270kHz, presumably in premature compliance with the plan.

Writing from Morden, **Sheila Hughes** says "I thought I would have a try at long wave DX for a change, which has been a neglected aspect of the hobby for me up to now". As her guide to the band Sheila used the LM&S long wave charts and the detailed information and excellent coloured maps in the *Dial Search* booklet - see *SWM* Book Service.

A holiday in Gt.Yarmouth enabled **Roy Patrick** (Derby) to check the band from a new location with his Vega 215 portable. No doubt the clear sea paths in some directions helped him to log the thirteen stations noted in the chart.

MW Transatlantic DX

Now that the longer hours of darkness have arrived, no doubt some listeners will be burning the midnight oil during their search for new stations! In the past the broadcasts from CJYQ in St.Johns, Newfoundland on 930 have acted as a pointer to the reception conditions prevailing between E.Canada and the UK and it seems that they are already reaching our shores quite early. Writing from Cambridge, **Mike Smith** says "I have been able to hear CJYQ from about 0030 onwards quite regularly for the last two or three weeks".

DXers have also found that the broadcasts from WINS in New York on 1010 provide an indication of reception between E.USA and the UK. On one occasion recently **Tim Shirley** picked up their transmission in Bristol around 2300, but to avoid disappointment it may be wise to listen later. **Simon Hamer** (New Radnor) logged their signals and those from several other stations in the USA, Canada and the Caribbean area around 0120 - see chart. Listeners who prefer to rise early may find the report from **Mark Thompson** (Wakefield) of interest. He says "All were heard near dawn and were fairly strong, but all suffered from deep fading. VOCM on 590 was of sufficient quality for me to listen while I was

Long Wave DX Chart

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

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

DXers:
A: Raymond Edwards, Chatham.
B: David Edwardson, Wallsend.
C: Paul Gibson, Edinburgh
D: Francis Hearne, Bristol.
E: Sheila Hughes, Morden.
F: Cyril Kellam, Sheffield.
G: George Millmore, Wootton, I.O.W.
H: John Hash, Brighton.
I: Ike Ddoom, Glasgow.
J: Fred Pallant, Storrington.
K: Roy Patrick, while in Gt.Yarmouth.
L: Philip Rambaut, Macclesfield.
M: Mark Selby, Aldershot.
N: Tim Shirley, Bristol.
O: Phil Townsend, London.
P: Neil Wheatley, while in Lytham St.Annes.
Q: Louis Whitfield, Luton.
R: Max Wustrau, Bedford.

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Local Radio DX Chart

Freq kHz	Station	ILR BBC	Power (kW)	DXer
585	R. Solway	B	2.00	H,I,L,M,P
603	Invicta Snd(Coast)	I	0.10	B,F,G,I,K,N,O,Q,R
603	R. Gloucester	B	0.10	G,L,M,Q,R
630	R. Bedfordshire	B	0.20	B,E,F,I,K,M,N,O,R
630	R. Cornwall	B	2.00	G
657	R. Clwyd	B	2.00	G,M,O,P,Q,R
666	DevonAir R	I	0.34	F,G,R
666	R. York	B	0.80	J,M,P,Q,R
729	BBC Essex	B	0.20	B,F,G,K,M,N,O,Q,R,S*
738	Hereford/Worcester	B	0.037	M,Q,R
756	R. Cumbria	B	1.00	H,J,M,O,P
756	R. Shropshire	B	0.63	G,M,P,Q,R
765	BBC Essex	B	0.50	B,F,G,K,M,N,O,Q,R
774	R. Kent	B	0.70	B,G,I,K,N,O,Q,R
774	R. Leeds	B	0.50	C*,J,M,O,P
792	Chiltern R	I	0.27	B,F,G,M,N,O,R
792	R. Foyle	B	1.00	H
801	R.Devon	B	2.00	G,M,R
819	Hereford/Worcester	B	0.037	M,R
828	2CR	I	0.27	B,G,L*
828	R. Aire	I	0.12	M,P
828	Chiltern R	I	0.20	F,K,N,O,R
837	R. Cumbria	B	1.50	C,M,P
837	R. Furness	B	1.00	P
837	R. Leicester	B	0.45	F,G,K,M,N,O,R,S*
855	R. Devon	B	1.00	G
855	R. Lancashire	B	1.50	M,P
855	R. Norfolk	B	1.50	B,F,I,K,M,N,O,Q,R
873	R. Norfolk	B	0.30	F,G,I,K,M,N,Q,R
936	GWR (Brunel R.)	I	0.18	F,G,Q,R
945	R.Trent (GEM-AM)	I	0.20	F,H*,M,O,P,Q,R
954	DevonAir R	I	0.32	G
954	R. Wyvern	I	0.16	E,Q,R
990	R. Aberdeen	B	1.00	I
990	Beacon R. (WABC)	I	0.09	O,Q,R
990	R. Devon	B	1.00	F,G
990	Hallam R.(C.Gold)	I	0.25	M,R
999	Red Rose R	I	0.80	H,M,O,P
999	R. Solent	B	1.00	B,F,G,K,Q,R
999	R.Trent (GEM-AM)	I	0.25	M,Q,R
1026	R. Cambridgeshire	B	0.50	F,I,K,M,N,O,Q,R
1026	Downtown R	I	1.70	H,O,P
1026	R. Jersey	B	1.00	B,G,K
1035	R. Kent	B	0.50	B,F,G,K,N,Q,R
1035	NorthSound R	I	0.78	J,O
1035	R. Sheffield	B	1.00	M
1035	West Sound	I	0.32	H*
1107	R. Northampton	B	0.50	F,G,K,M,O,Q,R
1116	R. Oerby	B	1.20	M,O,P,Q,R
1116	R. Guernsey	B	0.50	B,G,K,L,R
1152	BRMB (Xtra-AM)	I	3.00	E
1152	R. Broadland	I	0.83	I,M,O,R
1152	R. Clyde	I	3.60	O,H
1152	LBC(LTalkback R)	I	23.50	B,F*,G,K,O,Q,R
1152	Metro R. (GNR)	I	1.80	J,O
1152	Piccadilly R	I	1.50	P
1161	R. Bedfordshire	B	0.10	R
1161	GWR (Brunel R.)	I	0.16	G
1161	R. Sussex	B	1.00	B,K
1161	R. Tay	I	1.40	D,H
1161	Viking R.(Gold)	I	0.35	M,O,R
1170	R. Orwell	I	0.28	B,I,O,R
1170	Signal R	I	0.20	P
1170	TFM Radio (GNR)	I	0.32	J,M,O
1170	Ocean Sound	I	0.12	F,G,K
1242	Invicta Sound(Coast)	I	0.32	B,C,F*,G,M,N,O,Q,R
1251	Saxon R	I	0.76	B,F,G,I,M,P,Q,R
1260	GWR (Brunel R.)	I	1.60	F,G,J*
1260	Marcher Sound	I	0.64	J*,P
1260	Leicester (GEM-AM)	I	0.29	F,M,O,R
1260	R. York	B	0.50	M,O
1278	Pennine R.(C.Gold)	I	0.43	G,M
1305	R. Hallam (C.Gold)	I	0.15	M,R
1305	Red Dragon R	I	0.20	F,G,R
1323	R. Bristol	B	0.63	M,R
1323	Southern Sound	I	0.50	B,F,G,K
1332	Hereward R	I	0.60	B,F,J*,O,Q,R,S*
1332	Wiltshire Sound	B	0.30	F
1359	Essex R	I	0.28	B,F,N,O,Q,R
1359	Mercia Snd(Xtra-AM)	I	0.27	O,R
1359	R. Solent	B	0.85	G,J*
1368	R. Lincolnshire	B	2.00	J*,M,O,Q,R
1368	R. Sussex	B	0.50	B,F,G,K
1368	Wiltshire Sound	B	0.10	C,Q
1431	Essex Radio	I	0.35	F,N,O,Q,R
1431	Radio 210	I	0.14	A,F,G,K,O
1449	R. Cambridgeshire	B	0.15	B,G,O,Q,R
1458	R. Devon	B	2.00	A,G
1458	GLR	B	50.00	B,F*,G,I,K*,O,Q,R
1458	R. Newcastle	B	2.00	J,O
1458	GMR	B	5.00	H,P
1476	County Sound Gold	I	0.50	B,F,G,K
1485	R. Humberside	B	1.00	I,M,O
1485	R. Merseyside	B	1.20	H,P
1485	R. Oxford	B	0.50	Q
1485	R. Sussex	B	1.00	B,F*,G
1503	R. Stoke-on-Trent	B	1.00	G,H,M,P,R
1521	R. Mercury	I	0.64	F,G,K,R
1521	R. Nottingham	B	0.50	M,O,R
1530	R. Essex	B	0.15	B,F,G,N,O,R
1530	Pennine R.(C.Gold)	I	0.74	J*
1530	R. Wyvern	I	0.52	J*
1548	R. Bristol	B	5.00	G
1548	Capital R (Gold)	I	97.50	B,G,K,M,O,Q,R,S*
1548	R. City	I	4.40	J*,O,P
1548	R. Cleveland	B	1.00	J,O
1548	R. Forth	I	2.20	H*,J*,O
1557	R. Lancashire	B	0.25	P
1557	Chiltern R	I	0.76	H*,J*,R
1557	Ocean Sound	I	0.50	B,G,J*,K,M
1584	R. Nottingham	B	1.00	G,M,O,R
1584	R. Shropshire	B	0.50	P
1584	R. Tay	I	0.21	H
1602	R. Kent	B	0.25	B,F,G,K,O,R

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

DXers:
A: Darren Beasley, Bridgwater.
B: Andy Cadier, Folkestone.
C: Scott Caldwell, Warrington.
D: Paul Gibson, Edinburgh.
E: Francis Hearne, Bristol.
F: Sheila Hughes, Morden.
G: George Millmore, Wootton, I.O.W.
H: Ike O'Doom, Glasgow.
I: Roy Patrick, while in Gt.Yarmouth.
J: Brian Renforth, Newcastle-upon-Tyne.
K: Mark Selby, Aldershot.
L: Tim Shirley, Bristol.
M: Mark Thompson, Wakefield.
N: Phil Townsend, London.
O: Ted Walden-Vincent, Gt.Yarmouth.
P: Neil Wheatley, while in Lytham St.Annes.
Q: Louis Whitfield, Luton.
R: David Wratten, Cambridge.
S: Max Wustrau, Bedford.

getting ready for work at 0600UTC". He rated their transmission from St.Johns, Newfoundland as SIO 333 at 0530.

