FOR THE RADIO LISTENER

short wave magazine

Reviewed

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April 1994 £1.90 ISSN 0037 - 4261

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- ★ AM/FM/WFM modes
- ★ The best base available! Price: £369

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WARNING:– ALL OF THE ABOVE MODELS ARE PRODUCED BY YUPITERU FOR THE UK AND COME COMPLETE WITH ORIGINAL YUPITERU GLOSSY HANDBOOK IN ENGLISH, PLUS AN APPROVED 12V SCANMASTER UK CHARGER. MODELS PRODUCED FOR THE JAPANESE DOMESTIC MARKET DO NOT INCLUDE THESE AND HAVE CERTAIN FREQUENCY COVERAGE REMOVED.

short wave magazine

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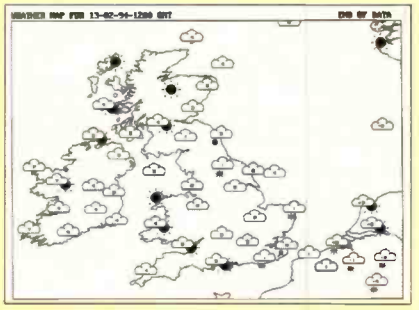
Cover Subject

Grundig International supplied the impressive photograph of our review subject, the new Grundig Yacht Boy-500, World Receiver. The inset picture shows the Marconi Memorial at Poldhu Point on The Lizard.

pw publishing ltd.

Features



Regular Columns

Good Listening

SWM SERVICES

Subscriptions

Subscriptions are available at £22 per annum to UK addresses, £25 in Europe and £27 overseas. Subscription copies are despatched by accelerated Surface Post outside Europe. Airmail rates for overseas subscriptions can be quoted on request. Joint subscriptions to both *Short Wave Magazine* and *Practical Wireless* are available at £39(UK) £42 (Europe) and £45 (rest of world).

Components for SWM Projects

In general all components used in constructing *SWM* projects are available from a variety of component suppliers. Where special, or difficult to obtain, components are specified, a supplier will be quoted in the article.

The printed circuit boards for *SWM* projects are available from the *SWM* PCB Service, Badger Boards, 87 Blackberry Lane, Four Oaks, Sutton Coldfield B74 4JF. Tel: 021-353 9326.

Back Numbers and Binders

Limited stocks of most issues of *SWM* for the past five years are available at £2.00 each including P&P to addresses at home and overseas (by surface mail).

Binders, each taking one volume are available for £5.50 plus £1 P&P for one binder, £2 P&P for two or more, UK or overseas. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate.

Orders for back numbers, binders and items from our Book Service should be sent to: **PW Publishing Ltd., FREEPOST, Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 8PW,** with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling.

Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Broadstone (0202) 659930. An answering machine will accept your order out of office hours and during busy periods in the office. You can also FAX an order, giving full details to Poole (0202) 659950.

editorial

A large number of you have returned completed Reader Survey forms and, although they have not yet been analysed, I have had a quick look at what you are saying. As a result, you will find that the the regular columns have been redesigned. Steve, my Art Editor, assures me that the amount of information that can be fitted in is exactly the same as before, so you are not loosing out. I hope that you find that the change is for the better.

Distribution Problems

I understand that there was a distribution problem with the March 94 issue of *SWM*. Although it was published on time, certain areas did not receive their normal supplies of the magazine. If you had problems getting your copy, please write and let me know. We can supply limited numbers of this issue from the Editorial Offices on receipt of £1.90 - but only if you live in the areas affected.

Of course, taking out a subscription not only prevents you missing out when this sort of thing happens, it also saves you money.

The Editorial Staff on all of our magazines pride themselves on getting the issues out on time. If you find that your newsagent cannot supply you with your copy of *SWM* on the fourth Thursday of the month, please do let me know. I need the name and address of the newsagent concerned, along with the explanation given by the newsagent, so that I can take it up with Seymour, our Distributors.

Dick Ganderton G8VFH

letters

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

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

Dear Sir

I'm not the most enthusiastic of letter writers, but your comments regarding the new AOR AR3030 receiver forces me to put pen to paper.

You say that "Every once in a while, a manufacturer produces something radically different and surprises us all."

It's comments like that, plus over enthusiastic reviews that actually stop manufacturers producing good general coverage h.f. receivers.

The only radical thing about the AR3030 is the use of 6kHz mechanical filter for a.m. The rest of it is pretty run of the mill.

I could never see the point in having memory banks and scanning on a h.f. RX. Why not put the cost of these into fitting a full set of good filters as standard. Paying for the optional filters plus the AR3030 along side the Drake R8E on the price and I know which I would rather have. When everything else produced in America is expensive, the R8E seems to be really good value.

I run a Yaesu FR101, but, like the Kenwood 820, it is only partial coverage. After a five year lay off, I'm back on the bands and decided a few weeks ago it would be nice to find out what goes on the other bands and started shopping around.

I've read every word in the *SWM* and *PW* magazines, scanned every available catalogue, but the only RX that comes anywhere near the FR101 is the Lowe HF-225 Europa. The rest are just not worth considering.

Take the Yaesu FRG-100, voted RX of the year yet it hasn't even got synchronous a.m. detection. Someone is even fitting s.s.b. to the Icom R100 with a filter width of 6kHz! That's worse than the slagged off FRG-7!

Lowe Electronics seem to be the only manufacturer making an effort to produce a good basic RX, but even they could do better by getting rid of the gimmicks.

When will someone be brave enough to forget memory banks and scanning and fill as standard really useful aids, like passband tuning, variable i.f. filters, p.l.l. good sensitivity and dynamic range, built-in switchable pre-amp, etc., for around £700. I think AOR have missed out on a golden opportunity.

I am 59 years old and retired, but would be waiting for the showrooms to open to purchase such a RX. I would even give up smoking to pay for it!!

PS. What happened to the HPX Ladder?

P. Ford
Gloucester

You cannot please everyone! Air testing a receiver must be just like road testing a car. Motorist will argue for hours over the relative merits and demerits of their own particular favourite make of car. What suits one driver will not suit another, even though they will all get you from A to B. I know what radios I like and what ones I do not like - but I will keep that information to myself. The HPX ladder was dropped to provide some of the space needed for all the developments that I felt were needed to turn SWM into a listeners' magazine. ***Editor.***

letters

Dear Sir
I have two reasons for writing to you. Firstly, I have been a radio enthusiast, on and off for many years, and within the last few years have returned to the fold, so to speak. In October of last year, I was very fortunate to hear an Amateur Radio station in the Sudan, Khartoum to be precise. His name is Ali and his callsign is ST2/G4OJW. He was QRP at 15W using an IC735 into a dipole.

I was very grateful to receive a response to the card and letter I sent to Ali and in return he asked me to make known in the UK the following information.

In his letter Ali states that for many decades there have been no legally licensed operators in the Sudan and after recent demonstrations that he gave to his authorities they are now prepared to issue formal licences. The first licensed station is a club with the callsign of ST0K and all QSL cards should be sent to the following address:

PO Box 617
Khartoum
Sudan

However, your readers may like to be aware that IRCs are not easy to exchange, though not impossible, and any QSL exchanges should be supported by an s.a.e. and preferably $1 US or 2 IRCs. ST0K can be heard usually between 0800-1200Z in c.w. or 18.069, 21.002 or 24.895-905MHz and 28MHz when open every day except Friday. The club station uses 100 watts to a dipole, and for the record, I heard Ali on 14.06146MHz at 1957Z on 8th October 93. I hope that this information is useful to your readers.

Secondly, I have been following closely recently the 'Great Debate' on the need for Morse code for Amateur A class license holders. As a professionally trained Morse operator, I feel that very little advice has been given on how to succeed in training and passing the test.

In my view, nothing short of hard work will achieve the goal plus a positive approach to the subject. Whilst I was under training, lessons were at least five hours per day for three months, achieving speeds of 20w.p.m. plus. I disagree with the old methods of learning characters at a very low speed and working up to the target speed. This leads to 'blocks' at certain speeds and can result in partial lack of confidence when these 'blocks' are encountered. I currently use a Datong Morse tutor to teach pupils. I find the ability of this super machine to send characters at speed but varying the space between characters ideal. This starts the pupil off with the sound of characters at the actual speed they are trying to achieve, whilst giving them breathing space to identify the characters. As a result, they are not hampered by learning a new speed every so often, and the gradual cutting down of time in between characters becomes unnoticeable.

I have had excellent results using this method with pupils achieving fairly good results with only a couple of hours practice per week. However, at the end of the day, its diligence and practice that makes perfect, the more time spent, the quicker you will achieve the desired result.

In conclusion, may I say that as someone who is presently doing self-study in preparation for the RAE, I wholeheartedly agree with Chris Carrington's comments. I could say that as a professional communications operator for over two decades, why should I have to sit and pass the RAE! This, of course, is not the attitude to take. If its worth having, it's worth studying for, and at the end of the day, if you have someone on the h.f. bands without a Morse qualification, then how could they deal with a distress situation in Morse code to identify someone who is causing harmful interference to their station with a Morse key!

I rest my case. Thank you for producing a high grade magazine. I wish you continued success with what is probably the best all round communications magazine on sale.

PS. Ali is not a member of the RSGB.

John Ireland G-20603
Buckinghamshire

Dear Sir
I have just read a most interesting article in the latest issue of *SWM* on building a valved airband receiver. Unfortunately, the article does not give pin numbers and unless your readers already have this information to hand, it is very unlikely that they will be able to obtain it.

It would be helpful therefore if you would publish the necessary information, or perhaps state where one may get such data. Without such information, the article fails to be of any use!

Although I am currently not an airband listener, I found this particular issue extremely interesting and the information therein well presented, keep up the good work!

I first subscribed to *SWM* when it had a blue cover and the office was in Victoria Street, London, it is still a good read!

E. F. C. Owen
Surrey

I am pleased that readers have found constructional articles, such as this one, interesting. Unfortunately, some errors crept into the circuit diagram: The screen and control grids of V1 got mixed up, C30 should be connected between chassis and R23/26 junction, C15 should decouple the heater of V2 and R24 goes to HT+ not HT+ Stab. If you are contemplating bulding this project an s.a.e. to the Editorial Offices will get you a corrected copy of the circuit diagram with valve pin connections added. ***Editor.***

Dear Sir
The BF254 transistor referred to by W. Calley of London in the March '94 'Airband' issue is listed in Electrovalue's 1993-4 catalogue Pg.101. Electrovalue's telephone number is (0784) 442253; Fax: (0784) 460320.

G. Morgan
Oxon

Dear Sir
Although I have been a regular radio listener since I left college, a few years ago, there are a few questions I would like to know if any of your readers could answer. Does anyone know if Air Canada or Canadian Airlines speak to their companies on h.f. at any stage during the flight while travelling westbound and if so, what are these frequencies, as I have never come across any. Also does anyone know what ACARS is, what airlines use it and what type of data is included in it? If anyone could answer these questions, I'd be most grateful.

Darren Heaney
14 Ashgrove Avenue
Lurgan
Co. Armagh

Dear Sir
Recently I wrote requesting some help with a project described in *SWM* June and July 1991, the Experimental Super-Regenerative VHF Receiver.

Further to this I was fortunate to meet an acquaintance with a little more technical skill than myself on Saturday who looked over my circuit. We decided to replace the 2N2646 transistor and rewind the tiny radio frequency choke, and sure enough the set sprang to life, to my amazement and delight.

Connected to a dipole in the loft, it can receive our local radio stations, Classic FM, a great deal of interesting Airband traffic, the 144MHz band and some other v.h.f. channels. Well worth the effort, I think.

So, thanks for your interesting article and thanks for a most enjoyable magazine, unmissable!

M. Smith
Warwickshire

I am pleased that you like the magazine and have tried building one of our simple projects. There is nothing quite like the feeling you get when your creation springs to life and plucks a signal out of the air for the first time. Well done! ***Editor.***

Dear Sir
All is REVEALED! I now know where it's all at in the scanning world. Haydon Communications and AOR have solved it.

I see from the advert on Page 17 of *SWM*, Dec 1993 that the new AOR 3000A covers a part of the radio spectrum that probably none of us knew was very active:- 0.1 to 26Hz! I just can't wait to get one!

Do AOR and Haydon know something that the rest of us don't, or has April 1st arrived early?

Merry Christmas to all, CUAGN on 3.5Hz QRP?!!!

R. Galliers
London

Covering letter from Royal Mail
I regret that the enclosed mail has been delayed due to the sack in which it was included being misdelivered to our Blue Peter Appeal depot.

grassroots

Club Secretaries:
Send all details of your club's up-and-coming events to: Lorna Mower, Short Wave Magazine, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. Please tell us your County and keep the details as brief as possible.

* Short Wave Magazine & Practical Wireless in attendance

rallies

March 27: Bournemouth Radio Society are holding their 7th Annual Sale at Kinson Community Centre, Pelhams Park, Milhams Road, Kinson, Bournemouth. Doors open at 10am. Talk-in from G1BRS on S22. Amateur Radio and Computer Traders, clubs and specialised groups. Admission £1 including free raffle ticket. **Ian G2BDV QTHR on (0202) 886887.**

March 27: Pontefract & DARS are holding their 14th Annual Components Fair & Spring Rally at the Carleton Community Centre, Carleton, Pontefract. Doors open at 11am, 10.30 for disabled. Bring & Buy, traders, bookstall, licensed bar and refreshments, Morse tests, tombola, traders, car boot spaces available, admission by prize programme, three prizes plus special draw for the ladies. **G0NQE, QTHR on (0977) 677006.**

April 3: Launceston Amateur Radio Club will be holding its 8th Amateur Radio Rally at Launceston College. Doors open at 10.30am, well known traders, ample parking, RSGB Morse tests on demand (bring two passport photographs). **Roy G0IKC on (0409) 221624 or Rodney & Joy on (0566) 775167.**

April 4: Centre of England Easter Radio, Satellite, Computer & Electronics Show is being held at the Sports Connexion Centre, Leamington Road, Ryton on Dunsmore, Coventry A45/A423. Doors open at 10.30am, admission £1.50, senior citizens, £1.00. Held in two large halls, over 80 traders, Bring & Buy, talk-in on S22, bar and hot food all day, ample parking. **Frank Martin G4UMF on (0952) 598173.**

April 10: Swansea ARS are holding a Radio and Computer Rally at the Swansea Leisure Centre between 10:30 - 5p.m. Many traders, Bring & Buy, and h.f./v.h.f. demonstration stations. Refreshments all day. Entrance £1, children 50p. **Roger Williams GW4HSH, Tel: (0792) 404422.**

April 16: The Spring All Micro Show Radio Rally and Electronics Fair is being held at Bingley Hall, Staffordshire Showground, Weston Road, Stafford (A518 Stafford-Uttoxeter Road) AA signposted from Junction 14 on M6. Doors open 10am, adults £2 on day (advance tickets £1.50), children under 14 free. As usual we are supporting local charity stalls, free parking, licensed bar from 11am, refreshments, meals and a cafeteria. **(0473) 272002.**

April 17: Bury Radio Society will be holding a rally at the Castle Leisure Centre, Bolton St. Bury. Doors open at 11am, 10.30am for disabled visitors. Bring & Buy, talk-in on S22, refreshments and bar available. **Laurence on 061-762 9308 evenings.**

April 17: The Cambridgeshire Repeater Rally Group will be held at the Philips Telecom - Catering Centre, St. Andrews Road, Chesterton, Cambridge. Doors open at 10.30am. There will be a Bring & Buy, trade stands and an auction. **Darren Salter on (0223) 358985 extension 3265.**

May 1: The BATC Rally, Sports Connexion, Coventry will be among the largest indoor radio events of 1994 - around 320 trading tables, flea market, outside TV displays etc. **Mike Wooding G6IQM.**

May 2: Dartmoor Radio Rally will be held at Yelverton Memorial Village Hall, Meavy Lane, Yelverton, Devon. Trade stands, Bring & Buy, refreshments etc. Parking, access for disabled, doors open 10.30, talk-in on S22. **Ron on (0822) 852586.**

May 2: Mid-Cheshire ARS Rally will be held at Civic Hall, Winsford, Cheshire. Doors open at 11am, (10.30am for disabled visitors). £1 entry and ample free car parking, full catering and bar plus Bring & Buy. **Dave G4XUV on (0606) 77787.**

If you're travelling long distances to rallies, it could be worth 'phoning the contact number to check all is well, before setting off.

AVON

RSGB City of Bristol Group: last Tuesdays, 7pm. New Friends Hall, Purdown, Bell Hill, Stapleton, Bristol BS16 1BG. March 29 - Cosmic Horizon, April 26 - Somerset range of kits. Dave. (0272) 672124.

Shirehampton ARC: Fridays. March 25 - Chat night, April 15 - Digital direction finding, 22nd - Chat night. Ron Ford G4GTD. (0272) 770504.

South Bristol ARC: Wednesdays. Whitchurch Folkhouse Assoc., Bridge Farm House, East Dundry Rd, Whitchurch. March 30 - How to build your own PC, April 6 - 40m activity evening, 13th - 1GHz exhibition, 20th - Radio controlled model boat exhibition, 27th - History of WD & HO Wills. For more information ring (0275) 834282 on a Wednesday evening.

BEDFORDSHIRE

Shefford & DARS: Thursdays, 8pm. Church Hall, Ampthill Road, Shefford, Bedfordshire. March 24 - Junk sale, 31st - Members activity night. Paul G1GSN. (0462) 700618

CENTRAL REGION

Stirling & DARS: Thursdays, 7.30pm. The Clubrooms, Bandeath Industrial Estate, Throsk, Nr. Stirling. March 31 - Video presentation on DXpedition. Brian Mulleady GM0KWL. (0324) 636235.

Dollar Academy ARC: The club meets most afternoons at the Academy after 3.30pm. Geoff Collier GM0LOD, Tait House, Academy Place, Dollar FK14 4JF. (0259) 742126.

DEVON

Torbay ARS: Fridays, 7.30pm. ECC Social Club, Highweek, Newton Abbot. April 22 - Monthly meeting. Peter G4UTO. (0803) 864528.

ESSEX

Vange ARS: Thursdays 8pm, Barnstable Community Centre, Long Riding, Basildon, Essex. April 7 - Junk sale, 14th - Steam trains by Bob G7JJX. Doris. (0268) 552606.

FIFE

Dundee ARC: Tuesdays, 7pm. College of Further Education, Graham Street, Dundee. March 29 - Lecture, April 19 - Construction night, 26th - Lecture by Morse Enthusiasts Group Scotland (MEGS). GM4FSB, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.

Dunfermline & DARC: Thursdays, 7.30pm. The former RAF radio station, Outh Muir, located by the A823 Dunfermline to Crief Road, one mile from the Knockhill Racing Circuit. Wallace Shackleton GM0GNT. (0577) 864050.

GRAMPIAN REGION

Aberdeen ARS: Fridays, 8pm. Queen Mother House, Aberdeen. March 25 - Building the Yearling Part 2, April 1 - Junk sale. Gordon Stuart GM7PXW. (0224) 780591.

GREATER LONDON

Edgware & DRS: Thursdays, 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak. March 24 - Morse training evening, plus station on the air, April 14 - Computer PCs, 28th - Morse training evening plus station on the air. Rod Bishop. 081-204 1868.

Wimbledon & DARS: 2nd & last Fridays, 7.30pm. St Andrews Church Hall, Herbert Road SW19. March 25 - Top Band DF, April 8 - Book sale. 081-540 2180.

HEREFORD & WORCESTER

Bromsgrove ARS: 2nd & 4th Tuesdays. Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. April 12 - Antenna construction - 2m DF, 26th - Technical Topics. Barry Taylor. (0527) 542266.

Droitwich Spa ARC: 1st Tuesdays, 8pm. Droitwich Community Hall. Many interesting evenings already booked. Jenny Read. (0905) 771571.

HERTFORDSHIRE

Hoddesdon RC: Alternate Thursdays, 8pm. Conservative Club, Rye Road, Hoddesdon. March 31 - Talk and demonstration on fast scan ATV by Adrian G0OJY, April 14 - Inter-club dart match (no doubt Stevenage & Dist. ARC revenge), 28th - Talk by John Taylor and colleague from the Radiocommunications Agency Radio Investigation Service with video. John G7OCI. (0920) 466639.

KENT

Hilderstone RS: Fridays, 7.30pm. Hilderstone College, St. Peter's Road, Broadstairs, Kent CT10 2AQ. April 25 - Quiz. (0843) 869812.

Medway AR & TS: Fridays, 7.30pm. Tunbury Hall Catkin Close, Tunbury Avenue, Walderslade, Chatham. April 1 - Yes, really, it is a meeting night, 15th - Alistair Dunlop, 'Radar the heavy weight radio!' Gloria. (0634) 710023.

West Kent ARS: 1st and 3rd Fridays. The School Annex, Camden Road, Tunbridge Wells. April 15 - AGM. John Taylor G3OHV. (0892) 664960.

LANCASHIRE

Preston ARS: Thursdays, 8pm. The Lonsdale Sports & Social Club, Fulwood Hall Lane, Fulwood, Preston. March. Eric Eastwood G1WCQ. (0772) 686708.

Rochdale & DARS: Mondays, 8pm. Cemetry Hotel, 470 Bury Road, Rochdale. April 18 - Talk 'Contests' by G3RTU. G7OAI. (0706) 376204.

LINCOLN

Lincoln SW Club: Wednesdays, 8pm. City Engineer's Club, Waterside South, Lincoln. April 20 - Trip to Smith Clayton Forge. Pam G4STO. (0427) 788356.

MERSEYSIDE

Sefton ARC: Fortnightly meetings at The Liverpool Prison Officers Club. Details from G4KIN. 051-531 0991 or G8YPL, QTHR.