While on holiday in New York, **Peter Easton** (Edinburgh) was able to monitor the m.w. band from the top of the World Trade Centre, which is some 518m a.s.l. Using a Sony ICF 7600DS portable with just the built-in antenna, he logged some 32 stations! Some of the callsigns he noted, e.g. WFAN 660, WOR 710, WCBS 750, WINS 1010, WCAU 1210 and WQXR 1560, are often mentioned in the logs from UK DXers, but many have not been heard on this side of the Atlantic. Peter says "The most interesting thing I found about American local radio is the way each station specialises in one particular type of music or subject".

Other MW DX

The long hours of darkness have enabled some of the broadcasts from N.Africa to reach the UK via sky wave paths. They stemmed from Rabat, Morocco 819, rated as SIO 333 at 0530 by Mark Thompson; Alger, Algeria 891 - 44544 at 2200 by **Mark Selby** in Aldershot; Alger, Algeria 981, heard by Philip Rambaut; Safi, Morocco 1323 (5kW) - 44454 at 2210, also Sfax, Tunisia 1566 - 43443 at 2306 by **Max Wustrau** in Bedford.

Several of the low power transmissions from Portugal and Spain have also been heard here: Lerida 612 (10kW), Zamora 702 (5kW) and Castellon 801 (5kW) were logged by **Darran Taplin** in Tonbridge; Radio Popular 837 (10kW), Radio Bilbao 990 (10kW) and San Sebastian 1260 (10kW) were noted by Philip Rambaut; Vila Real 1170 (10kW) was heard by Ike Odoom in Glasgow; Oviedo 531 (10kW), Leon 1395 (5kW), Gerona 1413 (2kW), Pamploma 1503 (2kW), Radio Manersa 1521 (2kW) and Pamplona 1584 (2kW) were logged by Max Wustrau.

MW Local Radio DX

Writing from Bristol, **Francis Hearne** says "Similar to many other ILR stations, LBC has now separated into two services. On m.w. (1152kHz) there is London Talkback Radio, which is aimed at listeners who are 40-50 years old. On f.m. (97.3MHz) there is LBC Crown FM, which is aimed at Londoners aged between 25 and 44. Between 2100 and 0500 every night the two services share the same output. Within two years London has had its choice of ILR stations expanded from two to four, following the formation of Capital-Gold and Capital-FM". Like most other listeners, Francis is wondering which ILR will split next!

Reporting from Lytham St.Annes, **Neil Wheatley** says he is quite impressed with the performance of the Clarion car radio plus 1m wire which he used to compile his list for the chart. It proved to be more sensitive than his Sangean ATS-803 portable and it enabled him to add BBC Radio Shropshire via Woofferton 1584 (0.5kW) to his growing list of DX.

Listening in Warrington at 1100, **Scott Caldwell** picked up the broadcasts from BBC Wiltshire Sound via Swindon (0.1kW) for the first time. In a welcome first report, **Paul Gibson** (Edinburgh) noted the strength of the signal from ILR Radio Tay via Greenside Scalp 1161 (1.4kW) as S9 + 30dB, which may be due to the fact that part of the path is over sea.

Short Wave DX

Generally excellent conditions have been noted in the high frequency bands during most days, but from time to time the ionosphere has been disturbed by solar flares and reception has been disrupted.

Most of the transmissions in the **25MHz (11m)** band have been reaching their targets at quite remarkable strength! The broadcasts to Europe include the Voice of the UAE in Abu Dhabi 25.895 (Ar 0600-1600), noted as SIO 455 between 0945 and 1530 by **Kenneth Buck** in Edinburgh; also Radio RSA Johannesburg, S.Africa on 25.790 (Du, Ger, Eng, Fr 0900-1300; Eng 1400-1600; Ger, Du 1700-1900), rated as 55444 at 1505 by **Raymond Edwards** in Chatham. The 500kW transmissions from Radio RSA also reached Quebec, Canada during 26 days of the month, where Alan Roberts logged them as 35434 at 1700.

The broadcasts to the Middle East and Africa are also being well received. Listening in George, S.Africa **Dick Moon** noted the BBC via Daventry, UK 25.750 (Eng to Africa 1100-1615) as 44544; RFI via Issoudun, France 25.820 (Fr to Africa 0900-1600) as 34343; also Radio Moscow, USSR 25.780 as 54554. In Thumrait, Oman **Rhoderick Illman** rated the transmissions from RTB Brussels 25.645 as 44444 at 1127; Radio Norway, Oslo 25.730 as 44333 at 0815; Radio Denmark, Copenhagen 25.850 as 44333 at 1244; also BRT Brussels 26.050 as 44433 at 1000.

Good long distance reception has been noted in the **21MHz (13m)** band during most days. Some of the broadcasts from Radio Australia have been reaching the UK, although they are intended for other areas. Using a home-built single valve (955 acorn) straight receiver in Bungay, **Ron Pearce** picked up their transmission to Indonesia, Malaysia and Singapore on 21.525 (Eng 1300-1430) at 1350, which he rated as SIO 322. Perhaps Ron's achievement will encourage others to build an inexpensive straight set based on a single valve or 2N3819 f.e.t. transistor.

The broadcasts to Europe in this band include: Radio Japan, Yamata 21.500 (Sw, It, Fr 0530-0700), rated as 34433 at 0559 by **Kenneth Reece** while in Borth; Radio Japan via Moyabi, Gabon 21.690 (Sw, It, Fr, Eng, Jap 0530-0830) - SIO 433 at 0700