NORFOLK

Norfolk ARC: Wednesdays, 7.30pm. Formal meetings: University Arms, South Park Avenue, Norwich, Informal meetings: Hewett School, Hall Road, Norwich. March 30 (formal) - AGM, April 6 (informal) - Committee meeting, on air QRP, 13th (formal) - Basic digital electronics by Mike G4EOL, 20th (informal) - Night on air, construction QRP, Morse practice, 27th (formal) - Club quiz. Sheila Snelling G0KPW. (0603) 618810.

NOTTINGHAMSHIRE

Mansfield ARS: 2nd Mondays, 7.30pm. The Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. April 11 - A talk by Gerald G0NRA (Novice instructor) 'The Novice licence - A new dimension'. Mary G0NZA. (0623) 755288.

OXFORD

Oxford & DARS: 2nd and 4th Wednesdays, 7.45pm. The North Oxford Grove House Club. Terry Hastings G0CFN. (0865) 863526.

SHROPSHIRE

Salop ARS: Thursdays, 8pm. Oak Hotel, Shrewsbury. March 24 - A second construction night, advice and discussion, leading to the under a fiver construction competition, 31st - A talk on Packet, April 4 - A talk on specialist antenna systems, 24th - Foxhunt, chase 1, followed by a bangers and mash supper, 28th - The under a fiver construction competition. Sheila Blumfield G0SST. (0743) 361935.

STRATHCLYDE

Milton of Campsie ARS: 2nd Wednesdays, 7.30pm. Milton of Campsie Community Hall. Alan Foulis GM7PGT. 041-779 1444.

SUFFOLK

Sudbury & DRA: 1st & 3rd Tuesdays, Wells Hall, Old School, Great Cornard, Five Bells Public House, Bures Road, Great Cornard. April 1 - Sudbury fun fair, 5th - Equipment/Junk sale, bring your items on the night, 19th - Natter and Noggin at 5 Bells Public House. Tony Harman G8LTY. (0787) 313212.

WARWICKSHIRE

Stratford-upon-Avon & DRS: 2nd & 4th Mondays, 7.30pm. Home Guard Club, Main Street, Tiddington, Stratford-upon-Avon. March 28 - AGM followed by 'Down memory lane', April 25 - Peter Chadwick G3RZP cables & s.w.r. etc. Mr A Beasley G0CXJ. (0608) 682495.

WILTSHIRE

Salisbury Radio & Electronic Society: Tuesdays, 7.30pm. 3rd Salisbury Sea Scout Hut, St Marks Avenue, Salisbury. March 27 - Bournemouth RS 7th annual sale, Kinson City Centre, 29th - HF operating - 'B' licensees under supervision, April 5 - Talk 'Microwave Part 1' by Martin G8OFA, 12th - Marconi Day planning, 19th - Construction evening and advice clinic, 23rd - Marconi Day International, 26th - Marconi Day debriefing. David Kennedy. (0722) 330971.

Trowbridge & DARC: 3rd Wednesday, 8pm. The Southwick Village Hall, Southwick, Trowbridge. April 6 - IBM computers, talk by S. Farthing, 20th - Social night. Ian G0GRI. (0225) 864698.

junior listener

Welcome to my first Junior Listener. After talks with the Editor, I have decided to extend the scope of Junior Listener to cover anyone who is a 'junior' in radio terms, whether 6, 66 or even older. Also I want to include basic information - so I'll be listing what you can expect to receive with your simple short wave radio and how to improve this. Then I'll look at using a more dedicated short wave radio. I also want to start looking at the listening clubs you can join and what they can do for you. If there's anything you would like discussed, or if you're involved with a listeners' club, please write and tell me all about it.

I'm aiming to clear the last of the letters sent to Jon. He's passed everything onto me and I hope to reply to you all when this copy is safely off.

Elaine Richards

Jargon Busting

Following a letter to Jon from **Basil Parylo** I'm sure that many of you have, at some time, been confused by the way the radio spectrum seems to be divided up into broad bands and given names instead of frequencies. This month I'll attempt to tidy-up this area and briefly explain how they all fit together and why they're used. Let's start with a simple table showing how the band names align to frequencies.

Band Name	Frequency Range	Main Usage
Very Low Frequency (v.l.f.)	3-30kHz	Maritime & navigation
Low Frequency (l.f.)	30-300kHz	As v.l.f. plus broadcast
Medium Frequency (m.f.)	300kHz-3MHz	Broadcast plus maritime
High Frequency (h.f.)	3-30MHz	Varied
Very High Frequency (v.h.f.)	30-300MHz	Broadcast plus various
Ultra High Frequency (u.h.f.)	300-3000MHz (3GHz)	Commercial plus space
Super High Frequency (s.h.f.)	3-30GHz	Radar plus space
Extra High Frequency (e.h.f.)	all above 30GHz	Special

In addition to these band names you will find another set associated with what are known as microwave transmissions. Just to make this really confusion there are two different naming systems - USA and the European (NATO) system. For the European version, microwaves are the band of frequencies between 1 and 90GHz. The USA system on the other hand covers 0.4GHz through to 100GHz. Within each of these large bands are a number of smaller bands that are defined by band letters. Although you might expect the European system to prevail in this country, you will find the USA system in common use for domestic/amateur applications. Here's how the systems works.

Band	Frequency
L	0.4-1.5GHz
S	1.5-5.2GHz
C	3.7-6.2GHz
X	5.2-10.9GHz
K	10.9-36GHz
Ku	11.7-12.7GHz
Q	36-46GHz
V	46-56GHz
W	56-100GHz

If you're involved in satellite TV you will recognise the Ku band as the main band used

DW Computer Programme

The English Service of Deutsche Welle has recently started broadcasting a new programme called *Headcrash*. It's aimed at all computer users between 14 and 41. *Headcrash* tries to be system-independent and deals with MS-DOS, Apple and Amiga news. They also broadcast tips and tricks to try, hardware and software tests as well as news on Public Domain and Shareware programs.

Headcrash is broadcast once a month in the Science and Technology slot. They even have regular quiz competitions with 'attractive prizes'. I'm not sure which Wednesday in the month it's broadcast, but you'll find it between 2000 and 2050UTC on 5.960 and 7.285MHz beamed to Europe.

The British DX Club

The British DX Club was founded in 1974, calling itself the Twickenham DX Club. The name British DX Club was adopted in 1979 and,

BDXC
BRITISH DX CLUB

apparently, they now have the largest UK-based membership of any DX club. The club specialises in all aspects of DXing on short wave, medium wave as well as the v.h.f. f.m. bands. The only requirement for joining is that you have an interest in DXing - age or experience doesn't matter.

The BDXC are a non-profit making group and is run by a Board and Editorial team - all are non-paid volunteers. If you join the BDXC, they encourage you to attend meetings to debate issues relevant to the club. Also contributions to *Communication*, the monthly journal are welcome.

Communication is an A5 booklet of about 40 or so pages and is posted to all members. It's published around the first week of each month and because of a short schedule is kept up-to-date. It has several regular sections and these include (amongst others):

'QSL Report' where details of verifications received are given, tips on how to get the best cards and also pictures of some of the more unusual ones appear.

'Mailbox' is where members get to express their own views on all aspects of the hobby.

Guide to DX Programmes is a comprehensive guide with times and frequencies of all main DX/media programmes. This regularly appears bi-monthly.

'Logbooks' is a very large section of the booklet and is a record of the loggings sent in by members. It's split into several sub-sections, Tropical logbook, HF Logbook, Beyond the Horizon (f.m. and TV bands) and Medium Wave Logbook that also covers the long wave bands.

Now the crunch bit, how much does all the service cost? If you live in the UK or have a BFPO address then the annual subscription at the moment is £9, Eire members and those wishing to have *Communication* posted surface mail need to part with £11, it's £12 for European destinations sent airmail and, finally, the rest of the world costs £14. You can pay your subscription in an amazing number of ways: UK cheque or postal orders, sterling Eurocheque, International Money Order, Postal Giro Transfer (plus a £2 admin charge), Sterling Bank Draft, Bank notes (UK or Foreign), postage stamps (less than 50p each) or finally International Reply Coupons!

If you're interested, the address you need is: **Dave Kenny, The Treasurer, British DX Club, 10 Hemdean Hill, Reading RG4 7SB.**

That's it for this month, send your letters to: Junior Listener, PO Box 1863, Ringwood, Hants BH24 3XD.

news

New Drake Receiver

Nevada have just told us of the new Drake SW8 communications receiver. Claiming professional desk-top performance in a reasonably priced portable package the new receiver gives full short wave coverage (500kHz to 30MHz), but with the addition of the v.h.f. airband and stereo broadcast band. Microprocessor controlled, of course, with a large liquid crystal display, 70 memories, dual mode clock timer a.m., f.m. and s.s.b. modes plus synchronous a.m. detection. This should be a popular receiver. *SWM* will, of course, review it as soon as we can get our hands on one. **Nevada, 189 London Road, North End, Portsmouth PO2 9AE Tel: (0705)613900**

Special Price Tandy PRO-44

Tandy dealers nation-wide have available for a limited time stocks of the Netset PRO-44 Scanner at a special price of £99.99.

The Netset PRO-44 is a 50 channel direct entry programmable scanner with features including a two second scan delay, memory back-up, lock-out function and monitor memory. Frequency coverage of the PRO-44 is 68 to 512MHz.

The normal price of the Netset PRO-44 is £149.99 but from March 21 to April 23 Tandy stores nationwide will be selling it for just £99.99.

Communications Catalogue

Waters & Stanton Electronics have recently published their Spring 1994 *Radio Communications Catalogue.*

The 64 page A4 sized catalogue is in its second edition and contains many of the most popular products from the Waters & Stanton range. It also includes helpful hints and tips for both short wave listeners and radio amateurs.

To obtain a copy of the *Radio Communications Catalogue* just send two first class stamps (UK customers, overseas customers please send £2) together with your name and address to **Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS.**

New AOR Hand-Held

By the time this issue of *SWM* hits the bookshelves the AOR AR8000 hand-held receiver should be available after its launch at the London Amateur Radio & Computer Show.

Derbyshire based AOR have been busy finalising the design of the AR8000 which has a frequency coverage of 100kHz to 2Hz, 1000 channels arranged in 20 banks of 50, as well as two new operating modes, 'Expert' and 'Newuser'. The Newuser mode is designed to restrict the number of ways the receiver is programmed, to make operation simplier for the less experienced operator. The idea behind the Expert mode is to permit access across the full range once the basics have been mastered.

At the time of going to press the AR8000 was so new that *SWM* had very few details on this new receiver. However, AOR (UK) Ltd., will be happy to give you more information (see 'Scanning' in this issue for additional comments on the AR8000).

AOR can be contacted at the Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbyshire DE4 4BG. Tel: (0629) 825926.

BBC World Service News

Dr. Michael Williams of the BBC World Service has recently been appointed the Director of Information for the United Nations Protection Force in the former Yugoslavia.

Dr. Williams is the Editor of *Dateline East Asia* which is the BBC World Service's current affairs programme for East Asia. His new appointment will mean him taking a six months leave of absence from the BBC to take up his post in Zagreb.

While in Zagreb Dr. Williams will be responsible for the public information office, which supplies information to the international press and to the UN's internal information network.

The BBC's Albanian Service has a new deputy head. **Linda Crammond** recently took as deputy head from Gabriel Partos, a post she will hold for six months.

Linda has worked for the BBC World Service since 1978, during this time her jobs have included working as Senior Duty Editor in the BBC newsroom.

ERA In Liquidation

Short Wave Magazine has recently been informed that Enterprise Radio Applications Limited have gone into voluntary liquidation. However, one of ERA's former employers Alan John Ryan has taken over the manufacture of the popular Microreader and other related products.

Alan is hoping to be able to continue operation from the existing ERA address. He asks potential customers to be patient if they have difficulty in getting through on the telephone or have to wait a while for their letters to be answered.

As soon as *SWM* receives more details we will pass them on to you through the News columns.

New Microreader Distributor

Following the demise of Enterprise Radio Applications Ltd., Nevada Comunications of Portsmouth have been appointed distributors for the ERA Microreader.

Nevada are now able to supply from stock the new Mk IV version of the Microreader with software. For more details contact **Nevada Communications, 189 London Road, North End, Portsmouth PO2 9AE. Tel: (0705) 662145.**

Operation Overlord

Ray G0EYM and Richard G0RNM together with Bedford and District ARC are planning to activate GB50OL (Overlord) to celebrate the 50th anniversary of Operation Overlord, the D-Day Landings.

It is proposed to activate GB50OL from June 3 to 7th 1994 from the control tower of the former RAF station of Little Staughton, which was the home of 'The Pathfinders'. Details of modes and frequencies will be available nearer the time.

For more information on Operation Overlord contact Ray G0EYM on (0234) 344506 or Richard on (0234) 781862.

Voice Of China

The latest edition of *Voice Of Free China* which is published by the Broadcasting Corporation of China has recently arrived in the *SWM* Editorial offices.

Voice Of Free China contains features published in English, French, Dutch, Spanish and Indonesian and is available on subscription for US$4 or is free of charge to listeners of Voice Of Free China broadcasts.

For more information on how to obtain a copy write to Voice Of Free China, Broadcasting Corporation of China, PO Box 24-38, Taipei, Taiwan, Republic Of China.

news

International Marconi Day

The Cornish Amateur Radio Club will be celebrating what is perhaps the most important event in the Amateur Radio Calender on April 23 1994. International Marconi Day celebrates Marconi's achievements in wireless communications and for the first time ever an English station will be participating using only the Amateur Radio Satellite Service for working DX.

The callsign **GB1IMD** will be in operation for as long as possible during the 24 hour period commencing on April 23 at 0001UTC. **John Heath G7HIA** and **Robert Turlington G8ATE** who are members of AMSAT UK will be operating the station.

Operating details are expected to be: Main activity on AO-13 Mode B on a downlink frequency close to 145.930 u.s.b. Uplink 435MHz using 40W into a 21-ele crossed Yagi. Downlink antenna will be a 5-ele crossed Yagi with a GaAsFET pre-amp mounted at the antenna. The station may also be active on Mode S using a 60cm dish with helical feed for the 2.4GHz downlink.

There will also be addtional operations via the Russian Satellite RS10 on a downlink frequency of 28.385. The uplink will be 145MHz using between 2 and 20W into a turnstile antenna. The downlink antenna will be a wire dipole for 28MHz. All Marconi Day transmissions will be made from locations with a Marconi connection wherever possible.

For more information contact John Heath, Chestnuts, Desford Lane, Kirkby Mallory, Leicestershire LE9 7QF or via packet radio @GB7SDC.#25.GBR.EU.

Grundig Ocean Boy

Grundig International Ltd. have launched a replacement for the Ocean Boy 330, the Ocean Boy 340. The Ocean Boy 340 is a compact portable radio which covers f.m., m.w., l.w. and s.w. bands.

Features of the Ocean Boy 340 include p.l.l. frequency synthesiser tuning, automatic and manual station search, 20 memory facilities (five per band), built-in clock/timer and multi-function l.c. display. Power is supplied through battery or mains power (using an adapter which is not supplied) and the radio can be used with headphones if required.

The Ocean Boy 340 is available now for £42.99. Additional information can be obtained from Grundig International Ltd, Mill Road, Rugby, Warkwickshire CV21 1PR.

Radio and TV DX News

The Sri Lankan broadcaster ETV is now transmitting the BBC WSTV terrestrially from Kandy (Mt. Hantane) on ch.E33 (ETV-1) and Prime Sports (ex Star TV) on ch.E56 (ETV-2). The state owned TV service intends to reopen transmitters in Northern Sri Lanka by mid-summer '94 from the repeater station at Kokavil (Madukanda) and Palali (Vavunia).

The transmitters had been put off the air by LTTE terrorists some years ago. There is 'great excitement' in the region with the high power u.h.f. satellite transmissions of ch.E54 Asianet (PAL) which allows cheap receivers to be used for this and the Russian Orbita 1 ch.E51 service (SECAM). NB. We hope to feature a cheap, cheerful but efficient circuit of the u.h.f. satellite receiver shortly courtesy Bandula Gunasekera.

The BBC have now successfully completed test transmissions of Digital Audio Broadcasting (DAB) across London at both u.h.f. and Band 3. The u.h.f. transmissions were on an unused Group A TV channel from Crystal Palace and relaying Radios 1-5.

Following on from this news the DTI have now confirmed the establishment of a Band 3 DAB band from 217-230MHz, which will allow many additional radio channels and the duplication of both a.m. and f.m. services to a new high quality band. It's possible that transmissions will be on the air before end 1995 and allow manufacturers to plan for domestic scale factory production. The use of DAB in the Netherlands will be introduced between 1997-2000 and current thoughts are to use the 191-193MHz band.

With the announcement of upper Band 3 going to DAB there is to be a review into the use of the remaining parts of Band 3 (Sub bands 1, 2) following changes in ownership and use by public and private operators. National Band Three have recently bought three networks from Motorola and decisions will be made for new regional licences in London, Manchester and Birmingham.

The UK's Classic FM is going continental following the Netherlands awarding them a terrestrial frequency for providing a service comprising 60% classical and 40% jazz. Sports, financial and travel news will also be included in the programme package. Another terrestrial award was to a familiar name 'Radio Nordzee Nationalaal', brings back memories of 'Radio Nordzee International'! Rumania will now enjoy a daily German TV programme *Heute* on the TVR network as a satellite rebroadcast, and CNN has signed with Triada in Bulgaria to begin 17 hours of CNNI transmission daily across Sofia on ch.R41.

The Saxony (Eastern state of Germany) licensing authorities have revoked the RTL transmission licence due to a lack of a regional programme and refusing to transmit local programming made by MDR. There has been more controversy with the State of Schleswig-Holstein awarding a terrestrial licence to the PRO 7 network, following a period of political resistance against the station.

The longest subsea fibre cable laid by UK firm COE supporting five colour video channels and a radar channel over 70km is now operational from a North Sea platform to mainland Norway. Lithuania is to cease using the SECAM colour standard by the year 2000 in favour of PAL. Sweden's national commercial TV channel TV4 will be running 24 hours a day by 1995 and is gaining viewing figures of 22-27% against public network SVT.

Belgium 50MHz amateur operators will continue to operate throughout 1994 with a review early 1995 as to a general release of the band, there still transmits ch.E2 TV in Antwerp. Germany meanwhile reckons to allocate 1000 permits during 1994 and again an early 1995 review will take place to decide the future of the amateur band. Germany, like France, is planning DAB tests in the 50MHz spectrum in the forthcoming 18 months.

In Czechoslovakia TV NOVA is now on air using the CT2 transmitter network. An identification logo 'CT1' or 'CT2' is carried in the top left hand corner of the screen. The former CT2 network is using the 6th in former OK3/CT3 network of transmitters, this will be supplemented this coming year with the following, all on air by November '94: Jesenik ch.R50 200kW erp; Brno ch.R46 20kW; Trutnov ch.R40 200kW; Plzen ch.R48 200kW; Jihlava ch.R42 100kW; Chomutov ch.R35 50kW and Hradec-Kralove ch.R57 200kW.

New Frequency Schedule

Radio New Zealand International's latest frequency shedule is as follows:

Frequency kHz	Time UTC	Comments
6035	1650-1849	Mon-Fri
11735	1850-2137	Daily
15115	2138-0758	Daily
9700	0759-1206	Daily
9700	1206-1307	Occasional use
9655	1307-1649	Occasional use

This frequency schedule is effective from March 19 - May 1 1994 at 1900UTC.

Lowe Electronics

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DSP NOISE REDUCTION PRODUCTS FROM JPS COMMUNICATIONS!

JPS Communications specialises in low cost ***Digital Signal Processors*** - the hi-tech way to filter out noise and heterodynes and what's more, they'll work with anything from your home-brewed short-wave receiver to the latest all-singing all-dancing receivers and scanners on any band you care to mention! Ideal for voice, Morse, RTTY and FAX. JPS make a whole family of DSP filters so there's something for everyone.

NRF7

General purpose noise remover and filter

The NRF7 reduces atmospheric noise through dynamic peaking and removes multiple tones from voice signals. High performance voice filters and CW filters with selectable centre frequency

Just £279.00.....*Carriage £10.00*

All JPS DSP filters work off receiver audio so there's no mods to be done to your rig - just plug into the speaker socket, hook up your headphones or an extension speaker and you are in business.

NIR10

Noise / Interference reduction unit

The NIR10 allows reception of difficult to read signals. NIR mode helps to reduce or even eliminate heterodynes, white or ignition noise, RTTY interference and power line noise. PEAK function reduces white noise interference. NOTCH FILTER mode removes multiple heterodynes and acts in 3 milliseconds! BANDPASS mode has a continuously adjustable centre frequency

Just £399.00.....*Carriage £10.00*

NTR1

Wide band noise and tone remover

The NTR1 provides wideband operation for AM or FM reception and narrow band operation for SSB, CW or Data reception. State-of-the-art DSP rapidly removes multiple tones.

Just £199.00.....*Carriage £10.00*

All JPS DSP filters require a 12V power supply to run from the mains but it needs to be fairly beefy. Run it from your shack supply or from our dedicated 1 Amp PSU available at £29.95

Lowe Electronics Ltd.

Chesterfield Road, Matlock,
Derbyshire, DE4 5LE
Tel 0629 580800 Fax 0629 580020

IF YOU WOULD LIKE MORE INFORMATION ABOUT THESE AND OTHER PRODUCTS, JUST SEND US FOUR FIRST-CLASS STAMPS AND REQUEST OUR "SHORTWAVE INFORMATION PACK" WE'LL ALSO SEND YOU A FREE COPY OF OUR FAMOUS LISTENER'S GUIDE!

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HALF A DOZEN BELTING GOOD RADIOS!

NRD535 - £1695

If you're looking for top performance, this has to be the one! Great on its own - but we can make it better !

HF225 - £479

Still the most popular choice for many serious DXers. Superb AM and SSB performance and it's made in the UK !

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Superior performance version of HF225, ideally suited to the dedicated BC band DXer

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Very popular with raw beginners because it is so easy to use but highly praised by the more experienced.

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Good performance from this popular set from Yaesu, drawing on their many years of design experience

R5000 - £999

Despite its age, still sought after by those that really know its capabilities

HEATHROW MOVES TO.. NEWBURY

As one door closes, another one opens...

A warm welcome awaits customers old and new at Lowe's new branch in Newbury, Berkshire, not all that far away from our old Heathrow shop. You can find us at:

3, Weavers Walk, Northbrook Street, Newbury, Berkshire, RG13 1AL Tel. 0635 522122

Our new branch will be under the watchful eye of Julian, G1DFI who is waiting there with our customary warm greetings and friendly service!

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34, New Briggate
Leeds,
Tel 0532 452657

WALES & WEST
79/81 Gloucester Road
Patchway,
Bristol,
Tel 0272 315263

NORTH EAST
Mitford House
Newcastle Int'l Airport
Newcastle upon Tyne
Tel 0661 860418

SOUTH WEST
117, Beaumont Road
St. Judes
Plymouth,
Tel 0752 607284

SCOTLAND
Cumbernauld Airport
Cumbernauld
Strathclyde
Tel 0236 721004

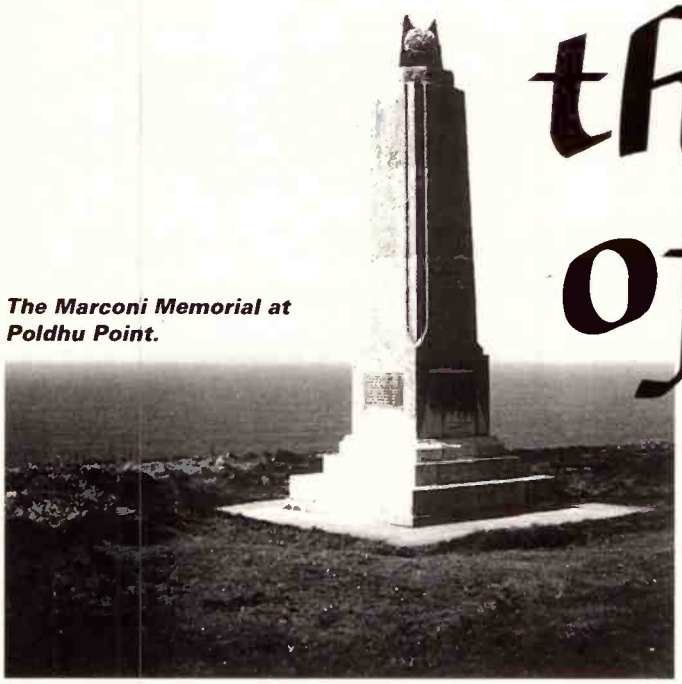
SOUTH EAST
Communications House
Chatham Road
Sandling, Maidstone,
Tel 0622 692773

SOUTH COAST
27, Gillam Road,
Northbourne,
Bournemouth,
Tel 0202 577760

EAST ANGLIA
152, High Street,
Chesterton,
Cambridge,
Tel 0223 311230

OPENING HOURS MON - FRI: 9.30 TO 5.00, SAT: 10.00 TO 4.00

The Lizard in the Field of Radio



The Marconi Memorial at Poldhu Point.

The Lizard is not just the most southerly point of the British Isles. It has also played a major role in furthering the evolution of worldwide communications, as Robert Whistler recalls.

Today, you can dial almost any country in the world and feel somewhat impatient if the call does not get through within a few seconds, thanks to the satellite network. But let us look back a bit and see where The Lizard fits into all this. We go to Cornwall, to Helston, the home of the Floral Dance, and proceed south to The Lizard. It was here that some very important milestones were laid along the path of long-distance radio communications over the past 90 years. From the hesitant beginnings in 1900 to today's worldwide high tech network of data, voice and television.

About 4km from Helston on the A3083, a turning on the right leads to Curry and on to Poldu Cove, an attractive cove with good parking and a sandy beach - and within easy walking distance to the site chosen in 1900 by Guglielmo Marconi for an important wireless station near Poldu Point. A steep cliff path passes the residential Poldu Hotel and on to the Marconi Memorial at Poldu Point. The memorial was erected in the 1950s by the Marconi Company to commemorate and identify the nearby site of the wireless station that was such an important milestone in the very early development of long-distance radio communication.

Marconi's objective in 1900 was to prove that it was possible to communicate across the Atlantic Ocean by wireless. Having established the transmitting station at Poldu, he and his team crossed the Atlantic by ship to Newfoundland where they set up a receiving station on the east coast near St John, some 3600km from Poldu. The equipment was, by today's standards, very rudimentary. A 'spark gap' transmitter connected to a long wire antenna at Poldu, while in Newfoundland the receiver was a 'Coherer Detector' (invented by a French engineer Edward Branley in 1896 and then the state of the art) and a similar antenna to that at Poldu.

On 12th December 1901 the Morse letter 'S' (...) was transmitted from the Poldu station and successfully received at the receiver site in Newfoundland. This was the first time that a wireless signal had ever been received over such a large distance and the success of this test was a breakthrough for long-distance communications. It was made possible in part by Marconi's decision to site the stations on the coast. The wide expanse of sea water between Poldu and St Johns minimised the loss of the weak wireless waves as they travelled across the earth's surface at the speed of light.

The mast base and anchors can still be seen in the field at Poldhu Point.

Another Milestone

Some years later, after wireless communication had been further developed using long wave and medium wave propagation over the earth's surface, the Lizard was again involved in another notable milestone in long-distance wireless (or radio as it is called today) paths.

The existence of 'ionised' layers above the earth at heights of up to 240km had been identified in the early 1920s by three physicists and one of them, Edward Appleton (later Sir Edward Appleton), had suggested in 1923 that using higher radio frequencies (or shorter waves) than the long and medium radio waves used at that time, some of these radio waves may 'bounce off' these ionised layers and return to earth.

An experiment to investigate this was carried out in 1923 by Guglielmo Marconi from the same radio station at Poldu. To increase the power radiated from Poldu towards the ionised layers, he contacted Charles Franklin, an engineer who had experimented with the design of antennas (or aerials as they were then called). He designed a directional short wave antenna by positioning the antenna wires in such a way that the radiation would be directed forwards at a low angle. This antenna was installed, between tall masts, at the Poldu site. Meanwhile Marconi sailed south in his yacht *Electtra* and successful communication was established between the Poldu station and the yacht while it was cruising in the South Atlantic at distances of up to 11200km away.

This was a remarkable achievement. The curvature of the earth is such that, if the radio signals are being bounced off the ionised layers at heights of up to 240km above the earth, the maximum distance that would be covered in one 'hop' would be approximately 3200km. The surface wave propagation used at long and medium wavelengths would not account for these results, particularly at the shorter wavelengths, because of the attenuation over the earth's surface.

To receive a radio signal at a distance of over 3200km meant, therefore, that there must have been more than one 'bounce' off the ionosphere. To travel 11200km, at least three and possibly four bounces must have occured, the radio signal being returned back to the inonsphere by reflection off the sea after each bounce (or hop) on the way. These important experiments proved that not only was single hop skywave propagation possible, but that multi-hop skywave radio paths could greatly extend the distances that could be covered by short wave (now more commonly called high frequency or h.f.) radio paths. This led to worldwide radio communications using this skywave propagation. As in 1901, the sea played an important part in these relatively low-powered experiments, this time by acting as a low-loss reflector to return the radio waves back to the ionosphere.

Marconi Memorial

The Poldu station remained in commercial use until 1935 and the site is now preserved by the National Trust. Besides the Marconi Memorial, the concrete mast and anchor bases, together with the foundations of the station buildings, can be seen in a field kept ship-shape by sheep. However, that was not to be the end of The Lizard's involvement in making radio history.

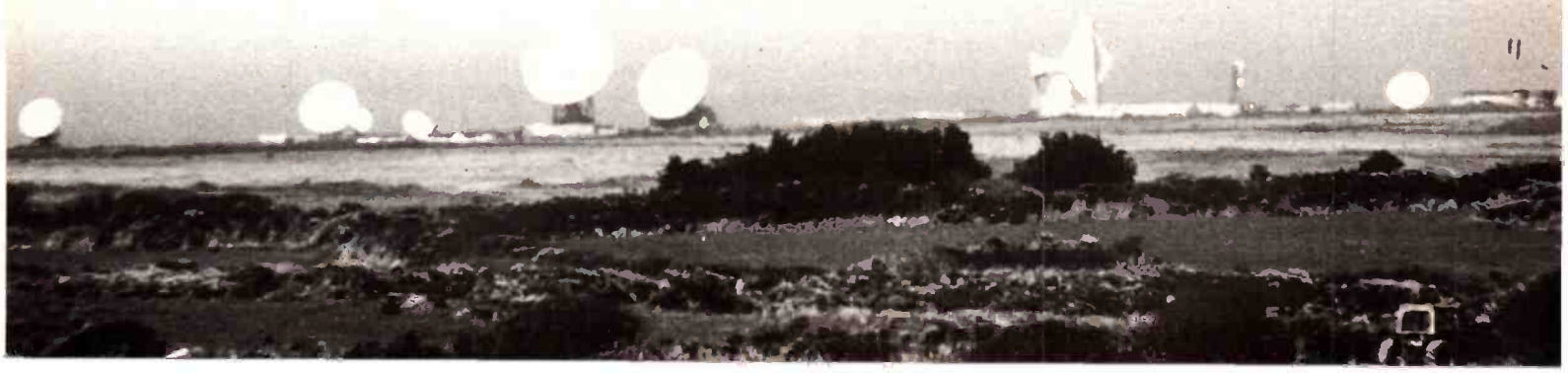
Satellites

Another radio station was opened in the mid-1960s some 7km from the Poldu site. The Goonhilly Satellite Station hearalded another evolution in long-distance radio communications. The selection of Goonhilly had one thing in common with the Poldu site - a quiet electrical environment. But here the closeness of the sea was not of prime importance - minimum noise and a flat, hill-free site were the key requirements. The windswept Goonhilly Downs, presenting an area of some 25 square kilometres of gorse, grass and bracken, was an ideal site for the large parabolic dish antennas needed to communicate via satellite relay stations high in space. These operate at very much higher frequencies - with wavelengths measured in centimetres - than Marconi could ever have dreamed of when he first went to The Lizard. The success and growth of the Goonhilly Station is vividly illustrated by the array of the many parabolic dish antennas, which have today become a local landmark.

Unique

The Lizard Peninsular is unique in the field of radio. It has witnessed the major advances in long-distance radio communications from the early hesitant beginnings of radio communications to the first time across the Atlantic by radio. It established the feasibility of multi-hop skywave radio transmissions and now plays an active part in the international satellite network, providing the telephone, TV and data transmissions that today we take for granted. ■

The dish antennas at Goonhilly Satellite Station, viewed from the south.



GRUNDIG YACHT BOY 500 WORLD RECEIVER

Described in the Grundig catalogue as a small, handy world receiver, the Yacht Boy 500 sets a new standard in short wave radio styling at the very least. Peter Shore puts this new radio through its paces.

Grundig's Yacht Boy receivers have always provided budget short wave reception with portable sets designed for the holiday maker or occasional business traveller. Last summer, the company broke that tradition by launching the revolutionary YB 500 at the Funkausstellung, the Berlin consumer electronics fair. The receiver looks unlike any other set on the market at present, with vertical styling as opposed to the conventional horizontal looks of competing radios. Grundig called in top designers to come up with a set that looked different yet pleasing. The new receiver is built at the Grundig factory in Portugal in which the high quality Satellit range of short wave radios has been built for many years. Unpacking the set from the box I was struck, despite the radio's light weight, by the solidity of its construction. It feels well built - unsurprising as the Portuguese factory currently produces only a matter of a few hundred sets each week, with considerable amounts of work still carried out by hand.

Controls

The front panel has a large liquid crystal data monitor that displays the time even when the set is switched off. Beneath that is the main keypad, with numeric keys, band selectors, manual tuning buttons and memory and clear keys. Below that is the sliding volume control. Running up the right hand side is a line of buttons that control all the ancillary functions. The main on/off switch is at the top right of the front panel and this has a built-in lock to prevent accidental switch-on during travel. The loudspeaker grill takes up the remaining half of the front panel. On the left hand side panel are sockets to connect an external power source, headphones, a line to a tape recorder and a remote tape start. The whip antenna is hidden away in a recess on the right hand side of the receiver. Curiously its hinge is at the base of the set rather than the top. This means that if you sit the receiver flat on a tabletop, for example, or at 40° using the built-in stand, the antenna sticks up at the front and can hinder access to the controls.

Facilities

The YB 500 has inherited many of the facilities that its bigger brother, the Satellit 700, has. There is an integrated ROM (read only memory) table which has up to 16 frequencies of nine European international stations pre-programmed at the factory. Deutsche Welle, BBC World Service, Radio Austria International, Swiss Radio International, Radio Netherlands, Radio France, RAI, Radio Moscow and Radio Exterior de Espana are assigned to ROM pages 1 to 9. To call up Radio Netherlands, simply press the '0/ROM' button on the keypad, followed by button '5' and then 'MEMORY'. The first preprogrammed frequency is then tuned - in this case 5.955MHz - and the data monitor displays RNED HOL and 5 ROM to confirm the operation. To access the other preprogrammed frequencies for one particular station, repeated pressing of the button marked 'MON/ROM/AF' is all that is required. The frequency is displayed for about five seconds, and then the display reverts to the station name. The frequencies programmed into the ROM cannot be altered which is not too much of a problem for stations such as the BBC and Deutsche Welle, but I wonder whether it was really such a good idea to include Radio Moscow as many of the frequencies are not used by the station now, although the first channel of 5.905MHz does carry the German service at 1600UTC.

Memories

A further 40 frequencies can be programmed in by the user, and on short wave the receiving mode (a.m., u.s.b. or l.s.b.) is also stored automatically making it a useful feature for radio amateurs as well as broadcast listeners. In addition, individual alphanumeric titles can be assigned. So, if you store Radio Australia's frequency of 9.77MHz, you can also enter up to eight characters, such as AUSTRALI. If you select a frequency that is already stored, the set alerts you to that, displaying * MEMO n. Hold the STORE button for a second or two and any free memory positions are displayed on the data monitor, although if all 40 are occupied, * FULL will appear on the screen. Unlike the ROM table, user memories can be overwritten as and when you want to. Recalling memorised frequencies is simple: tap in the memory number, followed by MEMORY. Alternatively, you can scan all the stored frequencies by repeatedly pressing the MEMORY key. For rapid deletion of a stored frequency, call up the appropriate memory number and then hold the CLEAR key for several seconds. Confirmation of erasure comes when * FREE is shown on the screen.

Tuning

Manual tuning on all bands is done with the TUNE and TUNE - buttons. On short wave single pushes change the frequency in 1kHz steps, longer depression of the buttons changes the increment to 5kHz steps. Holding the button for a second or two starts the scanning function and the set will scan along the band in 5kHz steps, stopping on each frequency for about a second whether or not a station is audible. The scanning function only operates within the limits of a broadcast band: try to start scanning on 13.500MHz, for example, and the set skips automatically to 13.600MHz, the lower end of the 22m band. However, if you have tuned to a frequency in one of the amateur bands, the set will start to scan through that band

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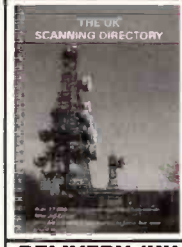

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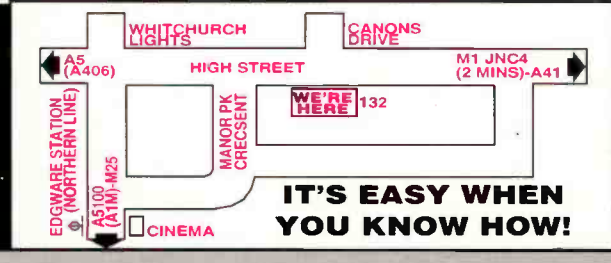

but this time in more helpful 1kHz steps. There is a fine tuning wheel on top of the right hand panel of the YB 500 that works on the short wave bands. On the f.m. band, automatic search mode is started by a long depression of the tuning buttons. The radio tunes in 100kHz steps, but will stop as soon as a signal is reached. Manual tuning steps, meanwhile, are 25kHz. On f.m., reception is automatically switched to RDS (Radio Data System) as soon as an RDS signal is detected. This provides the station name in the data monitor (eg BBC 3 FM or KISS 100). An additional feature, also found on the larger and more expensive Satellit 700, is RDS test mode. To activate this, key in "5 4 3 2 1" and then switch the set on. Then tune in an f.m. station transmitting RDS and the different segments of the station name will appear on the display in the order they are received. For example, on BBC Radio 3, the order is FM, then C 3 and finally BB. Press the 'LSB/USB' key once and the PI code and TP/TA flags appear. This might show as C203, and the TP/TA code might be 01 (as is the case on Radio 3 in London) which indicate that no traffic programme is being transmitted. Press the 'LSB/USB' key again and RDS error rates are displayed (eg 20 45). The first figure relates to the momentary error rate, in this case 20%, while the second shows the maximum error rate since the last RDS block synchronisation. A further depression of the 'LSB/USB' key and the PTY (programme type) code and M/S code is shown. The PTY code provides information on the type of programme (news, drama, current affairs etc) that is being transmitted. A final press of the 'LSB/USB' button and the RDS quality is displayed in a bar graph. The greater the number of segments shown, the higher the quality of the received RDS signal. It all sounds rather complicated, but it does provide a good way of testing individual RDS components and, rather interestingly, seeing how in this country commercial stations and the BBC compare in their use of RDS. (More information about RDS is available from the European Broadcasting Union in Geneva, or from BBC Engineering Information, 201 Wood Lane, London W12 7TS). Grundig products have always boasted rather better sound quality than a number of their competitors and the YB 500 is no exception. The set offers stereo sound on f.m. via the headphones socket, and Grundig have made exceedingly novel use of the stereo amplifier to improve sound output on the built-in mono loudspeaker. A switch immediately above the two position tone control (high for music and low for speech) on the front panel labelled SOUND NORMAL/BOOST combines the output of the two stereo headphone amplifiers with that of the ordinary mono amplifier for the built-in speaker, increasing sound output from 1.5W to 3W music power. It makes a considerable difference to the audio level, without causing any noticeable distortion unless the volume control is cranked fully up.

Clock

Naturally there is a clock, with dual time facility, and this can also be programmed with two discrete on and off times. It is possible to ask the radio to come on automatically using the timer, or for a buzzer to be sounded or if you are a particularly sound sleeper both. If you want to make unattended recordings, perhaps to record Radio Netherlands' Media Network programme at 1155 on Thursday mornings, then all you have to do is tune in the appropriate frequency (in this case from the fifth page of the ROM table), set the on and off time, plug one end of a lead into the output switch jack and the other end into the remote start socket of your cassette player and it should do the rest automatically when the YB 500 switches on.

Performance

Being a conservative evaluator, I would say performance is not bad. Short wave sensitivity is good, with weaker signals received reasonably well. Selectivity is not bad either, although the filter on short wave might be a little too wide on some occasions to allow for really heavy DX work. The f.m. sensitivity is high and it is good to be able to check RDS quality which sometimes differs from the signal strength meter on the data monitor.

Pros and Cons

The set is extremely portable (with four AA batteries required), but the power adaptor supplied will certainly make a hole in your luggage allowance as it is about three times as heavy as the radio set itself, and rather bulky. It is attractively styled, and will look equally at home in a designer sitting room or on a poolside table in the Med. RDS means easy station identification on the f.m. band, and the pre-programmed ROM table saves having to carry round the schedules of the major European broadcasters. With 40 additional memory channels, everyone should be catered for. There is superb sound particularly when the Boost position is selected. Do make sure that it is plugged into the mains when using boost, though, or your batteries will very quickly be flattened. Average life for a set of alkaline batteries is around 20 hours. There is reasonable performance on f.m. and short wave, comparable with a majority of other sets in the same price range. The drawbacks I found included the curious positioning of the whip antenna. If only it was hinged at the top of the set instead of the bottom. And why was there no direct connector for an external antenna?

Conclusion

In conclusion, my impression is that this is a well thought out receiver that is well built and performs to a high standard. It is easy to operate even, I suspect, for the complete novice and so it can be recommended as a set for the traveller, or perhaps for someone who wants a portable radio around the home. I am sure that at the very least it will attract some admiring looks from people who will want to know what it is and what it does, and still be baffled when you explain! At £189.99 it is not a budget set, but does offer fair value for money. Thanks to **Grundig International, Mill Road, Rugby, Warwickshire CV21 1PR** for the loan of the test sample. ■

Specifications

Frequency Coverage:	l.w.	160 - 353kHz
	m.w.	513 - 1611kHz
	s.w.	1.612 - 30.000MHz
	f.m.	87.5 - 108MHz
Modes:	l.w.	a.m.
	m.w.	a.m.
	s.w.	u.s.b.; l.s.b.; a.m.
	f.m.	mono; stereo; RDS
Tuning:	PLL frequency synthesiser, auto search and manual tuning	
Memories:	16 factory pre-programmed (ROM) 40 user programmable	
Audio:	Tone control and switchable Booster	
Audio Output:	1W (mains powered) 2W with 'Boost' (mains powered) 0.3W (battery powered) 1W with 'Boost' (battery powered)	
Antennas:	f.m. & s.w. m.w. & l.w.	telescopic whip internal ferrite rod
Sockets:	LINE OUT (mono 3.5mm jack) Headphones 32Ω - 2kΩ (stereo 3.5mm jack) Output switching (3.5mm jack) DC IN 9V (3.5mm coaxial)	
Timer:	24-hour quartz clock Two programmable switch-on & off times	
Power:	9V d.c. (external) 4 x 1.5V AA batteries (internal)	
Battery Life:	21h approx.	
Size:	113 x 186 x 41mm	
Weight:	560g (excl. batteries)	

OVERLOAD INTER

Almost everyone who spends a lot of time listening to radio receivers will encounter a strong local interfering signal from time to time. Joseph J. Carr K4IPV offers some advice on how to deal with this problem.