SEEN & HEARD

Medium Wave DX Chart

Freq kHz	Station	Country	Power (kW)	DXer
531	Leipzig	Germany (E)	100	J,L*
531	Oviedo	Spain	10	T*
540	BRT-2 Wavre	Belgium	150/50	D,F,J,K,L,M*,R,T*
540	Solt	Hungary	2000	N*
549	DLF Beyreuth	Germany (W)	200	D,J,L,M*,R,T*
558	Espoo	Finland	100	E*
558	DDR/F Rostock	Germany (E)	20	L*
558	Valencia	Spain	20	T*
567	RTE-1 Tullamore	S.Ireland	500	C*,F,J,K,L,M*,R
567	West Berlin	Germany (W)	100	T*
576	Stuttgart	Germany (W)	300	J,M*,T*
585	Drf Wien	Austria	600	M*
585	FIP Paris	France	8	J,P
585	RNE-1 Madrid	Spain	200	D,I*,L*,P*,T*
585	BBC-R3 Dumfries	UK	2	L
594	HRF Frankfurt	Germany (W)	400	K*,L,R
603	BBC-R4 Newcastle	UK	2	J,K,L
612	RTE-2 Athlone	S.Ireland	100	J,K*,L,M*
612	Lerida	Spain	10	P*
612	Tallinn	USSR	100	E*
621	RTBF-1 Wavre	Belgium	300	F,J,K,L,M*,P,R
621	RNE-1 Santa Cruz	Tenerife	100	N*
630	Vigra	Norway	100	K,L*
630	Tunis-Djedeida	Tunisia	600	Q*
639	Liblice	Czechoslovakia	1500	K,L,M*
639	La Coruna	Spain	100	I*,P*
648	BBC Drfordness	UK	500	J,K,L,M*
648	Simferopol	USSR	150	E*
657	Burg	Germany (E)	250	D
657	BBC-Wales Wrexham	UK	2	J,L
666	Bodenseesender	Germany (W)	300/180	K,L*
666	Barcelona	Spain	20	L*
675	Hilversum-3 Lopic	Holland	120	D,J,K,L,M,R
684	RNE-1 Sevilla	Spain	250	L*,P*
693	BBC-R2 Droitwich	UK	150	L,M
702	Aachen/Flensburg	Germany (W)	5	L
702	Monte Carlo	Monaco	300	T*
702	Zamora	Spain	5	P*
711	Rennes 1	France	300	F,M*,P
711	Heidelberg	Germany (W)	5	L*
720	BBC-R4 Lisnagarvey	N.Ireland	10	L
720	BBC-R4 Lots Rd London	UK	0.5	J
729	RTE-1 Cork	S.Ireland	10	J,L
729	Oviedo	Spain	50	L*,P*
738	Paris	France	4	J,P
738	Poznan	Poland	300	M*
738	RNE-1 Barcelona	Spain	250	L*,P*
747	Hilversum-2 Flevo	Holland	400	D,F,J,K,L,M,R
756	Brunswick	Germany (W)	800/200	K,L*,P
756	BBC-R4 Redruth	UK	2	T*
765	Sottens	Switzerland	500	J,K,L*
765	BBC-R2, Chelmsford	UK	0.5	T*
774	BBC-R4 Enniskillen	N.Ireland	1	J
774	RNE-1 Caceres	Spain	60	P*
774	RNE-1 San Sebastian	Spain	60	L*
783	Burg	Germany (E)	1000	J,K,L,M*,P
792	Sevilla	Spain	20	L*
801	BRF via Munich	Germany (W)	420	K*,L*,M*
801	Castellon	Spain	5	P*
810	SER Madrid	Spain	20	M*,T*
810	BBC-Scot.Westerglen	UK	100	B,L,P
819	Trieste	Italy	25	L*
819	Rabat	Morocco	25	Q*
837	Nancy	France	200	D
837	R.Popular, Sevilla	Spain	10	L*,M*
846	Rome	Italy	540	L*,T*
855	Murcia	Spain	125	I*,J,K*,L*,M*,P*
864	Paris	France	300	D,K*,L*
873	AFN Frankfurt	Germany (W)	150	C*,F*,K*,L,M*,T*
882	BBC-Wales Washford	UK	70	D,J,K,L,M,T*
882	Titograd	Yugoslavia	300	K
891	Algiers	Algeria	600/300	F*,L*,M*,T*
891	Hulsberg	Holland	20	L
900	Milan	Italy	600	C*,L*,M*,T*
909	BBC-R2 Moorside EdgeUK	200	L	
918	R.Intercont. Madrid	Spain	20	C*,M*
918	R.Ljubljana	Yugoslavia	600/100	L
927	BRT-1 Wolvertem	Belgium	300	D,J,K,L,M,P,R
936	Radio Bremen	Germany (W)	100	D,K,L,M*
945	Toulouse	France	300	D,L*,M*
954	Dobrochov	Czechoslovakia	400	L*
954	Al Arish	Qatar	1500	K*
963	Pori	Finland	600	K*,L,M*
972	NDR/WDR Hamburg	Germany (W)	300	D,K*,L,M*,N
981	Alger	Algeria	600/300	C*,K*,L*,M*
990	SER R.Bilbao	Spain	10	L*,P*
999	Hoyerswerda	Germany (E)	20	L*
999	R.Popular, Madrid	Spain	20	D,P*
1008	Hilversum-5 Flevo	Holland	400	D,K,L,M,R
1017	Wolfsheim	Germany (W)	600	K*,L,M*
1026	Graz-Dobl	Austria	100	L*
1044	DDR-1 Burg	Germany (E)	250	K,L,M
1053	BBC-R1 Droitwich	Uk	150	L
1062	Kalundborg	Denmark	250	D,K,L
1071	Prague	Czechoslovakia	60	L*
1071	Brest	France	20	J,K,M
1071	Lille	France	40	D
1080	Katowice	Poland	1500	K*,L*
1089	BBC-R1 Moreside Edge	UK	150	L
1098	Bratislava	Czechoslovakia	750	K*
1098	Dammam	Saudi Arabia	5	G*
1107	AFN via Munich	Germany (W)	40	F*,K*,L*,P*,S*
1107	BBC-R1 Wallasey	UK	0.5	L
1125	La Louviere	Belgium	20	J,L*
1125	BBC Llandrindod Wells	UK	1	L
1125	Zagreb	Yugoslavia	200	K*
1134	Zagreb	Yugoslavia	300	L,M*,S*
1143	AFN via Stuttgart	Germany (W)	10	D,L*
1143	Kaliningrad	USSR	150	M*,N*
1170	Vila Real	Portugal	10	K*
1179	Solvesborg	Sweden	600	C*,D,F*,J,K*,L
1188	Kuurne	Belgium	5	J,K,M*,R
1197	VDA via Munich	Germany (W)	300	K,L*,R
1197	BBC-R3 Bournemouth	UK	0.5	J
1206	Bordeaux	France	100	D
1206	Wroclaw	Poland	200	L*,M*
1215	BBC-R3 Moorside Edge	UK	100	L
1215	BBC-R3 Westerglen	UK	50	M
1224	CDPE Madrid	Spain	20	L*
1233	Prague	Czechoslovakia	400	K*,L*,M*
1251	Siofok	Hungary	135	M*
1251	Huisberg	Netherlands	10	L
1260	SER San Sebastian	Spain	10	L*
1269	Neuminster	Germany (W)	600	D,J,K*,L,M*
1278	Strasbourg	France	300	D
1278	RTE-2 Dublin/Cork	S.Ireland	10	K*
1287	Litomysl/Liblice	Czechoslovakia	300/200	C*,K*,L*,M*,R,T*
1296	Kardzali	Bulgaria	150	T*
1296	BBC Drfordness	UK	500	J,K*,L,R
1305	Constantine	Algeria	20	T*
1305	Marche	Belgium	10/5	K,L*
1314	Kvitsoy	Norway	1200	D,L,M*,T*
1323	BBC Zyyi	Cyprus	50	G*
1323	R.Moscow via Leipzig	Germany (E)	150	L*
1323	Safi	Morocco	5	T*
1332	Rome	Italy	300	L*
1341	BBC-Ulst.Lisnagarvey	N.Ireland	100	J,K,L,T*
1350	Nancy/Nice	France	100	D,L*,M*,T*
1359	RBI Berlin	Germany (E)	250/100	B*,F*,L*
1359	Moscow	USSR	150	E*
1368	Manx Radio, Foxdale	I.D.	20	A*,K*,L
1377	Lille	France	300	D
1386	Kaunas	USSR	1000	K*,L,T*
1395	R.Tirana via Lushnje	Albania	1000	T*
1395	Leon	Spain	5	T*
1404	Komotini	Greece	100	T*
1413	BBC via Masirah Is	Oman	1500	G*
1413	Gerona	Spain	2	T*
1413	RCE Zaragoza	Spain	20	K*
1422	Heusweiler	Germany (W)	600	D,J,K,L,M*
1422	Saarbrucken	Germany (W)	1200/600	T*
1422	Riyadh	Saudi Arabia	20	G*
1431	Bernburg	Germany (E)	20	K*,T*
1431	Dresden	Germany (E)	250	L*,M*
1440	Marnach	Luxembourg	1200	C*,J,K,L,M*,P,T*
1467	TWR Monte Carlo	Monaco	1000/400	C*,F*
1476	Wien-Bisamberg	Austria	600	K*,L*,T*
1494	Leningrad	USSR	1000	C*,K*,L*,T*
1503	Stargard	Poland	300	F*,M*,N*
1503	Pamploma	Spain	2	T*
1512	BRT Wolvertem	Belgium	600	C*,D,F*,J,K*,L,D*
1521	Kosice	Czechoslovakia	600	L*
1521	Radio Manresa	Spain	2	T*
1530	Vatican Radio, Rome	Italy	150/450	M*,T*
1539	DLF Mainflingen	Germany (W)	700	L,M*,T*
1548	Trincomalee(DW relay)	Sri Lanka	600	G*
1566	Sarnen	Switzerland	300	L*
1566	Sfax	Tunisia	1200	T*
1575	RBI via Burg	Germany (E)	250	B*,H*,M*,T*
1584	Pamplona	Spain	2	T*
1593	Langenberg	Germany (W)	400/800	L,M*,T*

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

DXers:-

A: Darren Beasley, Bridgwater.
B: Scott Caldwell, Warrington.
C: Jim Cash, Swanwick.
D: Raymond Edwards, Chatham.
E: Simon Hamer, New Radnor.
F: Sheila Hughes, Morden.
G: Rhoderick Illman, Thumrait, Oman.
H: Graham Johnson, Nuneaton.
I: Cyril Kellam, Sheffield.
J: George Millmore, Wootton I.O.W.
K: Ike Odoom, Glasgow.
L: Philip Rambaut, Macclesfield.
M: Mark Selby, Aldershot.
N: Tim Shirley, Bristol.
D: Chris Shorten, Norwich.
P: Darran Taplin, Tonbridge.
Q: Mark Thompson, Wakefield.
R: Phil Townsend, London.
S: Ted Walden-Vincent, Gt.Yarmouth.
T: Max Wustrau, Bedford.