One of the differences between low priced and high priced, or at least high quality, short wave and monitor/scanner receivers is how they handle overload from strong local signals. These signals, which can come from a.m. and f.m. broadcast stations, amateur operators and land or mobile (police, taxicab and business radio) transmitters. Virtually everyone who spends a lot of time listening to radio receivers will encounter a strong local interfering signal from time to time.

The receiver specification that characterises this performance is the dynamic range. Unfortunately, neither dynamic range nor the price of the radio actually tells us every possible effect. However, low cost radio receivers (including some you might not see as particularly 'low cost' and those higher cost models with low dynamic range figures, are most likely to be affected by strong local signals.

There are several different types of interference seen. Strong co-channel interference is from a transmitter on the same frequency as another station that you want to listen to. The receiver will tend to capture on the stronger signal, making the weaker signal inaudible. The only practical cure for this form of interference is to use a highly directional antenna.

Dipoles and loops have bidirectional patterns, similar to **Fig.1**, that have two main lobes in which maximum reception occurs, and two nulls in which nulls occur. The maximum null is on the order of -30dB for a well designed, properly installed antenna, although 18 to 25dB is more likely in practical antennas. A beam antenna (e.g., Yagi, quad, phased array) has a undirectional pattern in which the main lobe is opposite the main null.

The idea is to place the null of the loop in the direction of the offending station, causing its received signal to be considerably less than that of the desired station. Of course, the idea is to have the desired station in the deepest part of the null. In general, however, because the null is much sharper than the peak of the main beam, it is usually best to position the null on the interfering signal. The desired signal is not received as strong as it might otherwise be, but the signal-to-strength ratio is considerably better and the result is reception when before it was impossible.

A related form of interference is near-co-channel, i.e., an interfering signal that is not on the exact frequency as the desired signal, but it is so close that it falls at least partially within the passband of the receiver. This type of interference is probably more common than straight co-channel interference because even co-channel transmitters often differ slightly in actual operating frequency. The output of the receiver may be a loud whistle caused by the two signals heterodyning together. The squeal or whistle represents the difference between the two signal frequencies. One solution to this problem is to use an audio notch filter at the output of the receiver audio selection. The best solution is to use a directional antenna to get rid of the offending signal.

Still a third form of interference is probably even more common than the two types mentioned above: basic overload. It can occur on channel or off-channel. This form of interference exists when a very strong local signal enters the antenna via the antenna transmission line. The problem comes from the fact that the input protection diodes and in the input r.f. amplifier (which is usually a transistor or integrated circuit) inside the receiver become heavily biased by the strong local signal.

Several different effects are seen. First, the receiver may become desensitised. The receiver r.f. amplifier may be biased so far up its curve that the gain is reduced considerably and normal signals are not able to be heard. The offending signal may or may not be audible in the receiver output, so don't take the absence of audible interfering signal as proof that no interference is taking place.

Another effect is the generation of harmonics of the offending signal (most likely) or other local signals. When the strong local signal is received in the radio front end, it may drive the r.f. amplifier or the protection diodes far enough into conduction that a non-linear situation is created. Under this condition the harmonics of the offending signal may show up on the receiver dial. It is fairly common in the bands that are under 7MHz, but above 1.6MHz, to hear a.m. broadcasting station harmonics. The actual harmonic output of the radio station's transmitter is quite low (our USA standard is -60dB or lower), but the receiver generates harmonics that are not normally present.

The harmonic generation phenomenon is often seen in v.h.f./u.h.f. television preamplifiers where there is a strong local v.h.f. station (for example, an f.m. broadcaster). I've even seen it create television interference (TVI). In one case, a amateur operator used a 1kW c.w. transmitter and its signal (which was legally clean of harmonics), generated a harmonic in a TV mast-mounted preamplifier. Unfortunately, the tuned antenna on the TV system re-radiated the harmonic to other nearby sets! It was strange to see a case where disconnecting a TV antenna preamplifier

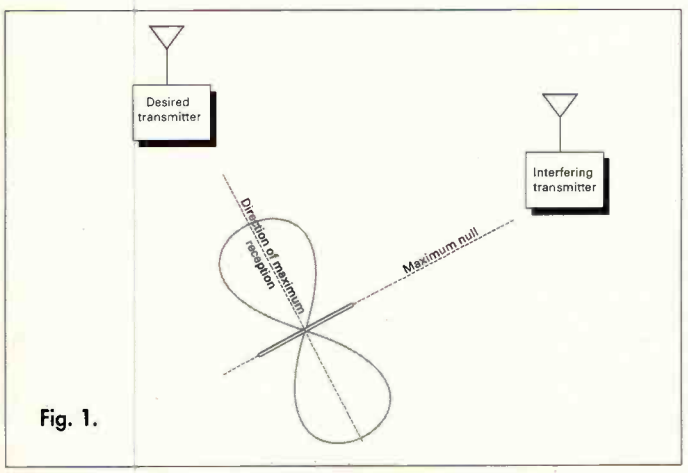

Fig. 1.

RFERENCE

eliminated interference from a local transmitter! But it happened in a local townhouse development in which each quadrangle of individual houses had its own common antenna and an MATV amplifier distribution system.

When the strong local signal is also the desired station, as it might be when using a sensitive short wave receiver in the broadcast band (and there is a nearby a.m. station you like). The strong local, but desired signal, might well be distorted beyond comfort, or may overlap several channels ('splatter' because of the non-linear effects of the signal on the r.f. amplifier.

Still another form of interference is the matter of intermodulation, i.e., when two signals (or their harmonics) mix in the non-linear receive to manufacture other signals at different frequencies. The general case is that the new frequencies will be:

$$F_{new} = mF1 + nF2 \qquad (1)$$

Where: m and n are integers (1, 2, 3, etc) and F1 and F2 are the two frequencies involved. This type of interference could easily occur where there are two or more local signals. There is a hill close to my home that local radio technicians and amateur operators refer to as 'intermod hill' because of the radio installations there: two f.m. broadcasters, an a.m. broadcaster (who shares a tower with one of the f.m. stations), a hospital security and paging system, scores of landmobile stations that hire antenna space on the broadcast towers and a telephone company microwave relay station.

I've sat outside of the hospital on intermod hill listening to my 144MHz band amateur radio receiver, monitoring telephone calls! The rig was tuned to 146.91MHz, but local interfering signal heterodyned a mobile telephone channel into the amateur band.

Years ago, when I was repairing biomedical electronic equipment for a living, we had a case where the nurses claimed that a patient's e.c.g. radio telemetry signals was appearing simultaneously on two channels of the central console oscilloscope. These radio signals were from 4mW v.h.f. telemetry transmitters attached to the patients to allow them mobility. It turned out to be true, although I was at first skeptical as I went to work at 3am to fix it! It seems that the nurses were using an f.m. broadcast radio receiver for entertainment throughout the long night shift. The local oscillator (l.o.) circuit inside the f.m. receiver was providing a local interfering signal to beat against some other, as yet unidentified, signal to the frequency shift Mr Jones onto Mr Smith's channel as well as his own. The radiated l.o. signal was picked up by a 400mm telemetry whip antenna that was sticking out of the ceiling tiles about 1.5m above the f.m. broadcast radio whip. The f.m. receiver's l.o. signal was then mixed with other signals to produce a different signal that happened to nearly coincide with the frequency of another telemetry channel. Retuning (then turning off) the f.m. radio receiver sent Mr Jones back to his own channel exclusively.

Most of the problems with local interference can be solved by one of the methods shown in the rest of this section. There are three approaches: attenuators, filters and antenna tuning units (a.t.u.).

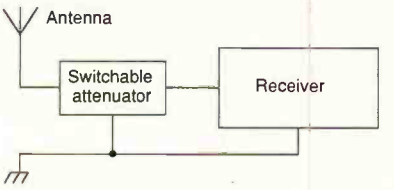

Fig. 2.

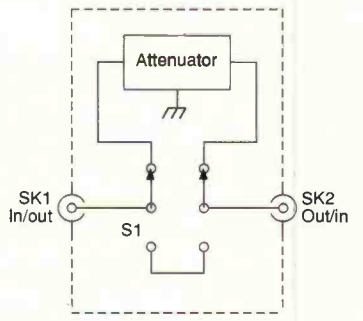

Fig. 3.

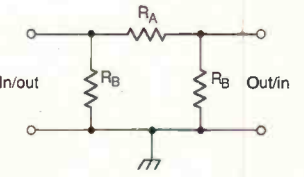

Fig. 4a.

Attenuation (dB)	R_A (Ω)	R_B (Ω)
-3	18	300
-5	33	200
-10	75	100
-20	270	68

Fig. 4b.

Attenuator Approach

An attenuator is a circuit or component that has the effect of linearly reducing the level of a signal. In other words, it is the opposite of an amplifier; its output is less than its input. The attenuator is used when you want to listen to a very strong signal that is too strong for the receiver. It is also useful when listening to the signals because, although it cuts all signals down to the same amount, it is often the case that the strong signal is dropped below a critical threshold where the receiver can handle the signal successfully.

An attenuator is placed in the antenna transmission line between the antenna and the receiver's antenna input terminals. In general, it is better to place the attenuator close to the receiver in order to prevent pick up of the strong local signal by the imperfectly shielded transmission line between the attenuator and the receiver. A few inches is considered a good bet. The attenuator should contain a switch that allows it to be connected in or out of the circuit as demanded by the situation. Some car radios have this feature under the guise of a 'town/county' switch, while many short wave and monitor/scanner receivers call it the 'local/DX' switch. But if your radio lacks this switch, then one can be added externally.

The circuit for a switchable attenuator pad is shown in **Fig. 3**. The attenuator selected should have the required attenuation factor (6, 10 & 20dB are common values selected), and be designed for the standard 50Ω impedance used by r.f. systems. An attenuator designed for say, 600Ω audio work will not perform as advertised in r.f. work. The attenuator in **Fig. 3** is connected to a double pole double throw (d.p.d.t.) switch. When the switch is in the position shown, the attenuator is placed in series with the signal line. ➡21

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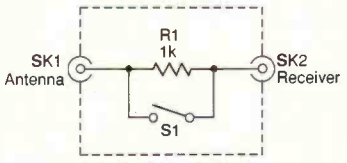


Fig. 5a.

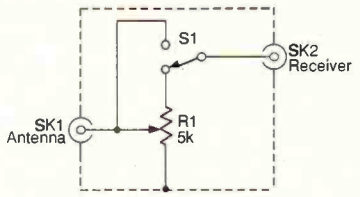


Fig. 5b.

➡17 But when the d.p.d.t. switch is placed in the opposite position, the signal line is shortened straight through from the input connector (J1) to output connector (J2). Note that the attenuator is built inside a screened box - no shield, no work!

I've used the Mini Circuits AT-x and MAT-x devices for this application*. They are fixed attenuators designed for mounting on printed circuit boards, and match the 0.1in d.i.p. spacing commonly seen on boards for i.c. installation. Other attenuators are built inside a coaxial housing, and typically have a female BNC or SO-239 at either end. They provide a fixed attenuation (see label for amount). Readers who don't want to buy an attenuator may be interested in building their own. **Fig. 4a** shows the circuit for a resistive attenuator pad that will provide a fixed attenuation with 50Ω unbalanced (i.e. coaxial) input and output impedances. **Fig. 4b** shows the values of Ra and Rb that give in close to the desired standard attenuation. Use 5%, or better, carbon composition or metal film quarter watt resistors for this circuit.

A crude method that is used on a lot of different receiver is the simple series resistor of **Fig. 5a**. In this type of attenuator circuit, a 'brute force' approach is taken: a resistor placed in series with the antenna signal line. A value of 300Ω to 5kΩ is typically used, depending on just how much attenuation is needed. A single pole single throw (s.p.s.t.) is used to short out the resistor when it is not used. This circuit is the basis for most 'town/county' or 'local/DX' switches in low-cost radio receivers.

An alternate form of 'brute force' attenuator is the variable type shown in **Fig. 5b**. In this circuit, a 5kΩ linear potentiometer is placed across the antenna terminals. The antenna is connected to the wiper, so the amount of signal applied to the receiver depends on the setting of the potentiometer. A single pole double throw (s.p.s.t.) switch is used to connect the potentiometer into and out of the circuit. At least one model of the Ramsey short wave receiver kit uses this type of circuit as a crude but reasonably effective 'r.f. gain' control.

Filter Approaches

The attenuator has its place, especially if attenuators matched to 50Ω are used. But the attenuator, no matter how good it is, is still a bit of a tacky method because it doesn't discriminate between unwanted and wanted signals. It is an equal opportunity hammer for all size nails. A more elegant approach is to use a selective filter that will remove signals in undesired bands, while passing signals within the desired band. A passive filter, made from inductive (L) and capacitive (C) elements may be what is needed. These LC filters come in four flavours: high pass, low pass, band pass and wavetraps.

There is no such thing as a passive filters that doesn't reduce the desired signal at least somewhat. This loss is called insertion loss. But the ratio of out-of-band loss to insertion loss is very high, so the passive LC filter very definitely discriminates against undesired signals more than desired signals.

Fig. 6 shows the circuit for a simple high-pass filter that will discriminate against signals in the a.m. broadcast band because it has a 1.6MHz cut-off frequency. Strong a.m. signals can adversely effect both short wave receivers and monitor/scanner receivers (the latter especially in the low v.h.f. bands). Although not the best possible high-pass filter, the circuit of **Fig. 6** uses easily obtained common parts and offers acceptable performance.

The capacitors used in the filter of **Fig. 6** are NPO disc ceramic units. While silvered mica capacitors are also visible, they tend to be a bit more expensive than NPO disc ceramics in the values shown. The inductors can be universal slug tuned or fixed inductors such as Toko 332PN-3416VN (Cirkit part no. 35-50340 **). Alternatively. the coils can be wound on toroidal cores, such as the Amidon Associates type T-50-2 (red)***. Wind on 26 turns of 24 or 26s.w.g. enamelled wire to give 3.3µH.

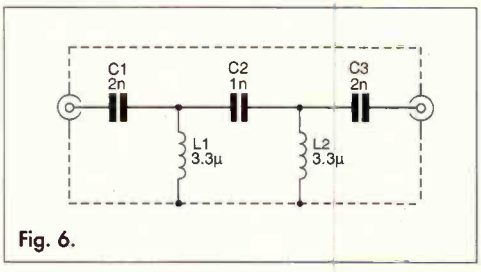


Fig. 6.

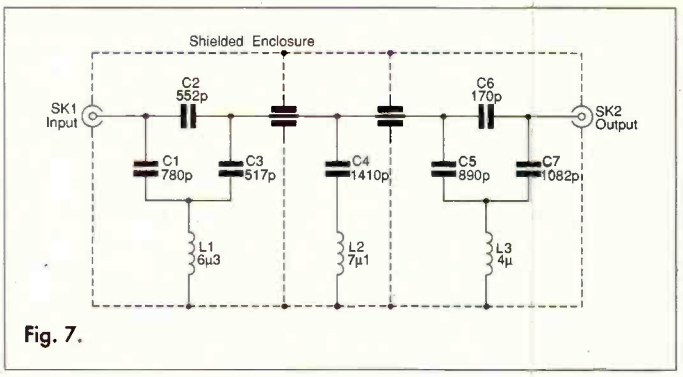


Fig. 7.

As for all the circuits in this article, build the filter inside a screened box. The box should be either a die cast aluminium type or a sheet of metal type that has overlapping edges on the top portion. The type of box that lacks the overlapping edges is fine for low frequency projects, but give a false sense of security at r.f. frequencies.

A more sophisticated 1.6MHz high pass filter is shown in **Fig. 7**. This filter offers more attenuation of signals in the a.m. broadcast band than the other design. It provides -40dB of attenuation at 1.6MHz, and more at lower frequencies. This filter, like the other circuit, with match 50Ω systems.

The odd-value capacitors are made by connecting, in parallel, two or more standard value capacitors. For example, the 780pF capacitor at C1 can be made by connecting 560pF and 220pF in parallel . These capacitors should be NPO disc ceramic or silvered mica units.

The coils can be either fixed or adjustable coils from a source such as Tokyo, or be wound on the same type of T-50-2 (red) toroidal coil form as used in

Fig. 6. For the three coils, **Table 1** lists the number of turns required for each coil.

Each section of this filter is built inside its own screened enclosure. A screened box is used for the filter, divided into three screened compartments. A 10mm hole in each internal screen is used to pass the wire from one section to the next.

The internal screens, indeed the entire box if you're so inclined, can be constructed from hobby brass stock. Hobby shops, the kind that deal with model builders, often stock brass sheet in sizes from 6mm wide upwards, in thickness from those that act like gold foil to tank armour - well, almost. They also typically stock angles, round tubing, square tubing and solid wire. Look near the balsa wood display in model shops, at least that's where the brass was in several that I've visited.

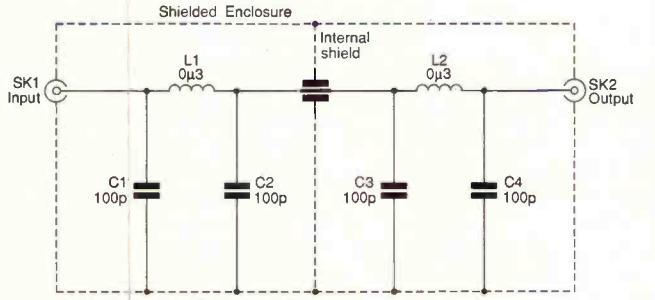


Fig. 8.

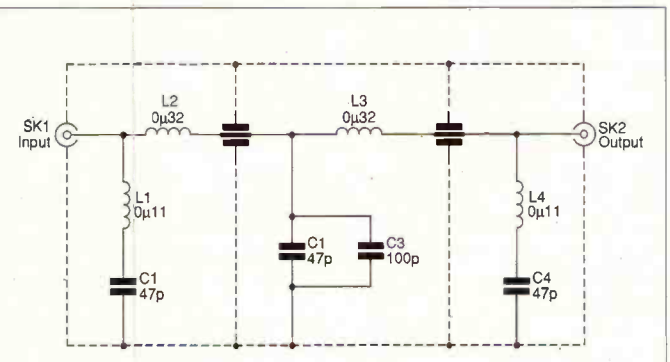


Fig. 9.

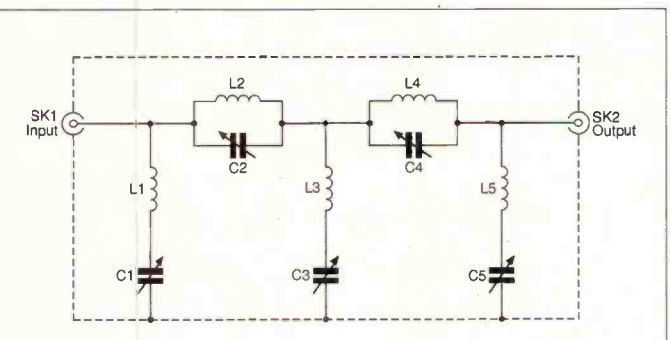


Fig.10.

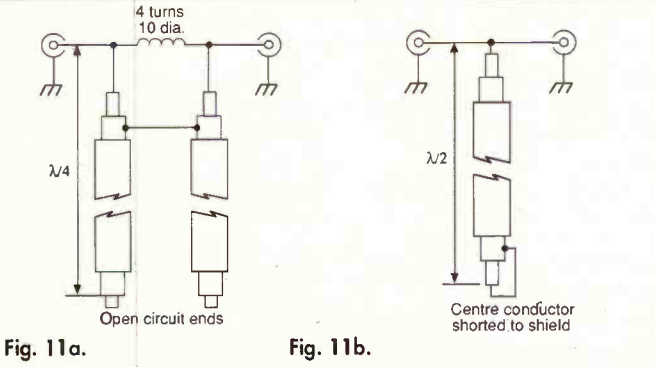


Fig. 11a. Fig. 11b.

Coil	Inductance (µH)	Turns
L1	6.3	36
L2	7.1	38
L3	4.0	8

Table 1.

A low-pass filter is shown in **Fig. 8**. This filter is designed to pass signals below 32MHz, or so, and attenuate those above 32MHz. It will guard a high frequency short wave receiver from interference by signals in the v.h.f. region. If your receiver must operate near an TV or f.m. broadcast station, a landmobile or public service two-way transmitter, or a v.h.f. amateur radio operator, then this filter may well eliminate some of the problems that you can experience with those transmitters.

Like the other filter above, **Fig. 8.** is made from disc ceramic or silvered mica capacitors, and coils wound on T-50-2 (red) toroidal formers with 8 turns of 24 or 26s.w.g. enamelled wire. Alternatively, because of the frequency, you can also use the T-50-6 (yellow) forms, but then you must use 9 turns of wire.

A viable alternative for short wave listening is to buy a amateur radio low-pass filter for this application. Amateurs use these filters to prevent the harmonics (if any) from their h.f. rigs causing television interference. Normally, s.w.l.s don't like to use amateur filters because they are much larger, due to power handling considerations. But the 250 to 300W size low-pass filters will not overburden most receiver installations. Several companies make a.t.u.s for fixed and mobile operation that will work nicely for s.w.l. receivers.

A bandpass filter is shown in **Fig. 9**. This filter will pass signals between approximately 1.8 and 30MHz, while attenuating those below 1.8MHz and above 30MHz. It, therefore, combines the charms of the other filters discussed in this article. The capacitors are common values, and should be either NPO discs or silvered mica units. The coil specifications are similar to the above: L1 and L4 and 5 turns of 24 or 26s.w.g. enamelled wire on T-50-2 (red) toroidal formers, while L2 and L3 are 8 turns of the same wire on T-50-2 (red) formers.