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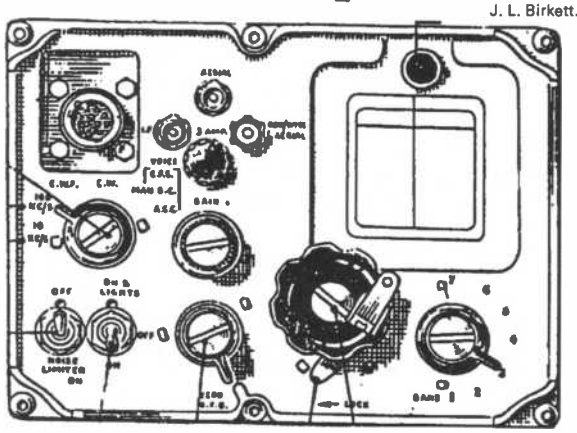

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SEEN & HEARD

Transatlantic DX Chart

Freq kHz	Station	Location	Time (UTC)	DXer
		USA		
660	WFAN	New York, NY	0130	A
840	WHAS	Louisville, KY	0140	A
1010	WINS	New York, NY	0125	A,B,D
1130	WNEW	New York, NY	0540	D
1210	WCAU	Philadelphia, PA	0120	A,D
1510	WKKU	Boston, MA	0030	A,D
1560	WQXR	New York, NY	0155	A
		Canada		
590	VOCM	St.John's, NF	0000	A,D
620	CKCM	Grand Falls, NF	0435	D
680	CIYQ	Grandfalls, NF	0000	A,D
920	CJCH	Halifax, NS	0115	A
930	CJYQ	St.John's, NF	0120	A,C,D
1010	CFRB	Toronto, ON	0130	A,D
1050	CHUM	Toronto, ON	0130	A
1200	CFGO	Ottawa, ON	0130	A
1220	CKCW	Moncton, NB	0515	D
1400	CBG	Gander,NF	0100	A
		C.America & Caribbean		
705	R.St.Vincent	Kingstown,St.Vincent	0305	A
770	R.Jamaica	Spur Tree, Jamaica	0305	A
1100	ZDK Granville	RSt.Johns, Antigua	0100	A
1570	Atlantic Beacon	Turks & Caicos Ils	0100	A
1610	Caribbean Beacon	The Valley,Anguilla	0100	A,D
		South America		
1220	R.Globo	Rio, Brazil	0325	D
		Other Areas		
650	GRF	Godthab, Greenland	0130	A
720	GRF	Simiuttaq,Greenland	0130	A

DXers:-
A: Simon Hamer, New Radnor.
B: Tim Shirley, Bristol.
C: Mike Smith, Cambridge.

by Cyril Kellem in Sheffield at 0700; Voice of Israel, Jerusalem 21.780 (Eng 1100-1130) - SIO 333 at 1110 by Philip Rambaut; UAE Radio Dubai 21.605 (Ar, Eng 0615-1730) - 55444 at 1330 by Raymond Edwards; WCSN Scotts Corner, Maine 21.780 (Eng 1400-1600) - 55545 at 1415 by **John Nash** in Brighton; Radio Japan via Moyabi, Gabon 21.700 (Eng, Jap 1500-1700) - 53333 at 1530 by **Chris Shorten** in Norwich; RCI Montreal, Canada 21.545 (Eng, Ger 1545-1730) - SIO 333 at 1600 by **Ted Walden-Vincent** in Gt.Yarmouth; WHRI South Bend, USA 21.840 (Eng 1500-1700) - SIO 233 at 1600 by **Darren Beasley** in Bridgwater; Radio RSA Johannesburg, S.Africa 21.535 (Du, Eng 1800-2000) - 44344 at 1853 by **Graham Johnson** in Nuneaton; Radio For Peace Int, Costa Rica 21.565 (Eng 2000-2400) - SIO 333 at 2045 by **John Evans** in Stacksteads; WYFR via Okeechobee, Florida 21.615 (Eng 2000-2100) - 34323 at 2043 by **Jim Cash** in Swanwick.

Some of the broadcasts to other areas were also logged: Radio DW Cologne 21.600 (Ger to Australia, New Zealand 0600-0800), noted as 24432 at 0600 by **David Edwardson** in Wallsend; Radio Prague, Czechoslovakia 21.705 (Eng to S.E.Asia 0730-0800) - 54434 at 0740 by Mark Selby; BRT Brussels, Belgium 21.815 (Du, Eng, Fr to S.E.Asia 0630-1330) - 34333 at 0810 by **Carl Yates** in St.Helens; SRI via Schwarzenburg, Switzerland 21.695 (It, Eng, Ger, Fr to S.Asia 0745-1030) - 45444 at 0835 by **David Wratten** in Cambridge; BBC via Limassol, Cyprus 21.470 (Eng to E.Africa 0900-1615), noted as "good" by Rhoderick Illman (Oman); Vatican Radio, Rome 21.485 (Fr, Eng, Port to Africa 1000-1215) - 33433 at 1125 by **Derek Lawrence** in Worcester; Radio Austria Int. Vienna 21.490 (Ger, Sp, Fr to W.Africa 1300-1700) - SIO 555 at 1430 by Simon Hamer; BRT Brussels, Belgium 21.810 (Du, Eng, Fr to Africa 1300-1430) - 22122 at 1340 by **Louis Whitfield** in Luton; Radio Pakistan, Islamabad 21.740 (Eng to Middle East 1600-1630) - SIO 455 at 1600 by Kenneth Buck; WCSN Scotts Corner, Maine 21.640 (Eng to E.Africa 1600-1800) - 34343 at 1657 by **Andy Cadier** in Folkestone; Radio Kiev, Ukraine 21.615 (Eng to ? 1900-?) - SIO 222 at 1900 by **Julian Wood** in Buckie; Radio Nederlands via Bonaire, Ned.Antilles 21.685 (Eng, Fr to C.Africa 1830-2025, Du to W.Africa 2030-2125) - 45554 at 2030 by **John Parry** in Northwich; WYFR Okeechobee, Florida 21.525 (Eng to W.Africa ?-2245) - SIO 333 at 2050 by **John Sadler** in Bishops Stortford.

Long distance paths have also been open in the **17MHz (16m)** band. The broadcasts from Radio New Zealand, Wellington to Pacific areas 17.705 (Eng 2345-0145; 0145-0330*; 0330-0730; *Sat/Sun only) have been audible in the UK around dawn during some mornings. Listening at 0600, Simon Hamer picked up their broadcast and noted it as SIO 222. From time to time some of Radio Australia's broadcasts to other areas have reached our shores. Their transmission to S.Asia via Carnarvon on 17.175 (Eng 0100-0915) was logged by David Wratten as 24333 at 0605. Daily variations in the reception of their transmissions to Central Pacific areas and the USA via Shepparton on 17.795 (Eng 2200-0900) were noted by **Kenneth Reece** in Prenton - at best he rated them as 22322 at 0531, but more often they were inaudible.

The reports included some of the many broadcasts to Europe: Radio Moscow, USSR 17.660 (Eng ?-?), rated SIO 444 at 1005 by **John Coulter** in Winchester; Voice of Israel, Jerusalem 17.575 (Eng, Fr 1100-1200) - 22232 at 1104 by Andy Cadier; RNE Spain 17.890 (Sp ?-?) - 53433 at 1550 by Raymond Edwards; Radio Moscow, USSR 17.810 (Eng 1000-1800), heard at 1630 by Paul Gibson; Radio Surinam Int, via RNB Brazil 17.755 (Du, Eng 1700-1750) - SIO 444 at 1740 by Philip Rambaut; Radio HCJB Quito, Ecuador 17.790 (Cz, Ger, Sw, Norw, Da, Fr, Eng 1900-2230) - SIO 333 at 2145 by **Alf Gray** in Birmingham; Voice of Israel, Jerusalem 17.630 (Eng 2230-2300), noted as "fair" at 2251 by **Robin Harvey** in Bourne; VOFC Taiwan via Okeechobee, Florida 17.612 (Ger, Eng 2100-2300) - 32442 at 2230 by **Don Redhead** in Dronfield.

Also noted were some of the broadcasts to other areas: Radio Japan, Yamata 17.765 (Eng, Jap to Asia 0300-0700) - 44444 at 0500 by Chris Shorten; BBC via Mahe, Seychelles 17.885 (Eng to C.Africa 0500-0630) - SIO 222 at 0502 by **Alan Smith** in Northampton; Radio DW via Julich, W.Germany 17.780 (Eng to S.E.Asia 0900-0950) - 55444 at 0900 by Mark Selby; Voice of Greece, Athens 17.550 (Eng to Australia 0800-0850) - 32332 at 0847 by Carl Yates; Radio Beijing, China 17.710 (Eng to S.Asia 0930-1130?), heard at 1100 by **Harry Sutcliffe** in Totnes; Radio Denmark, Copenhagen 17.840 (Da to Africa 1300-1352) - 33333 at 1300 by Rhoderick Illman (Oman); RTM Tanger, Morocco 17.595 (Fr, Eng to Middle East, N.Africa 1400-1700) - 54544 at 1417 by John Nash; Radio DW via Trincomalee, Sri Lanka 17.810 (Eng to W.Africa 1900-1950) - SIO 444 at 1905 by Kenneth Buck; WSHB Cypress Creek, USA 17.555 (Port to S.America 2200-0000) - 35443 at 2223 by Max Wustrau.

Long distance paths to the UK have frequently been open in the **15MHz (19m)** band. The 7.5kW transmissions from Radio New Zealand, Wellington on 15.485 (Eng to Australia, Papua New Guinea 2345-0145; 0145-0330*; 0330-0730; *Sun only) have been audible here around dawn. Kenneth Reece has been monitoring them on a daily basis and he noted variations in reception ranging from inaudible to 34433 at 0630. Some of Radio Australia's broadcasts have been heard here too! Their transmission to Asia via Shepparton 15.245 (Eng 1530-1830) was rated as 44544 at 1750 by David Edwardson; to C.Asia via Darwin 15.170 (Chin 2200-0000) as 23422 at 2200 by Darran Taplin; to the S.Pacific via Shepparton 15.240 (Eng 2100-0730) as 55555 at 0540 by Chris Shorten; to E.Asia via Carnarvon 15.395 (Eng, Chin 0100-0900) as SIO 433 at 0800 by Cyril Kellam; to the C.Pacific via Shepparton 15.160 (Eng 2100-0700) as 34444 at 0720 by David Wratten - this transmission was also noted by Dick Moon (S.Africa) as 33333 at 0545.