A wavetrap is a special filter that takes out one frequency while passing all others. **Fig. 10** shows the basic wavetrap circuit. No values are given for the inductors and capacitors because these depend on the frequency being exorcised. The resonant frequency of each trap section (C1/L1, C2/L2, C3/L3, C4/L4 and C5/L5) is found from:

$$F = 1/(2\pi f\sqrt{(LC)}) \qquad (2)$$

For the most common case, an a.m. station close to your home, try 365pF variable capacitors and 220µH inductors. Traps for the f.m. broadcast band are available at 75Ω impedance - which should work well enough in 50Ω circuits. It seems that f.m. stations occasionally wallop TV signals.

Fig. 11 shows two v.h.f./u.h.f. wavetrap circuits. The circuit of **Fig. 11a** is based on using a pair of quarter wave open circuited stubs tuned to the offending frequent, while the filter of **Fig. 11b** uses a half wave shorted stub to accomplish the same purpose. The physical length of coaxial cable is shorter than its electrical length by the velocity factor

(V), i.e., the percentage of the speed of light at which signals propagate in the cable. Typical values of V are 0.66 for regular polyethylene coaxial cable and 0.80 for polyfoam. Some Teflon cables are listed as V = 0.70. For the half wave case:

$$L = 14996V/F \qquad (3)$$

L is in mm, F is in MHz.

For the quarter wave stubs divide the value obtained from Equation (3) by two. Keep in mind that the quarter wave stubs (**Fig. 11a**) are open-circuit, while the half wave stubs (**Fig. 11b**) are short-circuit at the free end.

Antenna Tuning Units

Antenna tuners are used to match antenna to receiver and transmitters. Smart amateurs always use them in the h.f. bands for both matching and harmonic suppression. A typical 'line flattener' style circuit that is intended to match 50Ω to 50Ω systems is shown in **Fig. 12**. Many tuners on the market lack capacitor C3, so are essentially high-pass filters. These are not the best selection for many applications, but will do. In some cases, where C3 is used, capacitors C1 and C2 are mechanically ganged together on a common shaft. The inductor is either 18 or 28μH (use the larger if lower bands are to be covered), and is tapped at least at four positions to provide different bands. A good choice for the inductor is 45 turns or bare 14s.w.g. solid wire, spaced equally over 75mm of length on a 25mm air cored former. A suitable former is 1in pvc waste pipe. Note, however, that pvc pipe may not be suitable for transmitter a.t.u. coils, even at low power levels.

An alternative is to use a 250W fixed to mobile antenna tuner intended for amateur radio operation. Although designed to operate on the amateur bands, these units will usually accommodate the nearby short wave bands. Alternatively, they can be modified by adding fixed capacitors of a few picofarads across each variable capacitor, or by using different taps on the inductor.

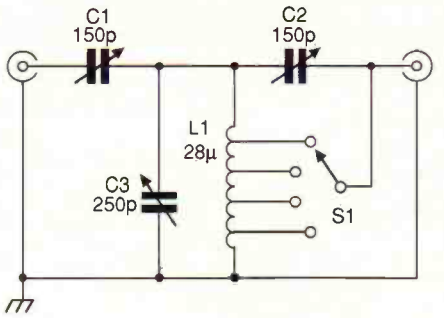


Fig. 12.

Conclusion

Overload and interference problems can be annoying, damaging and are often dauntingly difficult to solve. But the listener who tries the solutions given here will achieve good results most of the time. ■

References

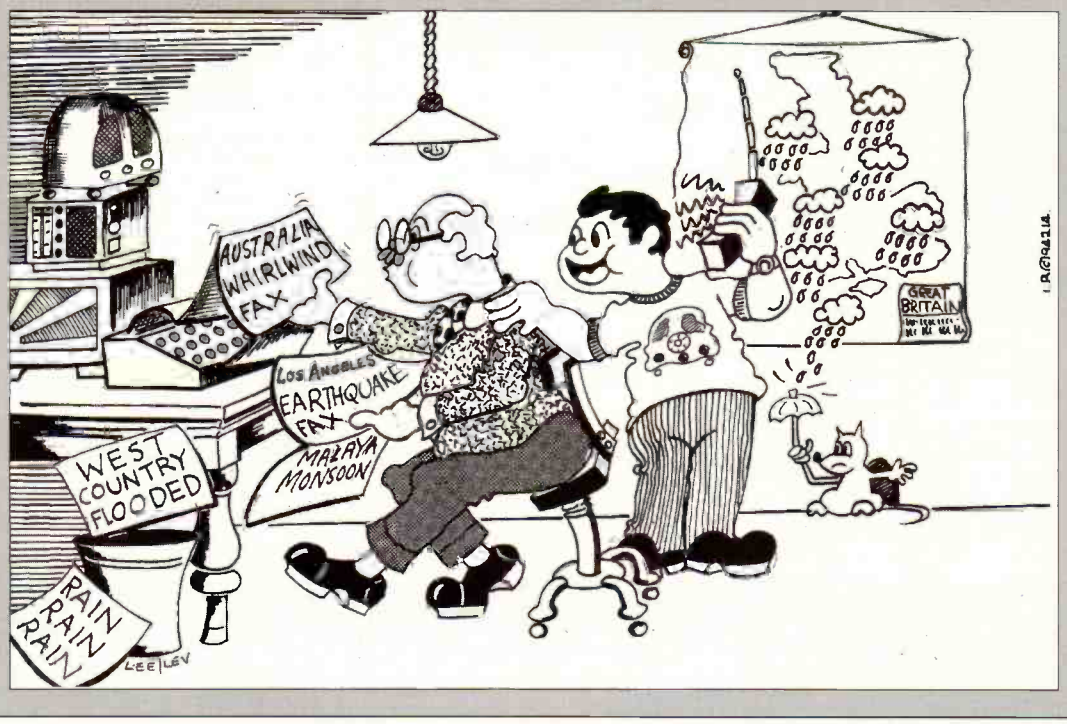
* Mini Circuits/Dale, Dale Electronics Ltd., Dale House, Wharf Road, Firmley Green, Camberley, Surrey GU16 6LF; (0252) 835094

** Cirkit, Park Lane, Broxbourne, Herts. EN10 7NQ Tel: (0992) 444111.

*** Amidon Associates, PO Box 956, Torrance, CA 90508, USA.

*** Ferromagnetics, PO Box 577, Mold, Clwyd CH7 1AH.

Listen With Grandad *by Leon Balen & David Levetett*



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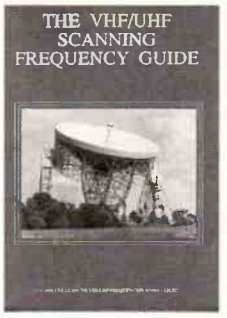

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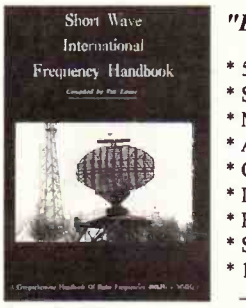

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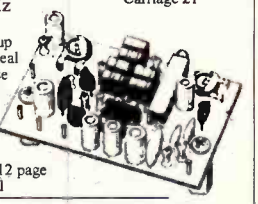
Carriage £1

100kHz - 1.3GHz



Superb low noise performance with up to 20dB of gain. Ideal for perking up those older scanners and short wave receivers. Uses 2 stage feedback design for ultra stability. Includes 12 page educational manual

AA-7 Active Aerial £29.95

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COMPUTER-RECEIVER INTERFACE FOR CW DECODING

One of the most popular uses for home computers by short wave listeners seems to be the decoding of Morse code and RTTY transmissions and it's a task for which a computer is highly suitable - providing you can find a way to connect it to your radio receiver. Gareth Jones GW4KJW offers this simple interface.

Home computers, be they humble Sinclair, mighty IBM, or anything between, are digital devices, internally, all of the address lines, data lines, RAM and ROM are busy communicating with each other in a stream of Ones and Zeros - ONs and OFFs - Digital. Morse code is a form of digital communication so you might be forgiven for thinking it's a simple matter of plugging a lead between your receiver and computer to transfer the Morse code signals received directly into it for decoding.

Life is seldom that straightforward. When you tune your receiver into a station transmitting Morse, with its b.f.o. or carrier insertion oscillator turned off, all you hear is a series of clicks as the carrier wave is turned on and off by the Morse key. Just hearing these clicks isn't much good, you have to hear the carrier or rather to hear the difference between short periods of carrier - 'dots' and longer periods of carrier - 'dashes'. Unless you're into walking on water, reading Morse just by listening to these clicks isn't practicable, you need the help of the audio tone produced by the hetrodyne effect of the b.f.o. on these periods of carrier.

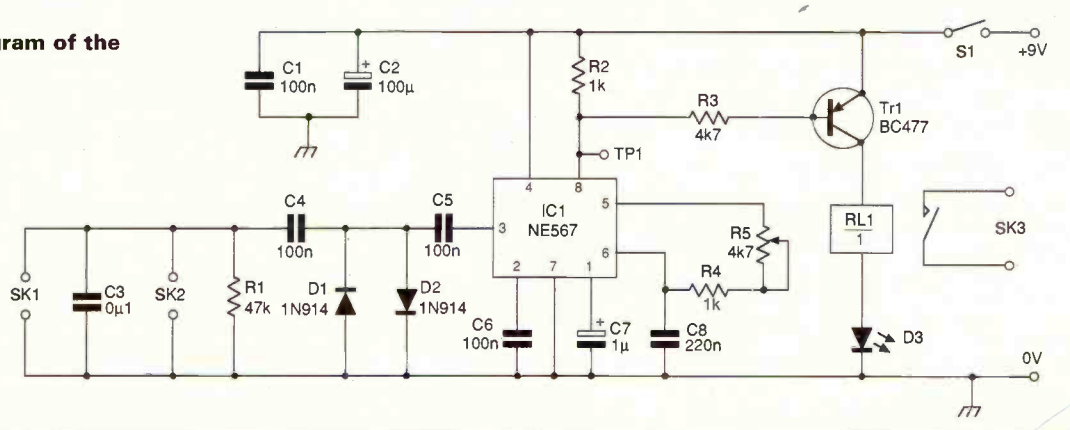
So what's needed is a way to get the information conveyed by the length of these audio tones into the computer - forget the pattern for now, the software will handle that - all the computer needs to know is if the signal it's receiving is longer, shorter or the same as the previous one.

The Circuit

The circuit for a simple interface to fit between the receiver and computer to achieve this is shown in **Fig. 1**. It's a tone-gate circuit based on the NE567 p.l.l. integrated circuit and is not particularly difficult to build. A suggested p.c.b. design is shown in **Fig. 2**, although you could build it on a piece of Veroboard if you wish. The component layout is also shown in **Fig. 2**. Capacitor C3 is optional, and may be connected across the headphone socket if required.

The unit is powered by a PP3, or similar, 9V battery, the battery drain being acceptably low. The audio signal from the receiver's output is applied, eventually, to the input (pin 3) of the NE567 p.l.l. chip. The resistance between pins 5 and 6 on this chip allows the pitch at which the tone-gate is activated to be varied so as to match the output pitch of the input signal. When this is matched, the tone-gate will switch the base of the BC477 transistor. The output from this transistor powers a small d.i.l. encapsulated relay which will operate in time with the audio tones on the input to the chip, the 'cold' side of the relay goes to deck via a small l.e.d., which flashes in time with the audio tones as the relay is powered. The output from the relay is used to 'key' a port or line on the computer. It is this switching between 'high' and 'low' states that the

Fig. 1: Circuit diagram of the simple interface.



computer program reads, decoding the received Morse signal.

Decoding

To get it all working turn on the computer and load a c.w. decoding program into the computer. Turn on the receiver and connect the interface. Now tune into a fairly strong Morse signal - using a strongish station will help whilst you are getting used to the interface. You will find, after some practice, that the p.l.l. can cope with surprisingly weak signals and even sort out transmissions that are close together. As long as you can hear a difference in pitch between two or more signals the p.l.l. can be tuned to distinguish one from the others. Tune the interface until the l.e.d. starts to flash in time with the audio, run the computer program and you should find that the Morse signal is decoded with the plain language displayed on the screen.

When the interface is connected to the receiver the receiver's internal loudspeaker may be muted, leaving no way to hear the received signal. For this reason an additional 3.5mm socket is provided on the interface box so that an external speaker or headphones may be attached.

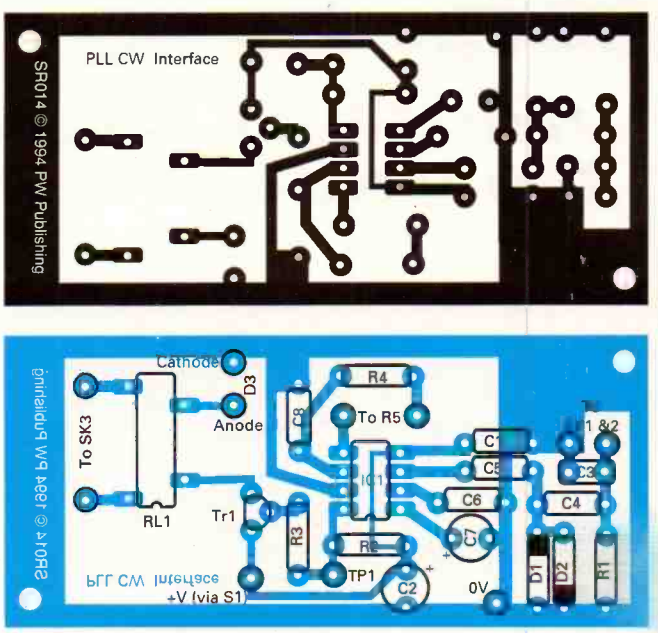
RTTY

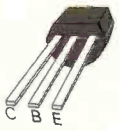
The interface may also be used, with reasonable success, to decode RTTY signals. In this case you will have to tune the interface (as before) to match either the 'Mark' or 'Space' tones you are receiving and match this with the configuration of the RTTY computer program. Purpose built RTTY terminal-units have two seperate tone gates one for each of the 'Mark' and 'Space' audio frequencies. When correctly adjusted the received RTTY signal should be decoded and displayed as was the cw.

Naturally the success you have will depend on the decoding program you are using. Good c.w. is decoded and displayed with few if any errors. Morse being sent automatically or from a keyboard is a pleasure to watch, hand-sent Morse is another thing though most good c.w.-decoding programs have self-adjusting timing/tracking routines within them so you shouldn't have to worry about setting received speeds etc. The upper speed limit when receiving c.w. is about 120 w.p.m. this is dependant on the switching speed of the relay. For RTTY use this means you will be able to receive 45.5, 50 and 75 baud signals. The bits and pieces you need should cost you around a tenner - less if you've got a good 'junk-box' in your shack. More, if you decide to put it into a proper case. But a suitable and very appropriate box is one of those flip-top clear plastics types that hold ten 3.5in computer disks, these can be unclipped into three pieces, if you are careful, for ease of drilling holes, etc. They are quite sturdy when re-assembled and as an added bonus are usually provided free when you buy ten new disks. (You can buy them 'empty' for around £1.50)

Apart from a plug and connecting lead to your receiver's external loudspeaker socket and the same for the port on your computer, there is nothing else to buy. You can build it in an evening..... Go on - give it a try! ■

Fig. 2: Full size p.c.b. track pattern and component placement for the interface.





Pinout for the BC477 transistor.

You Will Need

Resistors

Carbon Film (1/3W)

1kΩ	2	R2, 4
4.7kΩ	1	R3
47kΩ	1	R1

Potentiometers

Linear

4.7kΩ	1	R5

Capacitors

Polyester

0.1µF	4	C1, 4, 5, 6
0.22µF	1	C8

Ceramic disc

0.1µF	1	C3 (see text)

Electrolytic

1µF	1	C7
100µF	1	C2

Semiconductors

Diodes

1N914	2	D1, 2
l.e.d.	1	D3

Transistors

BC477	1	Tr1

Integrated circuits

NE567	1	IC1

Miscellaneous

Relay s.p. d.i.l. 500Ω coil; Jack sockets 3.5mm (3); Min. toggle switch, s.p.s.t.;
Printed circuit board (see text); Plastics case (see text); Knob; Battery connector PP3 type.

AOR™ *Innovative Radio Communications*

The New Classic AR3030 and the Wider Horizon AR3000A

Collins Inside

When the **AR3030** was first placed onto the drawing board about 15 months ago, the R&D team at AOR had the dream of producing a high quality DDS (Direct Digital Synthesizer) receiver with excellent filtering characteristics offered by the legendary ***Collins** mechanical filters. This dream has now come true, a feat rarely achieved by any manufacturer whether large or small. As a shortwave listener you too can enjoy the experience of this very special marriage of high technology and classical styling.

Most receivers employ ceramic filters, such filters offer good performance and reasonable cost. However the "best" kind of filter is the mechanical resonator filter, pioneered and still manufactured by the ***Collins** Division of Rockwell International. In contrast to ceramic filters, ***Collins** mechanical I.F. filters are more expensive and rarely used in any but the very top of the range and professional equipment.

Our aim here at AOR has been to produce a general coverage receiver using the ***Collins** 6kHz AM mechanical filter fitted as standard yet at an affordable price for most shortwave listeners around the World. We believe that only the very best receiver design deserves the ***Collins** mechanical filter, and feel our R&D team have succeeded with this goal. It is very easy to appreciate the true effectiveness of the ***Collins** AM mechanical filter on todays' crowded medium and shortwave bands especially in Europe after dark.

We also believe DDS is the best method available today to produce the cleanest signals, absolutely essential for high performance receive capability especially on crowded bands containing many strong signals. There are two other filters fitted as standard, these being 2.4kHz for SSB/FAX/CW and narrow AM/S.AM & 15kHz for NFM. Additional filter options include a ***Collins** 7 resonator mechanical 500Hz filter for narrow CW operation and a ***Collins** 8 resonator mechanical 2.5kHz filter for even better selectivity on SSB.

Our **"Collins inside"** logo and use of name has been fully approved by **Collins Rockwell** and we are proud of that fact. Our pride will be lifted even higher should other manufacturers be brave enough to follow our example in the near future.

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The AR3030 has a number of unique facilities to offer. In particular the BFO (Beat Frequency Oscillator) is switchable on USB/LSB/CW and FAX modes. During 'normal' operation the AR3030 uses **true carrier re-insertion** techniques for SSB reception, this ensures ease of use and good audio quality. However should adjacent interference be encountered, the BFO may be switched On so that the main rotary tuning control can be used to tune away from interference and the BFO used to recover readable audio thus provide a simple but effective manual form of passband tuning.

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FACTS ON FAX!

Of all the utility or data modes, facsimile or FAX is the one you can most easily impress your family and friends with. It is also one of the least understood. Mike Richards explains how the system works and the type of equipment needed to receive FAX pictures at home.

Early Beginnings

Like many areas of modern technology, the basic principles of a working system have been known for some considerable time. In the case of FAX systems, the first record came with a British patent that was registered back in 1843 by the Scottish inventor and clock maker Alexander Bain. Since that time there have been an amazing range of developments by most of the main communications manufacturers.

Perhaps the most unusual was a system produced by the WideCom Corporation of Ontario. They introduced a special wide-bodied FAX machine that could handle a document 0.6m wide by 61m long! The latest office FAX machines have now reached exceptional speed and quality standards such that they can transmit a page of A4 high quality text in a couple of seconds using BT's ISDN network.

I don't intend to try and cover all this ground here, instead I shall concentrate on the systems that can be received using a short wave receiver and suitable decoding system.

Basic Principles

At the heart of every FAX system is a basic operating principle that has changed very little over the years. The easiest way to explain this is to consider a very simple FAX system and see the role of each component. I've illustrated the main elements in **Fig. 1** so you will need to refer to that diagram.

Most FAX systems start with a revolving drum around which is wrapped the document to be sent. Running alongside this drum is a motorised stylus that's used to scan the document. The stylus can take many forms, but is essentially a light sensitive unit that can detect the differing shades of the document to be transmitted. For simple text documents of weather charts, this detector just has to be able to successfully detect black or white. When sending photographs, the detector has to be able to accurately interpret the varying shades of grey. The output from the stylus can take many forms, but is essentially an electrical signal of which the extremes represent black and white respectively. This signal is fed to the transmitter and broadcast using one of the standard systems that I'll cover later.

At the far end, the FAX receiver is identical to the transmitter, except that, the stylus has to be able to mark the sheet of blank paper that's wrapped around the drum. I know this all sounds very straightforward, but it's at this point we hit our first problem. If we are to receive a faithful reproduction of the original image, the receiver's drum speed and stylus must move at exactly the same rate as the transmitter.

We also need to think about what would happen if the sheet of paper at the receive end was smaller (or larger) than the transmitter. What is needed is a way of specifying the speed of the drum and the speed of the stylus. The drum speed is easy as we simple quote the speed in revolutions per minute r.p.m. The difficult bit is defining the stylus speed so that you can receive the image perfectly proportioned on any size sheet of paper.

Index of Co-operation

The answer is to use what has become known as the index of co-operation (IOC). The name is very appropriate as it describes the way in which the stylus movement must co-operate with the line length to reproduce a perfect replica of the original. This index is calculated as the length of each scanned line multiplied by the number of line per unit length divided by π.

The formula for this is:

$IOC = L\ (D/\pi)$

Where L is the scanning line length or drum circumference. D is the scan density or lines per unit length.