Many of the broadcasts to target areas outside Europe were logged, including Radio Bangladesh, Dacca 15.195 (Eng to Middle East 1230-1300), noted as 34333 at 1230 by Rhoderick Illman; Radio Finland via Pori 15.400 (Eng, Fin, Sw to USA 1145-1400) - 53535 at 1309 by Louis Whitfield; VOA via Kavala, Greece 15.205 (Eng to S.Asia, Middle East 1400-1500) - 33343 at 1500 by John Nash; Radio Veritas Asia, Manila, Philippines 15.443 (Eng to S.Asia 1500-1530) - 43333 at 1500 by Sheila Hughes; KUSW Salt Lake City, USA 15.650 (Eng to Canada 1500-2200) - SIO 323 at 1647 by Philip Rambaut; Africa No.1, Gabon 15.475 (Fr, Eng to W.Africa 1600-2100) - SIO 444 at 1933 by Ron Pearce; BBC via Ascension Island 15.400 (Eng to C.Africa 1500-2300) - SIO 333 at 2015 by Ted Walden-Vincent; KSDA Guam, Pacific 15.310 (to Japan 2100-2200) - 45554 at 2100 by John Parry; WCSN Scotts Corner, Maine 15.300 (to W.Africa 2200-0000), noted as "good" at 2315 by Robin Harvey; BBC via Ascension Island 15.260 (Eng to S.America 2000-0330) - 44444 at 0115 by Max Wustrau.

Among the many broadcasts to Europe, good reception was noted from Radio Free Europe via Gloria, Portugal 15.145 (Pol 0600-1900) rated as SIO 555 at 1003 by John Coulter; Radio Korea, Seoul 15.575 (Eng 1800-1900) - 44444 at 1830 by **Ted Agombar** in Norwich; Voice of Vietnam, Hanoi 15.010 (Eng, Russ, Viet, Fr, Sp 1600-2130) - 44333 at 1902 by Mark Selby; Radio Budapest, Hungary 15.160 (It, Ger, Hung, Eng, Russ, Sp 1630-2230) - SIO 544 at 1930 by Darren Beasley; Radio Kuwait, Sulaibiyah 15.505 (Ar 0700-0000) - SIO 455 at 1950 by Kenneth Buck; Voice of Israel, Jerusalem 15.640 (Eng 2000-?) - 45444 at 2011 by Jim Cash; RCI via Sackville, Canada 15.325 (Eng, Fr 1930-2300) - 43344 at 2130 by Andy Cadier; WCSN Scotts Corner, Maine 15.610 (Eng 2000-2200) - 34333 at 2130 by Leo Barr in Sunderland; VOFC Taipei, Taiwan 15.345 (Ger, Eng 2100-2300) - SIO 333 at 2215 by Francis Hearne; WWCR Nashville, USA 15.690 (Eng 1700-0200) - 45444 at 2309 by Graham Johnson; WRNO New Orleans, USA 15.420 (Eng 1700-0000) - 55455 at 2355 by Carl Yates.

The broadcasters now using the **13MHz (22m)** band include WSHB Cypress Creek, USA 13.760 (Sp to C.America 0200-0600), rated as SIO 544 at 0504 by Alan Smith; RBI via Leipzig, GDR 13.610 (Port, Ger, Eng to E.Africa 0445-0645) - 44434 at 0516 by Rhoderick Illman; Radio Jordan, Amman 13.655 (Eng to Europe 0500-1315) - 44433 at 0537 by Kenneth Reece; Radio Austria Int., Vienna 13.730 (Eng, Fr, Ger, Sp to Europe 0400-1700) - 44554 at 0745 by David Edwardson; Radio Korea, Seoul 13.670 (Eng to Europe 0800-0930) - 43333 at 0840 by Chris Shorten; SRI via Sottens, Switzerland 13.685 (Eng to Australia, New Zealand 0745-1030) - SIO 333 at 0850 by Alf Gray; Radio Nederlands via Sottens 13.635 (Eng, Fr, Ger, It to E.Asia 1045-1300) - 55544 at 1112 by Darran Taplin; Radio Moscow via Alma Ata 13.615 (Russ, Can, Chin to S.E.Asia 0200-1600) - SIO 323 at 1125 by Philip Rambaut; Radio Prague, Czechoslovakia 13.715 (Eng, Cz, Ar, Fr to S.Asia, Middle East 1400-2125) - SIO 434 at 1530 by Darren Beasley; Voice of the UAE in Abu Dhabi 13.605 (Ar 1600-2130) - SIO 444 at 1645 by Kenneth Buck; Radio DW via Wertachtal, W.Germany 13.790 (Eng to W.Africa 1900-1950) - 34333 at 1910 by Jim Cash; Radio Baghdad,

SEEN & HEARD

Tropical Band Chart

Freq kHz	Station	Country	UTC	DXer
3.200	TWR	Swaziland	1830	D
3.215	R.Orange	S.Africa	1900	D,G
3.215	R.Orion	S.Africa	0518	J*
3.230	ELWA Monrovia	Liberia	2102	H
3.255	BBC via Maseru	Lesotho	1821	E
3.270	SWABC 1, Namibia	S.W.Africa	1900	D
3.300	R.Cultural	Guatemala	0348	C,G
3.325	FRCN Lagos	Nigeria	0450	C
3.365	GBC Radio 2	Ghana	0530	C,H,J*
3.915	BBC Kranji	Singapore	1840	H,I
3.955	BBC Daventry	England	1850	A,B,E,H,J*,P
3.965	RFI Paris	France	1850	B,H,J*,M
3.975	BBC Skelton	England	0443	B,J*
3.980	VOA Munich	W.Germany	0428	A,B,G,H,J*,M
3.985	R.Beijing, China	via SRI Berne	2125	B,C,R
3.985	SRI Berne	Switzerland	1850	H,M
3.995	DW Cologne (Julich)	W.Germany	2117	B,J*,K,Q
4.030	R.Anadyr	USSR	0145	G
4.050	R. Frunze	USSR	0029	Q
4.220	PBS Xinjiang	China	2320	C
4.500	Xinjiang	China	2320	C
4.635	R.Dushanbe Tadzhik	USSR	0110	F,H,Q
4.735	Xinjiang	China	2320	C
4.740	R.Afghanistan	via USSR	1850	G,H,Q
4.760	ELWA Monrovia	Liberia	1925	H,J
4.765	R.Moscow	via Cuba	0637	J*
4.770	FRCN Kaduna	Nigeria	1845	H,J*
4.790	R.Atlantida	Peru	0345	G
4.790	TWR Manzini	Swaziland	1845	H
4.800	R.Popular Cuenca	Ecuador	0527	C
4.800	LNBS Lesotho	Maseru	1845	H
4.810	R.Orion, Jo'burg	S.Africa	2200	D
4.810	R.Yerevan	USSR	1845	G,H
4.815	R.diff TV Burkina	Ouagadougou	1905	H,Q
4.820	La Voz Evangelica	Honduras	0210	G,J
4.820	Khanty-Mansiysk	USSR	1915	H,Q
4.825	R.Cancao Nova	Brazil	0200	F
4.825	R.Moscow Yakutsk	USSR	1900	G,H
4.830	R.Grigota,SantaCruz	Bolivia	0117	Q
4.830	Gaborone	Botswana	1815	H
4.835	ABC-Alice Springs	Australia	2130	D
4.835	R.Tezulutlan, Coban	Guatemala	0145	G
4.835	RTM Bamako	Mali	1925	B,H,J*
4.845	R.Fides, La Paz	Bolivia	0123	Q
4.845	ORTM Nouakchott	Mauritania	1925	H,J*
4.850	R.Yaounde	Cameroon	1845	C,G,H
4.850	R.Columbia Pt	Costa Rica	2300	L
4.850	R.Tashkent	USSR	0043	Q
4.865	PBS Lanzhou	China	2015	C,H
4.865	V of Cinaruco	Colombia	0400	C,G,J*,L,N,Q
4.870	R.Cotonou	Benin	2105	H,J*
4.870	R.Rio Amazonas	Ecuador	0408	G
4.875	R.Tbilisi	USSR	1920	H
4.880	SABC Radio 5	S.Africa	1920	D,G,H
4.885	Voice of Kenya	Kenya	1925	C,H
4.890	RFI Paris	via Gabon	0458	J
4.895	R.Bare, Manaus	Brazil	0450	J
4.895	Voz del Rio Arauca	Colombia	0145	B,G
4.905	R.Nat.N'djamena	Chad	1930	C,H,J*
4.910	Tennant Creek	Australia	2130	D
4.910	R.Zambia, Lusaka	Zambia	1820	H
4.915	R.Anhanguera	Brazil	0231	G
4.915	R.Ghana, Accra	Ghana	2040	H,J*
4.915	Voice of Kenya	Kenya	1820	H,J*
4.920	ABC Brisbane	Australia	2000	D
4.920	R.Quito	Ecuador	0447	C
4.930	R.Moscow, Ashkhabad	USSR	1830	H
4.935	R.Capixaba	Brazil	0515	G
4.935	Voice of Kenya	Kenya	1820	C,H
4.940	R.Kiev	USSR	1830	B,H,J*,O,Q
4.940	R.Moscow, Yakutsk	USSR	1925	K
4.940	R.Continental,Barinas	Venezuela	0548	J
4.945	Caracol, Neiva	Colombia	0538	J*
4.955	R.Marajoara, Belem	Brazil	0210	F
4.958	R.Baku	USSR	2000	H
4.970	PBS Xinjiang	China	2320	C
4.970	R.Rumbos, Caracas	Venezuela	0536	C,G,J*,N
4.975	R.Uganda, Kampala	Uganda	1820	H
4.980	Ecos del Torbes	Venezuela	0600	L
4.985	R.Brazil Central	Brazil	0413	G,J*
4.990	FRCN Lagos	Nigeria	2100	B,C,G,H,J*
5.000	YVTD Caracas	Venezuela	0523	G
5.005	R.Nacional, Bata	Eq.Guinea	2047	H,K
5.015	R.Moscow	Arkhangelsk	USSR	0500 J
5.015	R.Moscow	Vladivostok	USSR	2050 H
5.020	La Voix du Sahel	Niger	0544	J*
5.030	R.Impacto	Costa Rica	0420	C,G,J*,L
5.030	R.Continente Caracas	Venezuela	0529	Q
5.035	R.Bangui	C.Africa	1810	C,H
5.040	Vos del Upano, Macas	Ecuador	0240	G,L
5.040	R.Tbilisi	USSR	1840	G,H
5.044	R.Impacto	Costa Rica	0419	B,G,J*
5.045	R.Cultura do Para	Brazil	0605	G,J*,Q
5.045	R.Togo, Lome	Togo	2105	C,H
5.050	R.Tanzania	Tanzania	1810	H
5.055	Faro del Caribe	Costa Rica	0557	J*
5.055	R.Catolica Nac, Quito	Ecuador	0335	G
5.057	R.Tirana Gjirokaster	Albania	2100	B,H,J
5.065	R.Candip, Bunia	Zaire	1810	H
5.075	Caracol Bogata	Colombia	0532	B,C,G,J*,Q
5.440	PBS Xinjiang	China	2330	C
5.720	R.San Miguel,Arcangel	Peru	0245	G

DXers:-
A: Ted Agombar, Norwich.
B: Jim Cash, Swanwick.
C: David Edwardson, Wallsend.
D: Simon Hamer, New Radnor.
E: Rhoderick Illman, Thumrait, Oman.
F: Dick Moon, George, South Africa.
G: John Nash, Brighton.
H: Fred Pallant, Storrington.
I: John Parry, Northwich.
J: Kenneth Reece, Prenton.
J*: Kenneth Reece, Borth.
K: Mark Selby, Aldershot.
L: Tim Shirley, Bristol.
M: Chris Shorten, Norwich.
N: Alan Smith, Northampton.
O: Phil Townsend, London.
P: Ted Walden-Vincent, Gt.Yarmouth.
Q: Max Wustrau, Bedford.
R: Carl Yates, St.Helen's.

Equipment Used

Ted Agombar: Grundig Yacht Boy 700 + 20m random wire.
Leo Barr: Matsui MR4099 + internal antenna.
Darren Beasley: Steepletone MBR7 + 20m random wire.
Kenneth Buck: Home-built superhet + random wire.
Andy Cadier: Saisho SW500 + 40m random wire.
Jim Cash: Sony ICF 2001D.
John Coulter: Yaesu FRG-7 + random wire.
Raymond Edwards: Kenwood R5000 + double wire loop.
David Edwardson: Trio R600 + trap dipole 22m long.
John Evans: Saisho SW5000 or Racal RA17L + ATU + G5RV dipole.
Paul Gibson: Panasonic RFB-60DL.
Simon Hamer: Lafayette HE30 + ATU + 22m random wire.
Robin Harvey: Matsui MR4099 + built-in whip.
Francis Hearne: Sharp GFA3 cassette radio + random wire.
Sheila Hughes: Sony ICF 7600DS; Vega 206; Panasonic DR48 + 15m inverted L.
Rhoderick Illman: Sony ICF 7600DS + 23m random wire.
Graham Johnson: Panasonic DR49 + built-in whip.
Cyril Kellam: Sony ICF 7600DS + AN-1 or 5m vertical wire.
Derek Lawrence: Sony ICF 6700W + dipole.
George Millmore: Tatung TMR 7602 portable or Racal RA17L + loop.
John Nash: Kenwood R5000 + random wire.
Ike Odoom: Philips D-2395 PLL portable.
Fred Pallant: Trio R2000 + random wire in loft.
Roy Patrick: Panasonic R1400 Vega 215 portable.
Ron Pearce: Home built one valve (955 acorn) straight set.
Philip Rambaut: Int.Marine Radio R.700M + random wire.
Kenneth Reece: Icom R9000; NRD525 (Kenwood R5000 + random wire in Borth).
Brian Renforth: HMV Model 1131 all valve set (Circa 1958).
Alan Roberts: Home built "Epsom" single conversion superhet + 9m wire.
John Sadler: DX-100L + indoor dipole.
Mark Selby: Realistic DX440 or Panasonic RFB-40 + ATU + 60m random wire.
Tim Shirley: Trio R600 + random wire.
Alan Smith: Matsui MR4099.
Mike Smith: Lowe HF-225 + Sooper Loop.
Harry Sutcliffe: Sony ICF 2001D + built-in whip.
Darran Taplin: Eddystone 680X + Global ATU + 6m indoor wire.
Mark Thompson: JRC NRD525 + 1m loop or 20m random wire.
Phil Townsend: Panasonic RF1680L portable or Lowe SRX-30 + random wire.
Ted Walden-Vincent: Grundig Satellit 1400SL or Sangean SG 786L.
Neil Wheatley: Sangean ATS 803 + built-in antenna.
Louis Whitfield: Matsui MR4099 + built-in whip.
Julian Wood: Trio R2000 + random wire.
David Wratten: Philips D2999 + loop or Trio R2000 + ATU + 30m random wire.
Max Wustrau: Datong PC-1 convertor + FDK-750 2m transceiver.
Carl Yates: Realistic DX-440 + 15m random wire.

Iraq 13.660 (Fr, Ger, Eng to Europe 1800-2200) - SIO 544 at 1951 by Ron Pearce; Radio Nederlands via Flevo 13.700 (Eng to W.Africa 2030-2125) - 35543 at 2050 by John Parry; WYFR via Okeechobee, Florida 13.695 (Fr, Eng to E.USA ?-2245) - 44344 at 2227 by Leo Barr; WHRI South Bend, USA 13.760 (Eng to USA, Europe 1700-0000), noted as "good" at 2330 by Robin Harvey.

There is plenty to interest the listener in the **11MHz (25m)** band! The broadcasts to Europe include WYFR via Okeechobee, Florida 11.580 (Eng 0500-0600), rated as 55444 at 0500 by Raymond Edwards; Radio Australia via Shepparton 11.910 (Eng 0400-0630) - 55545 at 0600 by Chris Shorten; Radio Finland via Pori 11.755 (Fin, Ger, Sw, Eng 0515-2230) - 44444 at 0730 by Sheila Hughes; Radio HCJB Quito, Ecuador 11.835 (Eng 0700-0830) - 44554 at 0730 by David Edwardson; RFI via Issoudun, France 11.670 (Fr, Eng, Yu, Russ, Pol 0700-2145) - 44444 at 1740 by Ted Agombar; Radio Pakistan, Islamabad 11.570 (Ur, Eng, Fr 1645-2015) - 34433 by **Darren Wells** in Faversham; Radio Kuwait, Sulaibiyah 11.665 (Eng 1800-2100) - 55544 at 1831 by Darran Taplin; Thessaloniki, Greece 11.595 (Gr 0900-2155) - SIO 454 at 1940 by Kenneth Buck; AIR via Aligarh, India 11.620 (Eng 1845-2230) - SIO 333 at 2030 by Ted Walden-Vincent; RCI via Sackville, E.Canada 11.945 (Eng 1930-2000) - SIO 444 at 2000 by Cyril Kellam; Radio Damascus, Syria 12.085 (Eng 2000-2100) - 32233 at 2030 by Andy Cadier; Radio Beijing, China 11.500 (Eng 2000-2215) - SIO 333 at 2100 by Alf Gray; Radio Peace and Progress, USSR 11.980 (Eng, Ger 2100-2159), noted as "good" at 2100 by Robin Harvey; RHC Habana, Cuba 11.800 (Eng, Fr 1900-2240) - 22432 at 2105 by Leo Barr; Voice of Israel, Jerusalem 11.605 (Eng 2130-2200), heard at 2145 by Francis Hearne; Radio Japan via Moyabi, Gabon 11.765 (Jap, Eng 2100-0000) - 42322 at 2323 by Jim Cash.