To better illustrate this, let's try a practical example. If we assume we are sending an A4 document that fits exactly around the circumference of the drum the length of each scanned line will be 210mm (width of A4 paper). Now let's assume the drum revolves twice every second, which is 120r.p.m. Next we need to know how many times the drum will turn as the stylus moves over the entire document. As I know the answer I'm trying to get, I've decided that the drum

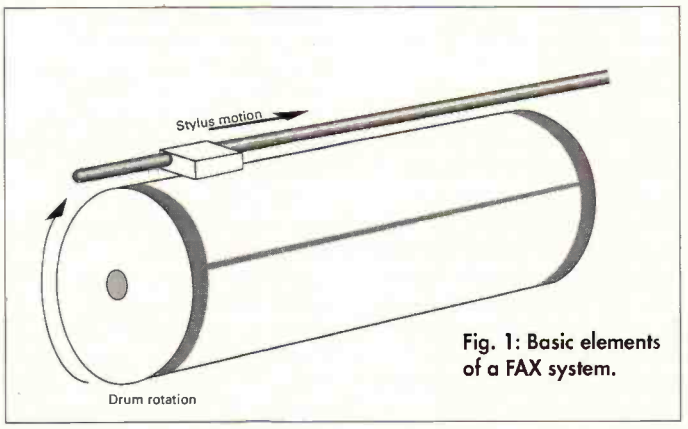
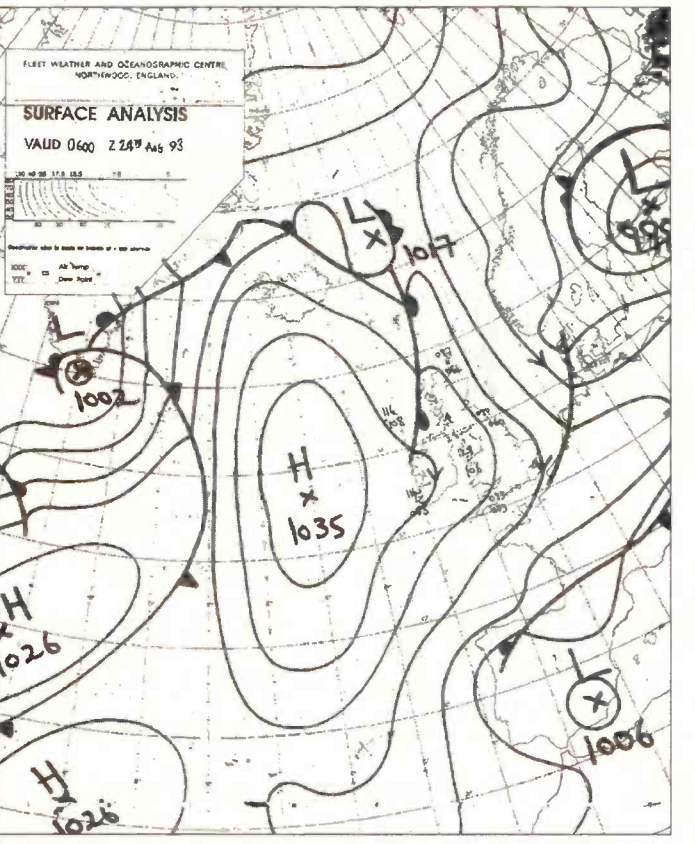


Fig. 1: Basic elements of a FAX system.



Typical weather chart from RN Northwood.

will have turned through 2554 revolutions. We also know that a sheet of A4 paper is 297mm long, so we can now calculate the number of revolutions or scanning lines per millimetre. This calculation is simply the number of revs (2554) divided by the length of the paper (297mm) i.e. 2554/297 = 8.6 lines/mm

To turn this into an IOC we divide the number of lines per millimetre by π (8.6/3.142 = 2.74) and multiply the result by the length of each line (210mm).

The result being an IOC of 2.74 x 210 = 575.4. If you've already tried FAX reception you will recognise that this is very close to the most common IOC standard of 576.

Just to complete the picture, let's use the knowledge gained so far to work out the parameters of a FAX unit that will receive an image from our A4 FAX mechanism but print it on A5 210mm (long) x 148mm (wide). The drum speed of our smaller machine needs to stay at 120 r.p.m. but we need to use the IOC to work out the number of line per millimetre that the stylus must travel.

In this case we need to rearrange the formula so we can calculate the scan density. The new formula becomes: IOC/L x π. The final calculation then becomes 575.4/148 x 3.142 = 12.2 lines per millimetre. This is a logical result, as you would expect the stylus to move slower to cover an A5 sheet in the same time as the original took to cover an A4 sheet. If you're not too hot on maths, you don't have to worry about all this to receive FAX images as this is all taken care of in the decoding system. In practice, all you have to do is choose between the two standard IOCs of 288 or 576.

Transmission Systems

Now we have our raw FAX signal from the stylus, we need to consider how we could apply this to a radio transmitter to build a useful communications system. For an h.f. or l.f. transmitter the answer is remarkably simple as we can use the same technology as that used for RTTY i.e. frequency shift keying (f.s.k.) or frequency modulation (f.m.).

In basic terms, this is where the carrier frequency of the transmitter changes in synchronisation with the FAX or RTTY signal. In our case, the amount of change or shift is restricted to a relatively small 1 400Hz on h.f. and 1 150Hz on l.f. Receiving this type of transmission is also very straightforward using a standard s.s.b. communications receiver. This shift is reproduced through the audio stages of the receiver as an audio tone that varies by the full 1400 or 1150Hz. It is this audio signal that's passed to the decoding system and used to produce the received FAX image.

The standards used for satellite FAX images is much the same as h.f., the prime difference being the modulation system. The use of simple f.s.k. is not possible because of an phenomena known as the Doppler effect. This effects the frequency of signals emanating or bouncing off a moving object (speed traps rely on this effect!). When trying to receive FAX images from a fast moving satellite the signal will suffer severe frequency changes as the satellite moves overhead and so changes from approaching the listener to rapidly receding. These frequency changes would cause havoc with the FAX image. The answer lies in a change to amplitude modulation (a.m.). In this system the amplitude of an audio tone is changed in synchronisation with the changing FAX image.

Automatic Reception

If you've ever tried h.f. FAX reception, you will know that a typical weather chart can take up to 15 minutes to send.

From a commercial viewpoint, it's clearly not viable to have a radio operator standing by to monitor the reception of every image. What's needed is an automatic reception system that can identify the type of image being sent and synchronise the start and finish of that image. The system devised for this is known fairly obviously as Automatic Picture Transmission or APT. The key elements of this systems are a start tone, phasing signal and stop tone.

The start tone tells the receiving system the IOC to use and the current standards are 300Hz for IOC 576 and 675Hz for an IOC of 288. The 30 second phasing signal that follows consists of a full white signal interrupted at a specific rate by a black pulse. The interruption rate indicates the drum speed of the transmitter as follows: 1Hz = 60r.p.m., 1.5Hz = 90r.p.m., 2Hz = 120r.p.m. and 4Hz = 240r.p.m. The final element is the 450Hz stop tone that puts the FAX receiver back into standby mode. Providing the receive station has a suitably stable receiver, the APT system enables completely automatic reception over long periods of time.

Practical Systems

If you've followed me this far you're probably wondering how you can adapt your system to be able to tap into the fascinating world of FAX reception. Fortunately this is remarkably easy to do thanks to a wide interest in FAX over a number of years. The first decision to be made is whether you want to get involved in using a computer for your decoding.

If you do, you will find that there are decoding systems available for many of the more popular computers. You do need to be careful that the resolution given by the package is up to the standard you require. I would recommend that you either see the package working before you buy or ➡35

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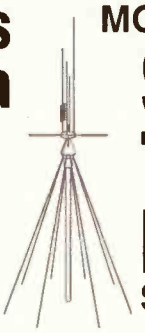

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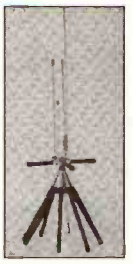

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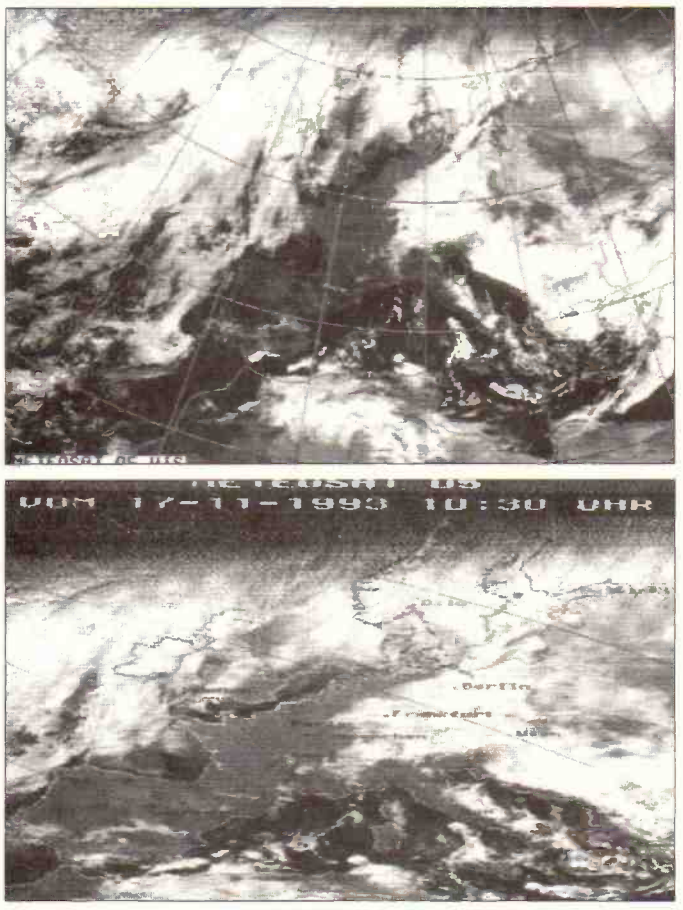


Re-broadcast Meteosat image. Meteosat 5, 17 November 1993, 1245Z.

Re-broadcast Metoesat image. Meteosat 5 Vis. 17 November 1993, 1300Z.

30 ➡

at least ask for sight of some sample images. If you don't have a local supplier you can visit, a trip to a radio rally is a good way to see and compare a number of different systems.

Generally the best results will be obtained from the more modern computer systems such as the IBM PC or Amiga. This improved performance is due to the superior graphics handling capabilities of modern computers. A look through the adverts in *SWM* will reveal a number of advertisers that can supply FAX systems. If you have an IBM PC or compatible you could take up my offer to supply a copy of JVFAX. This is an excellent decoding package that makes an ideal way to try out FAX reception (see my 'Decode' column for details).

If you want to keep away from using computers for FAX decoding, you will need to look out for a standalone FAX unit. There are several on the market and again the adverts in *SWM* should point you in the right direction. You will also find that most of the stand-alone units use a standard computer printer to show the received image. Whilst this usually provides a good quality image, you can use up a lot of paper whilst searching for a suitable signal.

My personal preference lies with the computer based systems as they enable extensive storage capacity and received images can be tidied-up after reception.

In addition to a good quality decoding system, you also need a decent receiver. The main qualities are fine tuning steps and good long term stability. This latter feature is especially important if you want to make the best of unattended automatic reception. When receiving h.f. FAX signals with a shift of 1400Hz you may be able to use a receiver with 100Hz tuning steps, this is certainly not true when receiving the popular German weather stations on l.f. The 1150Hz shift means that you really need 10 or 15Hz steps to receive good quality re-transmitted weather photographs from METEOSAT.

Reception Problems

Because FAX is so different from the other utility modes there are some new problems you may have to tackle. The most common is that of multi-path reception of h.f. signals. A big word, but it just means that the signal arrives via more than one route. The effect on the received image is very similar to the ghosting that can sometimes occur on domestic televisions. Because the signal arrives via more than one path, the transmission distance and therefore transmission time is different. The end result varies depending on the severity of the multi-path signals.

In a mild case there may be just a second image displaced to the right of the original. In severe cases the image looks as though the ink has been badly smeared. One of the benefits of the long transmission times of a FAX image is that shorts bursts of interference generally have very little effect on the final image.

Those of you using computer based systems may find that the received image is skewed. This skewing is caused by errors in the computer's internal clock. Most computer decoding systems are able to correct this very easily and you should refer to the operating manual for more detail. One tip I can offer is to use the Rugby MSF standard frequency transmission on 60kHz to help align your computer. To use this, you just set your decoder to a drum speed of 120r.p.m. and tune to 60kHz. when properly tuned you should see a black stripe down one side of the screen with pulses leading out to the right. All you have to do is adjust the internal clock setting so that the black line remains parallel with the side of the screen.

I hope you have enjoyed this brief look at FAX, if you have any comments or questions, please drop me a line via the 'Decode' column. ■

Abbreviations

a.m.	amplitude modulation
APT	Automatic Picture Transmission
BT	British Telecomm
f.m.	frequency modulation
f.s.k.	frequency shift keying
FAX	facsimile
h.f.	high frequency
Hz	hertz
IOC	Index Of Co-operation
ISDN	Integrated Services Digital Network
kHz	kilohertz
l.f.	low frequency
m	metres
mm	millimetres
r.p.m.	revolutions per minute
RTTY	Radio TeleType

BREAKING THE BANDS

Today's allocations in the radio spectrum seem most confusing. Tony Hopwood puts forward some suggestions for sorting out the chaos.

It was an advert in *SWM* that made me think about writing this article. A hand-held receiver with continuous frequency coverage from 100kHz to 1.2GHz. How sensible, how logical! Why should we put up with anything less? Thanks to the microchip, the days of fixed wavebands ruled by combinations of mechanical L, C and R are gone for good.

It's going to be tough to break the tuning habits of sixty years. All those ancient Broadcast Conventions going back to the days when the wireless warmed the living room and high frequency meant over three megacycles, sorry, megahertz! Thanks to those Conventions, ancient and modern, we have been conditioned into believing that the radio spectrum is jammed solid with transmitters duelling for the last kilohertz.

We were told that this was why the dear old 'Beeb' was evicted from its 200kHz slot, which it had kept warm since 1928, to make space for one or two extra long wave channels, then Radios Two and Three were banished from the medium wave and so on.

All unnecessary. Today's use of the radio spectrum is a bit like someone saying you may be able to see all the colours of the rainbow, but the only ones of any use are the green and blue, the others are out of order!

It's time to slaughter a few holy cows!

First for the chop is f.m. radio, especially the stereo variety.

What's wrong with f.m.?

It's supposed to better than a.m. because there is less interference from static and it can offer a wider audio bandwidth than a.m.

Hang on! For a start, what's static?

Static is interference, short for static electricity. It was a big problem in the sparks era of radio when very long waves were used with enormous antennas. In the 20s and 30s it became the popular name for the mains borne fizzes and crackles from tramcars, motors and switches and, very occasionally, lightning.

Static

These days there is very little static because things are better suppressed and signals are stronger. But anyway, as the frequency goes up, what static there is, virtually disappears. To emphasise the point, I have a wide band a.m. receiver that gives continuous coverage from 35 - 250MHz, and I can confirm that nearby lightening hardly registers above 50MHz.

And as for the audio bandwidth argument, that's a waste of airwaves - a.m. wins hands down. If you take the BBC standard f.m. signals channel, it has a deviation of ±75kHz for full modulation. The ration is one station per 100kHz. That's the entire a.m. long wave band for two and a half stations.

How does it work out if you put out a high fidelity a.m. stereo signal on v.h.f.? Say two adjacent channels, each amplitude modulated to 20kHz for left and right. If you allow 10kHz sound channel separation, you are still only going to need about 50kHz per station and much less if you start doing clever things with the sidebands or go digital. That means at least twice as many hi-fi disco rap channels between 88 and 108MHz!

How would wide band a.m. sound on v.h.f.? It was tried before the war when BBC TV radiated signals on Band 1 from Alexandra Palace. The trade press reckoned that a.m. TV sound was so good that many late 30s domestic radios sprouted an ultra short wave band so you could listen to TV sound and test card music on the ten shilling wireless licence!

So far we have doubled the number of channels in the 88-108MHz band where else can we find more spare ether? Try looking at the gaps on your radio dial. My 10-valve RGD (1950) has a good domestic radio frequency coverage: Long Wave 160 - 400kHz; spare 400 - 650kHz (at 9kHz channel that's another 27 channels!); Medium Wave 650kHz - 1.5MHz - jammed solid.

Not so the wide open spaces from 1.5 to 6MHz. Yes, I do know that there are some stations and amateur bands out there, but you will find most of that great chunk of ether is empty - if you've actually got a set that can tune it!

For a start, why not allocate 1.5 to 3MHz for a.m. local and community radio of less than 1kW e.r.p.? That would ease the medium wave logjam and better still revise the use of portable radios with internal ferrite rod antennas rather than the lethal f.m. kebbabers that nobody except the Beeb loves.

Round numbers suggest there could be another 160 channels between 1.5 and 3MHz, say 100 more if we leave space for h.f. amateurs and maritime users.

The same goes for the spectrum from 3 to 6MHz. Not much there either until you crash into the 49 metre band ant-heap. Say another 200 spare channels if power is limited to 20kW.

The next bit, from 6 to 30MHz is well used and because you can get a long way on little power if conditions are right - so best left alone!

Above 30MHz it's back to wide open spaces, so how about some of the new a.m. stereo rigs to compete with Band 1 TV signals and existing East European users like that well known hot music station Gdansk?

There's no reason why some of the spectrum from 30MHz to the existing 88 - 108MHz f.m. band shouldn't be allocated for broadcasting with parts re-zoned to protect Emergency Services and Air Traffic Control from adjacent channel splatter. There are enough spare channels to give licensed amateurs more channels as well.

Above 108MHz, there's certainly some tidying up needed. Here in the West Midlands, we have numerous licensed packet and business comms stations interfering with emergency services and aircraft. Why not ghetto the pulse code and RTTY traffic into an exclusive sector to clear a space for satellite weather signal downlinks, radio astronomy and other less pushy radio services?

Reorganising the radio spectrum is not going to happen overnight because there are international broadcast conventions involved and getting them changed will make the Maastricht negotiations look easy.

The important thing is that technology can now free radio from its ancient bands, but nothing will happen until radiophiles realise that pollution of some parts of the ether by congestion is every bit as antisocial as light pollution or acid rain. ■

ICS SYNOP III DATA PLOTTING SOFTWARE

Have you ever wanted to generate your own custom weather charts? If so this latest version of the powerful ICS SYNOP, reviewed here by Mike Richards, could be just what you're looking for.

Whilst most utility software is used to decode a variety of transmission systems into a string of received text, this program for the IBM PC or compatible takes decoding to another level.

Those who have ventured into RTTY reception on the h.f. bands will no doubt have encountered the coded weather transmissions that comprise a seemingly endless stream of five digit number groups. One of the most popular European transmissions being Bracknell Met on 4.489MHz. These transmissions have been developed over a long period of time to provide a remarkably efficient way of communicating high volumes of weather data.

The information transmitted comprises detailed weather reports from a wide variety of weather stations that range from aircraft through ships at sea and dedicated land-based weather stations. In simple terms, SYNOP III takes this coded information and turns it into a more usable format. This could either be a list of reports or even a detailed weather map rather like those used by the TV weather people. Having whetted your appetite, let's take a closer look at how ICS SYNOP III performs.

New Features

For those of you that already have an earlier version of SYNOP there are a number of interesting changes built-in to version III. Perhaps one of the most powerful is the ability to create customised maps. With this facility you can enter the latitude and longitude for the bottom left-hand corner of the screen and then adjust its height in whole degrees of latitude. Once the map has been defined you can name and save it for use with any of the data capture and display functions. There are an infinite range of uses for these maps.

Just to complete the picture, this new version includes the facility to plot isolines for both pressure and temperature. The computations for this are quite complex and took a few seconds to complete even on my 33MHz, 486 computer. The instructions warn that the calculations can take a few minutes with some computers. The addition of isolines was a very powerful enhancement that made the received information much easier to understand. You should find a copy of a sample chart with isobars illustrating this review.

Installation

Before getting too excited about using SYNOP III, you need to be sure that your computer has the hardware necessary to support the program's sophisticated features. The requirements are comparatively modest by today's standards needing just a PC/XT or 80286 processor or higher. The display adapter needs to be EGA or VGA and able to support 640 x 480 pixels in 16 colours. SYNOP supports a number of standard printers including Epson 9- and 24-pin plus Hewlett Packard LaserJet, DeskJet and PaintJet systems.

Despite this good cover, I was surprised to find that an IBM Proprinter driver was not included as this ranks with Epson as one of the most popular emulations. However, the omission was not serious, as you could export all the screen images in the popular PCX format for printing via other graphics packages.

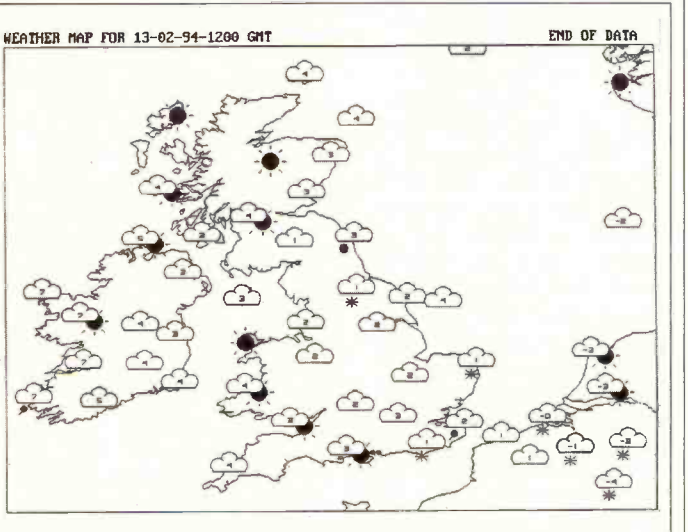
Connection to your h.f. receiver is done using a special DSD-3 demodulator that plugs into a spare serial port on your computer. This can be either COM1 or COM2 so you can still use other serial devices.

In addition to providing some demodulation electronics, the decoder also contained a hardware copy protection device. This prevented the software running properly if the demodulator was not in place. One rather odd point about this set-up was the inclusion of a LOCK l.e.d. and SHIFT slider switch on the demodulator. Whilst this was very neatly done, it's not very practical when you consider that most computer serial ports are tucked away at the back of the cabinet! In my case the problem was easily overcome as I use a four way switch box connected to my spare serial port plus a short length of ribbon cable to act as a gender changer. Using this system I was able to make the decoder easily accessible by resting it on top of the switch box.

The SYNOP software was supplied on a 3.5in disk with a simple batch file to handle installation to the target disk drive. Once installed, the program occupied 1.12Mb of disk space.

Good Manual

As synoptic weather reports are something of a black art to many utility listeners, a good manual is essential if the newcomer is to get the best from the software. The



Typical pictorial plot from SYNOP III showing the 'cloud' pictures.

manual supplied with the review version was very well packaged in a hard-back A5 ring file that also had provision for storing the master disk. The manual was very well structured and divided into some 23 sections. In addition to covering all the key operational features of the program there was a selection of reference material designed to help the operator interpret the received weather maps.

My only real criticism of the manual concerned the fly sheets that had been added to bring the program up to the latest version. Whilst the package was advertised as SYNOP III, there seemed to be an identity problem as the first sheet was titled - What's New in SYNOP v5.1! The confusion was continued in the first section where the header indicated version 3 while the text detailed the new features of version 2. None of this constituted a serious problem, it was just a little irritating.

The details of the manual was supported by a very handy on-line help facility that could be accessed simply by pressing F1. This provided well thought out guidance on the currently selected operation. You could also get help on other areas of the program by accessing the help index. Once I had mastered the basic program operation, I found the on-line help was all I needed to cope with the vast majority of my requirements.

Operation

If you've never encountered Synoptic weather reports you're probably wondering just how all this fits together with your h.f. receiver!

Once you've installed the software and connected the interface to the audio output of your receiver you're ready to go. The first thing you need to do is gather some weather reports from a SYNOP station. Probably the best way to do this is to tune into Bracknell Met on 4.489MHz using u.s.b. To receive this station you need to set the bandwidth slider on the DSD-3 interface to WIDE. To get accurate results you also need to ensure the signal is properly tuned in.

With the SYNOP III package the correct tuning point is indicated by the LOCK l.e.d. on the interface or the illumination of a square block in the bottom right hand corner of the screen. In practice this proved to be a fairly crude tuning indicator and I found the best technique was to swing the receiver right through the band where the indicator lit and then back track to find the mid-point.

With the tuning point set you can move to the RTTY option using the neat drop down menu system. From this menu you can view the decoded RTTY live and set the appropriate baud rate. You can also disable the RTTY decoder to allow an existing RTTY decoder to feed SYNOP III. A typical example of this is if you already have a PK-232 or similar decoder, you can connect the ASCII output direct to the computer's COM 1 or COM 2 port and use the information to feed the SYNOP III program.

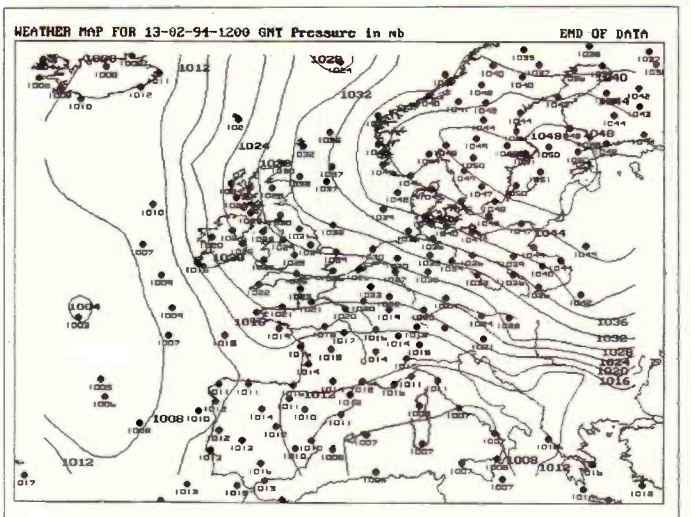
Automatic Reception

A particularly powerful facility is the AUTODUMP option. This provides automatic saving of received data in three hourly segments. This is important because it is common practice for weather readings to be taken at 0000, 0300, 0600, 0900, etc. The autodump ensures that all data from these groups is automatically saved to disk three minutes before the three hour point. This means you can leave your receiver tuned to a Synoptic station for long periods of time without having to manually save the buffer every three hours. You can also review and print the RTTY buffer to examine the raw data in more detail.

With the receive function set-up and capturing data you can choose to plot the data as it arrives. To do this you first have to select the map you want to use. SYNOP III comes with a good selection of maps covering the North Atlantic and Europe. You can also choose to present the data in list form, which can be by country, station or aircraft. Next you have the option of choosing the features that you want displayed on the selected map. This determines which of the components of the SYNOP weather reports are displayed on the map. The range of available features is extremely good, covering from a straightforward pictorial map with cloud pictures, through to a plot of all data.

For those new to weather monitoring, the pictorial option gives a very easy to use display. I've included a sample to give you a better idea. However, my image does not do SYNOP III justice as the on-screen display makes very good use of colour to show the differing weather conditions.

If you want to review previously captured data you just have to change the data source from Live to File. Personally, I found the live display quite fascinating as new reports popped-up onto the display.



SYNOP III plot with isobars and spot pressures.

Display Options

Once your display of data is complete you have a number of options available to preserve the image. The simplest of these is to just hit the Print Screen key, which will give you a printout on your printer.

Alternatively, by pressing Control-X, the image is saved in the popular PCX graphic file format. The great advantage of this is that files in this format can be edited and printed using a wide range of commercial graphics programs. You can also take advantage of SYNOP III's slide show system to automatically display a number of previously stored PCX files. This is a very effective way to illustrate changes in weather systems. ■

Summary

Of all the weather related decoding systems around SYNOP III stands out as being the most powerful in terms of clarity of display. The wide choice in display formats means that it has strong appeal to both newcomers and the more experienced listener. SYNOP III currently costs £149.95 and is available from **ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD. Tel: (0903) 731101**. My thanks to ICS for the loan of the review model.

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

Propagation

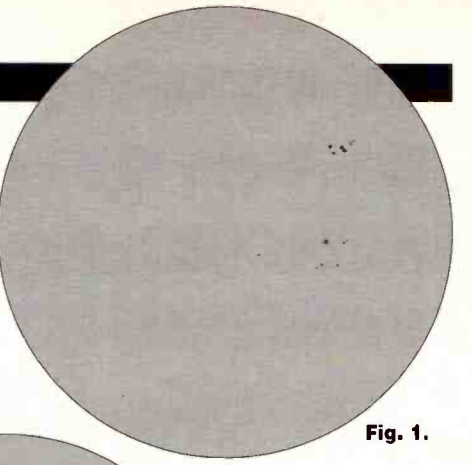


Fig. 1.

"This has been a most 'tiresome' period, activity has been very sparse," wrote **Ern Warwick** (Plymouth) at the end of January. Ern summed up the general feeling among the 28MHz beacon watchers.

At opposite ends of the UK, **Ian McDermid** (Comrie) and **Cmdr Henry Hatfield** (Sevenoaks) found only the occasional beacon signal, but this is not unusual during the low part of the sunspot cycle. "The m.u.f. (maximum usable frequency) rarely above 23MHz up here", remarked Ian on his log covering the period shown in **Fig. 3**. Nevertheless, the consistent monitoring of the 28MHz beacon signals is important because it tells us, at what time and in which direction a path was open through the upper regions of the ionosphere. Such information can then be compared with any auroral, magnetic and solar activity that occurred around the same time.

Good Reading

Most of the post-war, co-ordinated observational work, by members of the amateur radio fraternity, dates back to the International Geophysical Year (IGY - 1 July 1957 to 31 December 1958). Although much more can be said about this work, there are two books that you may find of great help to better understand the value of regular observations on related subjects. One, published by Hodder and Stoughton in the 1960s, is *Assault on the Unknown* by Walter Sullivan and the other, published by the RSGB in 1991, is *Radio Auroras* by Charlie Newton, ISBN 1-872309-03-8.

Solar

During December, **Ron Livesey** (Edinburgh), using a 2.5in refractor telescope and a 4.0in projection screen, located one active area on the sun's disc on most days, two on the 2nd and 4th and three on the 30th. From his observatory in Selsey, **Patrick Moore** kindly sent drawings of the groups of sunspots that he projected at 1150 on January 1, **Fig. 1** and at 1130 on the 25th, **Fig. 2**.

Auroral

The auroral co-ordinator for the British Astronomical Association, Ron Livesey, received reports of auroral 'glow' for the overnight period on December 9/10, 17/18 & 29/30, 'arc' on 7/8, 'rayed arc or band' on 7/8, 'active' on 2/3, 7/8 & 21/22 and 'corona' on 7/8 from observers in North America, Canada and Scotland.

In Portland, **Ford White** heard the German beacon DK0WCY on 10.144MHz transmitting a weak auroral warning at 1000 on January 23 and Ern Warwick tells me that this beacon sends solar data once every five minutes.

Magnetic

The various types of magnetometer used by **John Fletcher** (Tuffley), **Andy Hollis** (Winsford), **Tony Hopwood** (Upton-on-Severn), **Karl Lewis** (Saltash), Ron Livesey, **David Pettitt** (Carlisle) and **Tom Rackham** (Goostrey) between them, recorded strong disturbances to the earth's magnetic field on December 1-3, 7, 8, 16, 19, 21, 23, 24 & 31.

Propagation Beacons

First, my thanks are due to **Gordon Foote** (Bristol), Cmdr Henry Hatfield, Ian McDermid, **Ted Owen** (Maldon), Ern Warwick and Ford White, for their 28MHz beacon reports from which I compiled the chart in **Fig. 3**. Ern, Ford and Ted added the South

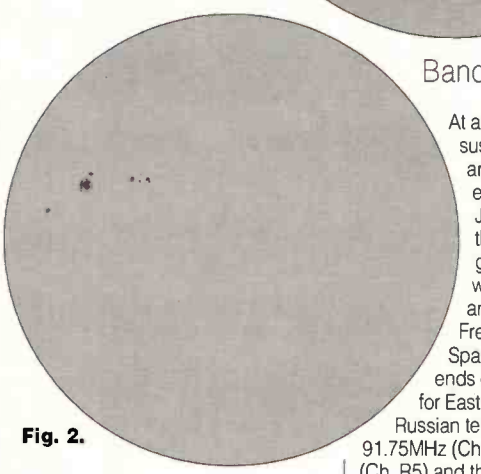


Fig. 2.

African beacon ZS1J to our list this time and Ford logged AB8Z and WJ9Z on the days indicated in **Fig. 3**.

Gordon has the opinion that the Cyprus beacon, 5B4CY continues to keep things 'afloat' and adds that OH9TEN was very loud and clear on [January] 24th and 25th. Both Ern and Ford reported very strong signals from EA3JA at 1735 on the 12th and Ford found the same for OH9TEN at 1205 on the 23rd. This sounds like a touch of winter Sporadic-E. At present, Gordon is using an active Diamond antenna on the apex of his roof and plans to erect a long-wire in due course.

Band II

At anytime when you suspect that conditions are right for Sporadic-E, especially in June and July, then carefully tune through Band II, on a good domestic portable with its own rod antenna and listen for a number of French, Italian and/or Spanish stations at both ends of the band. Also check for Eastern European or Russian television sound on 91.75MHz (Ch. R4) and 99.75MHz (Ch. R5) and the 'buzz' of the 'R5' vision pulses on 93.25MHz.

It's amazing how strong these signals can be and their reception means that an extensive Sporadic-E is in progress. Then is the time to check the strength of the signals from the 28MHz propagation beacons in Germany (DF0AAB, DF0THD, DK0TEN, DL0IGI), Italy (IY4M) and Spain (EA3JA).

Tropospheric

The variations in atmospheric pressure for the period December 26 to January 25 are shown in my 'Television' column elsewhere in this issue.

Fig. 3. 28MHz beacon chart.

	December						January																						
Beacon	**26**	**27**	**28**	**29**	**30**	**31**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
AB8Z																															x
DF0AAB		x			x	x																									
DL0IGI	x	x																x		x								x			
EA3JA						x	x	x	x			x				x		x	x	x		x	x								
HG5GEW	x																														
IK1PCB		x	x																									x			
IY4M	x	x	x				x																					x			
KA1NSV				x							x			x																	
KB9DJA									x		x			x				x													x
KD4EC				x							x							x													
KF4MS				x																											
LA5TEN		x																													
NX20				x							x																				
OH2TEN		x				x	x	x		x		x				x		x		x	x		x	x	x						
OH9TEN						x				x					x														x		x
PI7BQC		x																													
SK5TEN		x				x	x	x															x								
SV3AQR	x	x				x	x	x	x	x		x	x	x	x		x	x			x	x	x	x	x	x	x	x			x
S55ZRS																												x				
VK5WI												x			x																
VK6RWA		x		x		x		x				x		x	x																
VK8VF																	x														
WB4WOR									x																						
WC8E				x	x				x		x			x				x													x
WJ9Z				x					x					x																	x
W3VD			x	x					x		x			x																	x
W9UXO																															x
YO2X			x			x																									
ZS1J			x			x								x						x							x				
ZS1LA		x				x			x				x		x			x	x	x	x	x		x			x				x
ZS5VHF																					x										
ZS6PW	x	x	x		x		x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x		x		x	x
5B4CY		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Roger Bunney, 33 Cherville Street, Romsey, Hants SO51 8FB

Satellite TV News

The Latest from the Clarke Belt

It's always good to hear from readers and **John Hockenhull** (Cheshire) has written to expand on photographs in the January '94 column. (THE) Arthur C. Clarke shown in Fig. 4 was a live feed from his home in Sri Lanka to Hastings, UK in celebration of the 60th anniversary of the British Interplanetary Society - apparently Arthur was secretary of the society in 1945 when he published his thoughts on satellite communication. The hook-up was sponsored by BT, Intelsat and Eutelsat and took place on 17 October 1993 from 1230-1330BST.

John details the signal path - the uplink out of Sri Lanka was organised by the SRLC onto Intelsat 604 at 57°W in C Band. Downloading of the feed was at BT Madeley, UK and then up again onto Eutelsat I F5 at 21°E. In Hastings, a 2.4m transportable link dish was in use. The Fig. 3 'Sports 21' appeared on Eutelsat II F1 and is usually seen on France Telecom transponders. John says that this card is usually been followed with Spanish language feeds such as Spain's TV3, Canal Sur, etc.

And to another John - **John Locker** in the Wirral. After the delayed launch of Ariane V63 from Kourou January 20, the flight finally lifted off on January 24. John monitored Eutelsat I F5 21°E that carried the whole event with an English sound track, most others watch an Eastbound feed from Intelsat K 21°W that only had a Turkish language commentary. On board the rocket were two important satellites carrying considerable Ku band transponder loading, Eutelsat II F5 destined for 36°E to expand the Eutelsat Network into Central Russia, and the Turkish Turksat 1.

The whole launch was to be a PR fanfare for Ariene but as the rocket lifted off and into flight John noticed a change in the faces of the controllers. Though the upbeat commentary continued, at about nine minutes into the mission the launch track on monitor screens showed a dip and at 210km height Kourou lost acquisition of the launcher. Though problems were obvious the commentary still maintained 'everything is progressing normally' - eventually, of course, Charles Bigot, chairman of Arianspace spoke to the press and announced the loss of the rocket and load. For Turksat 1 the delay in an orbiting bird is temporary since Turksat 2 is on-stream to launch later this year, Eutelsat however has a major problem since the loss will set back their expansion programme considerably. Their series II F6 will, of course, launch on schedule (subject to Arianspace delays following the rocket malfunction).

The mystery of the Ku Telecom band TV (signals seen from Canada/USA) that have been received from about 50°W have now been solved. Various theories suggested a rogue and drifting Telecom 1A satellite, another Intelsat at 50°W but research has now proven that Intelsat 513 at 53°W **does** have Telecom band transponders together with Intelsat 515 (18°W) - 514 failed on launch. The two active birds have three Telecom transponders at 12.54, 12.63 and 12.71GHz all vertical. Later series 6 Intelsats do not carry Telecom band transponders.

UK company Starbird was very active on Eut. II F3 at 16°E with their UKI84 unit. With Serbia having their own bizarre Winter Olympics - having been banned from the official Norwegian version - an odd 'coals to Newcastle' circuit was witnessed night of February 16 with a 'CBS Sarajevo to London + Norway' news item. The item featured the former Olympic stadium in Sarajevo but now filled with UN military armour! This was another Telecom feed at 12.53GHz vertical via Eut. II F3 at 16°E. The Telecom band on this satellite is well worth checking out as it's been much more active in recent weeks.

Far from our winter snow (4in here in South Hampshire) to our Thailand reader **Alan Smith**. A SWM Ku band LNB has been fitted onto his dual band C/Ku feed though the main problem is locating any Ku signal in his area, TV signals generally are C Band in the Far East. Weak signals have though been sighted though to originate from the new Thaicom 1 bird at 78°E. Signals seen at about 125-127°E recently look as though Alan's seen the first C Band manifestations from the APStar 1 satellite. Lillehammer too has been sighted with Intelsat 66°E 'lit up like a Christmas tree with two feeds from NHK in Norway and one from Paris, all feeds in C Band'!

Still in the warm and **Bindu Padaki**, Bangalore, India reports that Doordarshan has again re-organised her satellite-born TV services, from the five original channels now down to three main services. On Insat 2B 93°E we have the national terrestrial channel - DD1; Metro Entertainment channel - DD2; a music, documentaries and information channel - DD3. Regional languages in some 10 dialects are carried on 4170, 3905 and 3825MHz. (NB Alan's SWM Ku Band LNB is not a *Short Wave Magazine* offering, it's one made by Swedish Microwave!)

As ever a very busy period and the above is just a snapshot of life in the Clarke Belt!

Orbital News

RTL-TV is changing to Smartcrypt encryption (Schlumberger) - another cut and rotate system but requiring two cards, one with the access code and the other with the algorithm coding. Cost is estimated at £100 with a three-year 'free' access to RTL-TV programmes.

Red Hot Television, the well known, though intermittently seen, English language porn channel has dropped plans for a 'Gay' segment, though at the time of writing the station is off the air once more. Rumours suggest that it may return end February this time beamed up from Zagreb.

Finally the 'Class' cattle auctions are still being carried on satellite from around the UK markets. The livestock auctions have been recently carried on Eutelsat II F3 at 16°E using PAL and unscrambled. The auctions seem to be aired at no fixed time, having been monitored both mornings and afternoons. Check out 10.986GHz horizontal with audio carried 7.02MHz.

Fig. 1: Many sports feeds were carried mid-February from the Winter Olympics, this via Telecom in SECAM. (Keith Marriott, Notts)

Fig. 2: Intelsat K 21°W carried a live Michael Jackson statement over his recent problems. (John Locker, Liverpool)

Fig. 3: And a Happy New Year to you too!

Fig. 4: Another news feed from Nato HQ concerning the Yugoslav problems.

Fig. 5: CNN often feeds back to Atlanta news material both live and edited packages, check out Intelsat K.

Fig. 6: John Locker shot this pile of $100 bills, this being part of the loot from a Russian hijack attempt that failed. Seen via Gorizont at 14°W out of Moscow.

Peter Shore, c/o SWM Editorial Offices, Broadstone

Bandscan

Europe

I will start this month's Bandscan here in Britain where, since the beginning of February, the BBC has been using the popular Astra satellite to carry all five domestic national radio channels, Radios 1, 2, 3, 4 and the revamped Radio 5 Live (what a ridiculous name for a radio station - as one columnist wrote, it could hardly be Radio 5 Dead).

The classical music station Radio 3 has gone on to transponder 34, UK Living TV, in stereo on the audio sub-carriers at 7.74 and 7.92MHz, and Radio 1 has moved to this transponder where it is also in stereo on the audio sub-carriers at 7.38 and 7.56MHz. Radio 2 is available on satellite for the first time, but in mono, on transponder 23, UK Gold TV, with the audio at 7.74MHz. Radio 4 is also on UK Gold at 7.56MHz and Radio 5 Live is at 7.92MHz. BBC World Service continues on UK Gold at 7.38MHz.

Whether the availability of Radio 1 on satellite will stem the flow of listeners away from the station following the shake up of schedules in the autumn is debatable. Maybe people on the Spanish Costas will be included in the audience figures in future.

With the release of the f.m. band between 104 and 108MHz to broadcasting in 1996, the UK's Radio Authority is now advertising for applicants to run three national commercial stations. It is likely that Richard Branson will want to try and secure one of the channels to move Virgin 1215 AM to the higher quality f.m. band and increase the station's audience share. Satellite owners can find the Virgin radio station on the Sky News TV channel on Astra and the audio sub-carriers at 7.38 and 7.56MHz.

Digital Audio Broadcasting - or DAB - is likely to go in to service in a number of European countries next summer including Britain, France, the Netherlands and parts of Scandinavia. Already receiver manufacturers are being wooed by broadcasters to ensure that sets are available, at least for cars initially, when services go live. I'll bring you news of developments in this exciting area as they occur.

The BBC World Service is currently going through a period of reorganisation on so-called regional lines. It seems that the BBC has divided the world into six separate regions, and will be tailoring programmes and schedules specifically for those areas. Will this mean the end of a global World Service broadcasting in English when you knew that wherever you happened to be on the planet, Dave Lee Travis would pop out from your radio set with *A Jolly Good Show* each Saturday at 0815UTC?

The European Scene

Over The Channel in France, Radio France International is working on plans to develop a separate French service for Europe, during the peak evening listening hours. This will be on the air for up to five hours every day, in addition to the 24 hour-a-day French channel beamed world-wide.

Radio Netherlands is another station affected, or about to be affected, by a major reorganisation. It has been rumoured - although I have to say that I have been unable to get reliable confirmation - that even the English service has been under threat. A report on the station's future has been prepared and new senior management are working out the best way to take the broadcaster through into the next century. There is likely to be more emphasis on both Europe and the parts of developing world that have the largest audiences at present. Full details will be known during the Spring, details that you will find covered extensively in the pages of *Short Wave Magazine*. In the meantime, tune in to the Hilversum based station in English at 1130UTC each day on the relatively reliable 49m band channel of 5.955MHz.

Radio Vlaanderen International in Brussels is now on Astra. You can tune in to the FilmNet TV on Astra 1C at 10.92075GHz and the audio sub-carrier at 7.38MHz.