Throughout the day there are many broadcasts in a variety of languages to other areas. They include RBI via Nauen, GDR 11.785 (Eng, Ger to W.USA 0145-0430), noted as 44343 at 0405 by Mark Selby; Radio Beijing, China 11.840 (Eng to USA 0400-0500) - 33433 at 0415 by Kenneth Reece; Radio Tirana via Lushnje, Albania 11.835 (Eng to Africa 0430-0500) - 44544 at 0440 by John Nash; RHC Habana, Cuba 11.760 (Eng to C.America 0400-0600) - 43443 at 0445

SEEN & HEARD

by David Wratten; KNLS Anchor Point, Alaska 11.715 (Eng to Asia 0800-0900) - 23232 at 0800 by Mike Smith; Radio Australia via Shepparton 11.720 (Eng to C.Pacific area 0830-0930) - SIO 333 at 0832 by Alan Smith; AWR Agat, Guam 11.980 (Chin to C.Asia 0900-1300) - 33433 at 1055 by Rhoderick Illman; Radio Tashkent, USSR 11.785 (Eng, Ur, Hi to S.Asia 1200-1500) - SIO 333 at 1330 by John Evans; Radio Sweden, Stockholm 11.905 (Eng to Australia, New Zealand 1400-1430) - 44444 at 1420 by Carl Yates; Radio Prague, Czechoslovakia 11.685 (Ar, Eng, Fr to Africa 1630-2125), heard at 2006 by John Coulter; Radio Globo via Rio, Brazil 11.805 (Port to S.E.Brazil 0900-0300) - SIO 322 at 2235 by Philip Rambaut.

Radio Australia's **9MHz (31m)** broadcasts to Europe via Shepparton on 9.655 (Eng 0700-1030) were rated as 32333 at 0720 by Leo Barr. A few of the many other broadcasters using this band include WCSN via Scotts Corner, Maine 9.850 (Eng to E.Africa 0200-0400), noted as 44344 at 0400 by Ted Agombar; the Voice of Greece, Athens 9.395 (Eng to Europe 1900-1950) - 44444 at 1920 by Sheila Hughes; SRI via Schwarzenburg, Switzerland 9.885 (Port, Eng, Sp to Africa 2030-2200) - SIO 333 at 2145 by Alf Gray; Radio Portugal, Sao Gabriel 9.680 (Port, Eng to USA 2200-0300) - 32322 at 0257 by Derek Lawrence.

While checking the **7MHz (41m)** band, Alan Smith rated Radio Australia's broadcast to Europe via Carnarvon 7.205 (Eng 1430-2030) as SIO 433 at 1634; John Parry noted KBS Seoul, S.Korea 7.550 (It, Fr, Kor, Ar, Ger, Eng, Sp, Port to Middle East, E.Africa 1545-2345) as 33553 at 2030; John Evans logged RTV Sfax, Tunisia 7.475 (Ar to Europe 1800-2345) as SIO 434 at 2200; Francis Hearne rated Radio Polonia, Warsaw 7.145 (Eng, It, Sp to Europe 2100-2355) as SIO 222 at 2330.

Radio Australia's **6MHz (49m)** broadcasts to Europe via Carnarvon on 6.035 (Eng 1530-2030) were rated as 43333 by Chris Shotten at 1605. Many of the reports mentioned the broadcasts to Europe from Radio Sweden, Stockholm 6.065 (Eng 1800-1830), rated as 44344 at 1808 by Graham Johnson; also from Vatican Radio, Rome 6.190 (Hung; Cz, Pol, Ger, It, Fr, Sp, Eng, Port 1630-2230), noted as 44444 at 2050 by Darren Wells.

Station Addresses

BBC Radio Northampton, P.O.Box 1107, Abington Street, Northampton, NN1 2BE.

ILR Marcher Sound, The Studios, Mold Road, Gwersyllt, Wrexham, Clwyd, LL11 4AF.

Radio Portugal, Central Sce. Av, Duarte Pancheco 5, P-1000 Lisboa, Portugal.

Radio Prague, Vinohradska 12, CS-12099 Praha, Czechoslovakia.

Radio Veritas Asia, P.O.Box 939, Manila, Philippines.

Voice of Vietnam, 58 Quan Su Street, Hanoi, Vietnam.

Abbrv	Language
Ar	Arabic
Can	Cantonese
Chin	Chinese
Cz	Czechoslovakian
Dan	Danish
Du	Dutch
Eng	English
Fin	Finnish
Fr	French
Ger	German
Gr	Greek
Hi	Hindi
Hung	Hungarian
It	Italian
Jap	Japanese
Kor	Korean
Norw	Norwegian
Pol	Polish
Port	Portuguese
Russ	Russian
Si	Sinhala
Sp	Spanish
Sw	Swedish
Ur	Urdu
Viet	Vietnamese

RALLIES

December 10: The Leeds and District ARS are holding their annual rally at the Civic Centre, Dawsons Corner, Pudsey, Leeds. This is on the main Leeds Ring Road between Leeds and Bradford. Admission is 50p and the doors open at 10.30am. There will be the usual traders and a Bring & Buy stall. There is a licenced bar and refreshments. **Geoff Stubbs on (0532) 585801.**

1990

February 24: The Rainham Radio Rally will be held in the Parkwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. Doors are open from 10.15am to 4pm (10am for disabled visitors). The usual traders will be there along with a Bring & Buy stall and refreshments . Talk-in by GB4RRR on S22 and SU22. **Bob G0LKE. Tel: (0634) 362154.**

***March 9-10**: There will be an amateur radio show at Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9. Details from: **London Amateur Radio Show, 126 Mount Pleasant Lane, Brickett Wood, Herts AL2 3XD.**

***March 18**: The Norbreck Amateur Radio, Electronics & Computing Exhibition will be held at the Norbreck Castle Exhibition Centre, Blackpool. Details from: **Peter Denton G6CGF. Tel: 051-630 5790.**

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

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

May 13: The Yeovil ARC 6th QRP Convention will be held at the Preston Centre, Monks Dale, Yeovil at 9am. The first lecture is at 10.30am. Lectures during the day will be conducted by GM3OXX, G3RHI, G3PCJ and G3MYM. All the usual traders will be there. Refreshments are also available. **D.J. Bailey G1MNM, QTHR.**

***June 24**: The Annual Longleat Mobile Rally will be, as usual, held at Longleat, near Warminster, Wilts.

July 1: The York Radio Rally will be in the Tattersall Building, York Race Course, The Knavesmire, York. Doors open at 11am with an entrance fee of 50p (children admitted free). There is ample free parking. On show will be amateur radio, electronics and computing, arts and crafts, there's a grand Bring & Buy, Morse tests, lectures on various aspects of amateur radio, a raffle and talk-in on S22. A licensed bar and cafe will be available for refreshments. The Knavesmire is well signposted and there will be additional RAC signs round the main approaches to York. **Frank Webb G3ZKS. Tel: (0904) 625798.**

September 16: The South Bristol Amateur Radio Club are holding the Bristol Rally in the Great Train Shed, Temple Meads Railway Station, Bristol. **David Farr G4WUB. Tel: (0272) 839855.**

*** *Short Wave Magazine* & *Practical Wireless* in attendance.**
If you are organising a rally and would like it mentioned in *Short Wave Magazine*, then drop us a line, preferably as soon as you have fixed the date but no later than six weeks in advance (marking your envelope Rally Calendar) and we'll do the rest. Please make sure that you include all the essential details such as the venue, starting time, special features and a contact for further information.

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STARTING OUT

Brian Oddy G3FEX

The role of a battery is to produce electrical energy by means of a chemical reaction. Experiments during the year 1800 by an Italian, Count Alessandro Volta (1745-1827), revealed that a potential difference (p.d.) or electromotive force (e.m.f.) could be produced between a copper disc and a zinc disc by separating them with a cloth moistened with a salt solution. Later, he connected a number of these Voltaic cells in series to form a battery of cells which he called a Voltaic pile.

There is a good deal more to a battery than may be suggested by its simple appearance. Unless a suitable type is employed in a portable receiver the unwary will soon find that prolonged operation is expensive.

Primary Cells

Subsequent investigations by others showed that a variety of "wet" cells could be produced by immersing two dissimilar metal plates in a suitable conducting liquid, i.e. one which would combine chemically with one of the metal plates during the discharge period. Such liquids are referred to as electrolytes and cells which produce electrical energy by chemical action in this way are known as primary cells. Whilst the electrical energy is being discharged through an external circuit the chemical characteristics of the elements of the cell are gradually changed and eventually the cell is destroyed.

One of the earliest practical wet cells was the Leclanche, which consisted of zinc and carbon rods immersed in a solution of ammonium chloride (sal-ammonaic). It produced an e.m.f. of approximately 1.5V, but the terminal voltage fell rapidly after only a brief discharge period because the chemical reaction resulted in the formation of hydrogen bubbles around the inert carbon rod which caused an increase in the internal resistance of the cell and also set up a counter, or "polarising", e.m.f. within the cell. Provided the cell was allowed to rest, the hydrogen bubbles would gradually disperse and the terminal voltage would slowly rise to the original value.

A "dry" version of the Leclanche cell is still popular today, being commonly used in torches. Small "penlight" (AA) cells of this type are often used to power calculators, radio receivers, "Walkman" type radio/cassette players and other devices, but they may not be ideally suited for the purpose - see later. Dry cells of this type consist of a zinc canister and a central carbon rod surrounded by a black paste. The exact nature of the paste is a trade secret, but the basic ingredients are ammonium chloride, powdered carbon, manganese dioxide and water. The top of the canister is sealed with pitch, but a small vent is provided to allow accumulated gas to escape. The role of the manganese dioxide is to act as a depolariser - it combines with the hydrogen to produce another form of manganese oxide and water.

Due to the chemical action within the cell, the carbon rod becomes positive with respect to the zinc case and a nominal potential difference of 1.5V exists between them. A steady fall in voltage occurs in this type of cell when on continuous load - see Fig. 1. On a heavier but intermittent discharge the voltage rises during each recuperative period - see Fig. 2. During each discharge period the chemical reaction results in part of the zinc case being converted into zinc chloride. Owing to impurities in the zinc some chemical action also takes place within the cell during rest periods and this results in the zinc canister being slowly eaten away; consequently cells of this type have a limited "shelf life". As the active area is gradually reduced the internal resistance of the cell rises. Failure of the depolariser to completely neutralise the hydrogen also results in increased internal resistance, which limits the discharge current.

The chemical action within the cell will continue beyond this point and eventually the zinc canister will be eaten away to the point where the contents start to leak through the case. Unless the battery is removed from a torch or other equipment before this occurs, serious corrosion and irreparable damage may ensue. In an attempt to overcome these problems, manufacturers have produced a version of these cells in which the zinc case and its contents are "sealed" in a steel outer case. Although this has eased the problem, it is important to appreciate that these cells are not totally "leak proof".

Relatively inexpensive individual cells in zinc cases can still be purchased but, despite the extra cost, the use of sealed cells in expensive equipment is a wise precaution. Unfortunately, the outer containers of most multi-cell batteries offer little protection against leakage. Waxed cardboard partitions are used to

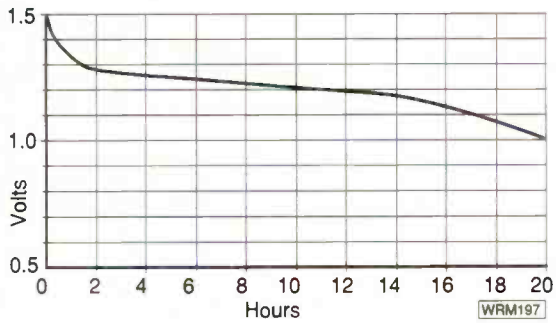

Fig. 1

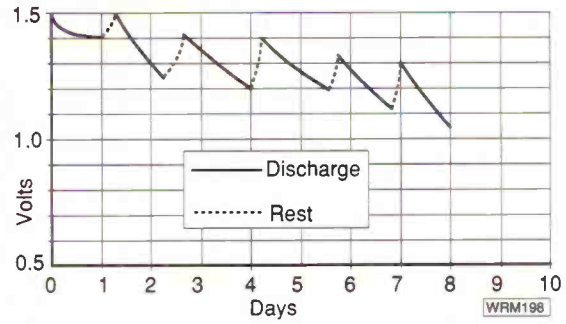

Fig. 2

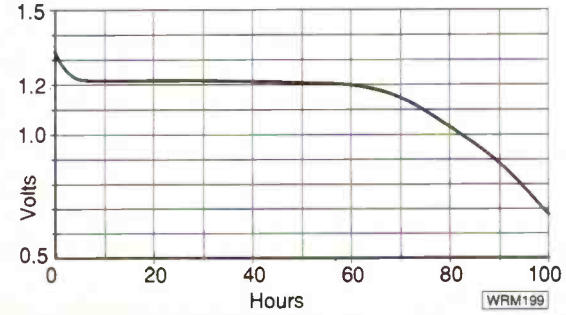

Fig. 3

separate the individual zinc-carbon cells, which are then connected in series to obtain the desired overall terminal voltage. The assembly is then housed in an outer container, which may be made of cardboard, tin plate or plastic.

In large cells the electrode area is increased so that a heavier current can be obtained. Some high power (HP) cells, which are the same physical size as standard purpose (SP) cells, are also available. These are intended to be used where a high current drain with reasonable voltage stability is required, a typical application being to power a small electric motor. There is no advantage to be gained from using HP cells instead of SP cells when a light discharge current is involved. It is important that the maximum discharge rate quoted by the manufacturer for a particular size of cell is not exceeded, otherwise the creation of excessive gas bubbles will cause a sharp rise in internal resistance and the life of the cell will be prematurely shortened. Their life will also be shortened if they are subjected to a continuous current drain, as all zinc-carbon dry cells require a rest period. Optimum performance can be expected from these cells at ambient temperatures of +20°C.

Several other types of primary cell are available. The alkaline-manganese cell has become popular comparatively recently. The exact nature of the contents of these cells is also a trade secret, but basically they consist of a zinc anode, a high density manganese dioxide cathode and a potassium hydroxide electrolyte, all of which are contained in an insulated electroplated steel case which is resistant to corrosion. A nominal p.d. of 1.5V is produced by these high energy cells, which offer a service life expectancy of up to six times that of a conventional zinc carbon cell. They have a low internal resistance and are capable of continuous discharge. Satisfactory operation can be expected over a wide temperature range, typically -20 to + 70°C. Another point in their favour is good "shelf life", whereby approximately 95 per cent of their energy is likely to be available after 20 months of storage. The cost of these cells is substantially higher than their zinc carbon counterparts, but the use of the penlight (AA) version of these cells in a portable receiver designed to accept them may well be an especially good investment for the s.w.l., since advantage can be taken of their ability to withstand the continuous discharges involved during prolonged periods of DXing.

Small button-shaped mercury cells for use in hearing aids and cameras have been manufactured for many years, but a full range of standard sized cells is now available. Each cell is contained in a corrosion resistant nickel plated steel case, which is not an active element of the cell although it is in direct contact with the compressed mercuric oxide and graphite which form the cathode. A zinc anode and an alkaline electrolyte of potassium hydroxide (caustic potash) are the other basic ingredients, but the exact nature of the contents is yet another trade secret! An off load p.d. of 1.3V is produced, but under load this falls to an almost constant 1.2V until near the end of a long service life, when a rapid decrease occurs - see Fig. 3. The low internal resistance also remains substantially constant. Resting the cell makes little difference to the energy available for intermittent or continuous discharge. The total energy available is several times that of a corresponding zinc-carbon cell, but the cost is very much higher. Mercury cells also have a long shelf life.

Abbreviations

e.m.f.	electromotive force
p.d.	potential difference
s.w.l.	short wave listener
V	volts
Ω	ohms

Secondary Cells

In contrast to a primary cell, which has to be discarded when discharged, a secondary cell is so designed that following a discharge it can be restored to its original state by passing a "charging" current through it in a direction opposite to that of the discharge current. Usually the process can be repeated many hundreds of times before chemical changes within the cell impair its performance.

The most common type is the lead-acid cell. It consists of two grid-like plates made from lead and antimony alloy, which are pasted with red lead (+plate) and lead monoxide (-plate). The plates are immersed in an electrolyte of sulphuric acid and water and they are then "formed" ready for use by passing a direct current through the cell. This converts the red lead to lead peroxide and the lead monoxide (litharge) to spongy lead. A p.d. of 2.05V arises between the plates when the cell is fully "charged". The cell is considered to be discharged when the voltage falls to about 1.85V. The internal resistance is of the order 0.001-0.1Ω, so they are prone to damage if short-circuited. A single cell is often referred to as an accumulator, but several cells may be connected in series to form a storage battery. Such batteries are in common use on motor vehicles and some motorcycles. They can provide an economical means of powering a receiver via its external supply socket (where fitted), but it is essential to observe the polarity and voltage requirements and to ensure that a suitable fuse is fitted in the lead to the set as these batteries can supply a very heavy current if accidently short-circuited. From time to time it will be necessary to top up the cells with distilled water.

Secondary cells which employ an alkaline electrolyte offer the advantage that they are much lighter than lead-acid cells of corresponding energy capacity, but they are more bulky. Known as nickel-iron or "NiFe" cells, they consist of a nickel oxide anode which is usually held in a nickel-steel frame, an iron cathode and an electrolyte of potassium hydroxide. The e.m.f. may vary between 1.4 and 1.0V during discharge. Another point in their favour is that they will stand up well to overcharging and excessive discharging.

Rechargeable "sealed" nickel-cadmium, or "NiCad", cells can provide an economical source of power for portable receivers. A nickel plated steel case contains the elements of the cell, which employs a caustic alkaline (potassium hydroxide) electrolyte. When fully charged the off load e.m.f. is just under 1.3V. On load this falls to 1.2V and remains almost constant during the discharge period. In the interests of long life these cells should not be discharged below 1.0V. With care, it may be possible to recharge them up to 1000 times before they exhibit an inability to hold the charge, so although they are expensive, they may be a good investment for the s.w.l.

Although NiCad cells are readily available in the standard sizes adopted for zinc-carbon or alkaline manganese cells, their e.m.f. somewhat limits their use as direct substitutes; e.g. a receiver designed to operate on a 6V supply provided by four "AA" sized zinc-carbon or alkaline-manganese cells connected in series, may not operate satisfactorily on the 4.8V provided by four "AA" size NiCad cells. Although a 6 V supply could be obtained by using five NiCad cells in series, it is unlikely that the battery compartment would accept five cells! This problem can be overcome by using an external battery holder* - they accept either four or six "AA" cells, which are linked in series and wired to small press stud connectors on the holder. A matching (PP3) press stud connector*, a length of two-core cable and suitable plug* will enable the battery pack to be connected to the external supply socket on the receiver. An unused cell space in the holder must be either linked with a "dummy" cell* or wired out. A wiser plan is to install a fuse across the unwanted space, since fully charged NiCad cells are liable to explode if short-circuited accidentally. □

* Available from Maplin Electronics Tel: (0702) 554161.

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