Unheard since late last summer has been Estonian Radio. In early February, though, the station appeared back on its old channel of 5.925MHz, with English at 2000UTC for half an hour, followed by Finnish and Swedish. There is also a half hour broadcast at 1600 UTC in Finnish, German and English.

Fellow Baltic state Lithuania seems to have settled, for the time being at least, on a schedule that includes English to Europe at 2000 on 9.71MHz, as well as 9.40MHz in lower side band, and 2230 on 9.71MHz. On Sunday and Monday, listeners in North America can tune to 7.15MHz at 0000 for a half-hour programme but Tuesday to Saturday there is just a five minute English news bulletin at this time, followed by 25 minutes of Lithuanian. The 7MHz transmission is beamed from a site in Russia.

A Radio Netherlands outside broadcast van on location; but will it be needed in the future?

New Services

A new broadcaster in central Europe started transmissions over the Italian Radio Relay Service, IRRS, based in Milan. Short Wave Radio Switzerland will have two hour-long programmes each month at 1300UTC on the second and fourth Saturday on the regular IRRS frequency of 7.125MHz. The Swiss station is a project of a group of enthusiastic DXers who got together last year to found a non-profit making association. The programmes appear to be of the type more usually heard on the 48m 'pirate' band on Sunday mornings, with the Voice of Basel one of the identifications being used.

It seems that by hiring time on IRRS, the Swiss DXers are circumventing the usual restrictions placed on small groups who want access to the airwaves. The owners of IRRS, Milan based Nexus- IBA, say they, "do not endorse the principle or right of free-radio producers to air via unregulated, unlicensed media, but intends to offer IRRS as a legal media and an excellent arena to be heard and judged for the value of their productions". In other words, I suppose, they don't really care. I wonder what other organisations whose programmes are aired on IRRS, including the United Nations, feel?

Radio Free Europe has started broadcasting a Balkan service in Serbo-Croatian to the former Yugoslavia. This is in addition to the service provided to the region by the Voice of America. The new programme stream began at the end of January, and eight staff, all veteran journalists from Serbia, Croatia and Bosnia, are putting together two hours of broadcasts every day. Tune in at 1800 and 2200 on 5.985, 7.115, 7.145, 9.695, 11.815 and 15.37MHz. RFE's new Balkan service is budgeted to cost US$1.2 million each year, out of a current total budget for both RFE and Radio Liberty of US$208 million. That will fall to an estimated $75 million by October next year.

At the beginning of the year, a new station was formed in Germany - DeutschlandRadio. It was formed from three existing stations: DS-Kultur, a former East German station, RIAS Berlin (Radio in the American Sector) and part of Deutschlandfunk's operations. DLF now calls itself the news station of DeutschlandRadio. You can tune to the new station on the short wave frequency of 6.005MHz or on long wave on 177kHz.

Vatican Radio is moving to new delivery methods, concentrating resources on satellite delivery while closing down medium wave outlets. The transmitters in the Vatican City on 527 and 1611kHz have been dismantled, although it is thought that 1611kHz will be used in the future when a new transmitter and antenna are installed at the Santa Maria di Galeria transmitting site. The transmitter will beam towards the Balkans and the Middle East.

That is all I have room for this quarter. Do drop me a line if you learn anything interesting about the European broadcast scene, or want me to investigate something. All letters gratefully received at the *SWM* Editorial Offices in Broadstone. Until the July edition, good listening!

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

DXTV Round-up

By the time you read this, we should be seeing the first signs of the 1994 Sporadic-E season, a period when Band I (45 to 68MHz) is an attractive area for both the new and experienced DXer.

Briefly, a Sporadic-E opening, caused by sudden changes in the 'E' region of the ionosphere, may last a few minutes or several hours. Such an event can deflect radio and television signals, between about 20 and 200MHz, over 1600km. This means that under extreme conditions, extraordinary DXing is possible in the 28, 50, 70 and 144MHz amateur bands, the broadcast bands between 68 and 106MHz and most television channels in Bands I and III.

The most vulnerable frequencies to be affected, by even a mild disturbance, are around 50MHz where signals from Russia to Scandinavia are 'bounced' into most parts of the UK. For example, 625-line television transmitters in Czechoslovakia, Hungary and Russia use Chs. R1 and R2, **Fig. 1,** and such countries as Norway, Portugal and Spain are among those using Chs. E2, E3 and E4. This alone shows that Band I can be a TVDXer's heaven, especially during the peak months of June and July when 12 and 18 hour openings are possible. The upper and lower frequencies shown in **Fig. 1** are for the vision and sound channels respectively. Signals at the beginning and shortly before the end of an opening are often subject to deep and sharp fading and this means from just above the receiver noise to ear-blasting.

If a disturbance creates a northerly path, with a modest dipole antenna you can expect to receive pictures from a variety of Norwegian regionals, identified on their test-cards, on all the 'E' channels and possibly Iceland on 'E4'. If a change of path-direction occurs, pictures on the 'R' channels are seen. The fun comes when the signals mix together and you may only catch a glimpse of a station's identity. That's when it helps to have a copy of the latest edition of *World Radio TV Handbook* by Billboard and Edition 3 of *Guide To World-Wide Television Test Cards* by Keith Hamer and Garry Smith, near to hand. Both titles are available from the *Short Wave Magazine* Book Service.

Identity

Experienced DXers like **Bob Brooks** (Great Sutton), **George Garden** (Edinburgh) and **Simon Hamer** (New Radnor) usually watch for 'local' adverts, logos above, or to one side of, news and weather captions and test-cards that usually carry some form of identity at the top such as ARD (Germany), BRT (Belgium), DR (Denmark) Canal+ (France), JRT (Yugoslavia), NED-1 (Holland), RAI (Italy), RTP (Portugal), RUV (Iceland), TVE (Spain), TVP (Poland), TVR (Romania) and YLE Finland.

Vision Pulses

Obviously, it's not practical to watch a screen full of receiver noise for long periods. However, there is another way that permits you to do other things while waiting for a Sporadic-E to develop. If you have a scanner, or a communications receiver, that covers the 50MHz region then set it to 48.25MHz and/or 49.75MHz and leave it running with the 'hiss' of the receiver noise just audible. At the first hint of a disturbance, random bursts of television synchronising pulses (a fluctuating 'buzzing') should be heard. When these get stronger and more prolonged, switch on the TV and see what's about.

During the 1978 'season', my sync-pulse monitor (a Hallicrafters 'S36'), had been emitting background noise, on Ch. R1, for most of the day, then suddenly, just before 1900BST, the room was filled with a deafening 'buzz' of sync. On went the TV and there was a clock, **Fig. 2**, on the screen with CCCP behind the upper centre of the hands. It was showing 2059, three hours ahead of GMT. This was followed at 2100 with their news-caption, **Fig. 3**, from the (then) USSR (now CIS). The event lasted for about 30 minutes, during which time I watched the bulk of their news. The pictures were rock solid because it was the only path open and no other stations using Ch. R1 appeared. Don't forget to set your scanner, or communications receiver, to one of the sound channels. For instance, it's possible to watch a programme on say Ch. E2 (48.25MHz) and hear the sound on another set tuned to 53.75MHz.

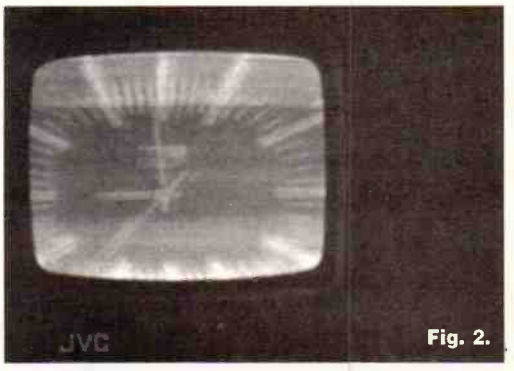


Fig. 2.

Fig. 3.

Satellite TV

In January, **John Scott** (Glasgow) received test-cards from Germany and Poland **Fig. 4** and a weather report from the Middle East Broadcasting Centre (MBC), **Fig. 5**, via satellite. In Holland, **Peter de Jong** (Leiden) produced photographs from his archives of a German test-card, **Fig. 6** and a programme caption from Turkey, **Fig. 7**, that he received, via Eutelsat II, F1 and F4 respectively, around the 21 December 1992. Peter tells me that 'Yerli Dizi' on **Fig. 7** means 'Local Series'.

Weather

"Very wet and stormy winter," wrote Simon Hamer early in February. How right you are Simon, in addition to the heavy rain falls toward the end of 1993, I recorded a further 6.33in of rain in January with more than 0.5in falling on days 2, 4-6, 10, 12 & 15 with lesser amounts on the 3rd, 9th, 11th, 13th, 19th, 23rd, 24th & 26-29th. However, this lot is only 0.73in up on the same period in 1993. Early morning frosts were seen on days 1, 8 & 18, light snow fell on the 6th & 17th and my relative humidity dial was over 80% on days 10, 12 & 22-24.

The variations in atmospheric

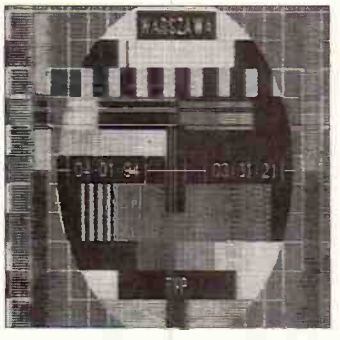


Fig. 4.

Fig. 1.

48.25	49.75	49.75	53.75	55.25	59.25	62.25	62.25
Ch.E2	Ch. E2a	Ch. R1	Ch. 1a	Ch. E3	Ch. R2	Ch. E4	Ch.I b
Belgium Germany Norway Portugal Spain Sweden Switzerland	Austria	Czech Hungary Poland Russia	Italy	Belgium Denmark Finland Germany Greece Iceland Norway Portugal Spain Sweden Switzerland	Czech Hungary Poland Romania Russia	Austria Denmark Finland Germany Iceland Nederland Norway Spain Sweden Switzerland Yugoslavia	Italy
53.75	55.25	56.25	59.25	60.75	65.75	67.75	67.75

Fig. 5.

DXTV continued

pressure from December 26 to January 25, shown in **Fig. 13**, were taken at noon and midnight from my own barograph.

Tropospheric

"What an obstinate start to the New Year," remarked Simon Hamer with his January log. The only stations that he found 'viewable' were Germany's MDR-1 on Ch. E6 in the v.h.f. Band III and a few in the u.h.f. band from Belgium, Denmark (TV2), Eire (RTE), France, Germany (ZDF) and Holland. Simon pointed out in his letter that DXTV is a hobby and requires patience.

SSTV

Referring to the slow-scan television spot 14.230MHz, **John Scott** (Glasgow) told me that, "the European stations come on mostly at regular times and again give many hours of enjoyable receiving". In January, John received captions from England, Finland **Fig. 8**, Germany **Fig. 9**, Spain, Sweden, Fig.10 - showing the operator with his gear - and one similar from a station in Switzerland.

"The advances in the computer related equipment is moving at a fast rate, regarding even the SSTV side of things, now I have found that colour pictures can be viewed using the computer and an audio interface," said John. He recently changed his computer base-unit to an Intertan DT-286. He has a new Trident 1Mb RAM, 256 colours, graphics card via which he now displays full colour, high resolution, slow-scan pictures.

Fig. 8.

Fig. 9.

Fig. 10.

Fig. 7.

Photo CD

Last month I raised the subject of keeping DXTV photographs on a compact disc. These, like any other 35mm negative that is processed this way, can be reproduced, via a Kodak Photo CD player, on your TV screen or via a compatible CD-ROM drive fitted to your computer. The Panasonic 562 unit fitted in the 'spare' 5.25in drive bay on my Packard Bell can be seen in **Fig. 11**. The CD tray is motorised and opens by a touch of the 'eject' button, seen on the right of the unit in **Fig. 11**. After the disc is laid in the tray another touch on the front of the tray and the motor takes it back in.

I agree with John, computer related equipment is moving at a very fast rate, you only have to look at any of the multitude of computer magazines to see that this is true. Most have a free 3.5in disc of software attached to the cover and, at present, *PC Home*, has a CD-ROM issue. No doubt, others will follow. One of their CDs is shown on my open drive-tray in **Fig. 12**.

Kodak Leaflets

I obtained two Kodak leaflets, both called *Your Photos On TV*. One, A4 size, describes their three players, PCD 265, 865 and 5865 and the other, much smaller, explains the procedure, in simple terms, to transfer your negatives to Photo CD. "The resolution available with Kodak Photo CD technology far exceeds the capabilities of current TVs, so the picture will only get better as televisions continue to improve," says Kodak.

I saw one of their PCDs working through a TV and the pictures and the cropping, turning and zooming facilities on the player were very impressive. Obviously there is much more on this subject so, before you purchase either the computer or direct-to-TV system, talk to a good computer and/or Kodak dealer and do let me know how you get on.

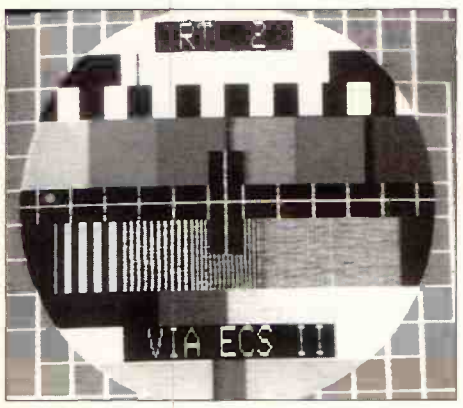


Fig. 6.

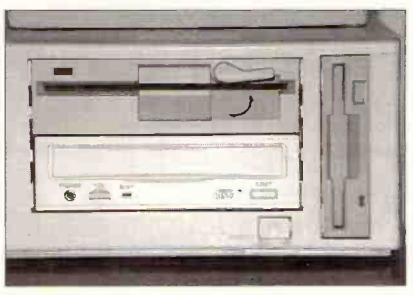


Fig. 11.

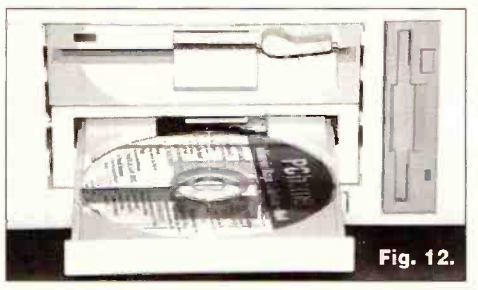
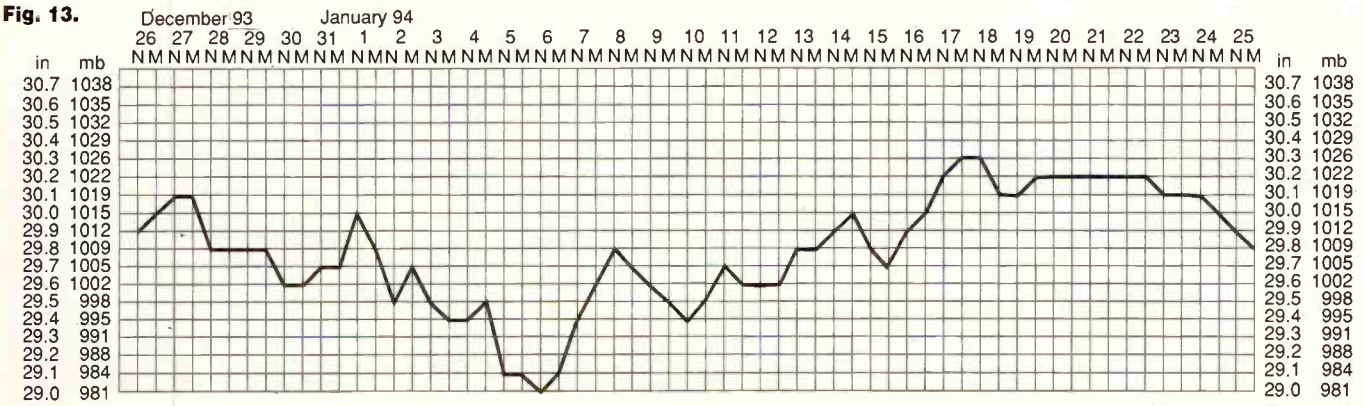


Fig. 12.

Fig. 13.



Graham Tanner, 42 David Close, Harlington, Middlesex UB3 5EA

SSB Utility Listening

HF Sideband

Following my appeal for more letters and logs, I am pleased to say that I have been snowed under with correspondence. Thank you to everyone who wrote. Your questions will be answered over the next few issues. I hope that I can count on your letters in the coming months. Your logs have also allowed me to continue with the Traffic Log.

ATC

The Air Training Corps (ATC) is a national voluntary organisation aimed at encouraging a practical interest in aviation, adventure and sport. The UK is divided into Regions, each of which is responsible for a number of Wings. Each Wing covers a number of Counties, and are responsible for the ATC Squadrons and ATC Flights within those counties. There are nearly 1000 ATC Squadrons, and about 100 Flights. ATC cadets can take part in a vast selection of activities, including radio. Many ATC units have converted p.m.r. equipment used for v.h.f., but a number have the ability to use h.f. s.s.b. equipment. The radios are use to train cadets in radio-procedure, and they are also used for communication with other ATC units. The best time to hear these stations is during weekday evenings after 7pm or at weekends.

A number of frequencies have been identified, as a result of patient monitoring. Each frequency is assigned a channel number, which comprises a letter/ number combination.

A1	4.610MHz	B1	4.925MHz
A2	5.770MHz	B3	3.236MHz
A4	7.740MHz	B4	7.740MHz
A5	7.450MHz	B6	3.715MHz
A6	3.678MHz	B7	3.615MHz
A7	3.615MHz		
		C1	5.245MHz
		C2	5.770MHz
		C4	5.795MHz
		C6	3.752MHz

Callsigns used by the ATC are all five characters long and start with 'M', and consist of three letters followed by two numbers. As an example, the callsign 'MRV92' was used at the 1992 Royal Tournament in London, but other callsigns have been heard in the 'MSL..' and 'MVX..' ranges. Finding out exactly which ATC unit uses which callsign is almost impossible, I do not know of any publicly available listing of callsigns - but maybe somebody can help?

There is a similar organisation based upon the Royal Navy, known as the Sea Cadet Corps (SCC). I have been told that they also make use of h.f. s.s.b., but I have been unable to find any of their frequencies - does anyone know of any?

Your Letters

Phillip Murphy from Eire listens regularly to the African ATC frequencies, including Algiers on 8.894MHz and Brazzaville on 8.903MHz. He says that the controllers and aircraft pass position reports as 'sectors', not geographical co-ordinates; he wants to know if there is any way of finding where each 'sector' is located. Unfortunately, Phillip did not list any of the 'sectors' in his letter, but I believe that the 'sectors' are actually VOR, DME or NDB reporting points, just like those in the UK and the rest of Europe. The only suggestion that I have for finding out exactly where these are located is to try to get hold of some old aircraft navigation charts for the area concerned. These may be available from British Airways; the 'Airband' column mentions the address quite often, so check your back issues.

Roderick McKenzie from Anglia mentions the usual 'mystery' station that many people still manage to mis-identify. This concerns the female voice on 6.745MHz that reads coded messages, and the unconfirmed HM Customs & Excise frequency of 6.746MHz. The two are not connected. The female voice is almost certainly associated with MOSSAD (the Israeli secret service), it has been 'd.f.ed' to Israel, while the slightly higher frequency has been regularly reported (but never confirmed) as the UK C&E. On the subject of the MOSSAD frequency, it operates at 45 minutes past each hour during the day; each transmission lasts for five minutes, and usually consists of the sequence 'C...I...O' or 'V...L...B' continually repeated. The number that follows the letters is thought to signify whether the 'message' is a real message or a dummy message.

Lee Williams asks about a flight that he heard on 11.176MHz. 'Barrel 25' was heard receiving weather details for 'L..I..R..P', and wants to know some more about what he heard. Well Lee, what you heard was a small part of a standard arrival message passed by a USAF aircraft; similar transmissions occur hundreds of times each day, mainly by military aircraft. The first part is where the aircraft talks with its destination airfield, and advises them of their arrival time and cargo or passenger load. The second part is where the aircraft talks with a Meteorological Office ('Metro') to find out the weather at their destination; for this, the Met Office need to know the destination and time; the time is always given as a Zulu time (UTC), and the destination is given as a four-letter code. A full list of these four-letter airfield codes can be found in the Klingenfuss *Air & Meteo Codes Manual*. In the example mentioned above, 'LIRP' is the airport at Pisa in Italy.

Traffic Log *(frequency in MHz, all u.s.b. unless indicated)*

1.906	Marseilles Radio calling ship *Lago IV*.
2.596	Douglas Lifeboat talking to Liverpool Coast guard, with the lifeboat passing their ETA for Douglas Harbour. *Liverpool Coast guard referred to this as a 'new' frequency.*
2.700	Cyprus Radio long-distance maritime service. Transmitting on 2.700MHz and listening on 2.182 & 4.079MHz.
2.702	GT working Coastal Control. GT said they were c/s GBBE -which is HMS *Edinburgh* (D97).
4.645	VOLMET broadcast by TALLINN INFORMATION in English, at 0820Z.
4.713	Possible UN Yugoslavia blockade traffic. American stations 6HM, T0E, 7YL, R3D & 2BE, British stations MS, 4UC, W5H & E3Y, and Spanish/Italian stations Y6A & 8IY. Aircraft mentioned were 1VG, Talon 410 & Talon 711.
4.739	RAF Neatishead ADRU working stations 4IV, 4DF & FOM, passing coded messages.
4.775	RN Culdrose Ops calling Navy 803 *(750 Sqdn Jetstream a/c)*. Culdrose reported that a dead bird was found on the runway after their take-off, and '803 should 'proceed with caution'.
4.775	Fishery Protection vessel GUYY/HMS *Orkney* (P299) requesting a radio-check with RN Culdrose, but got no reply.
5.180	Cape Radio working DoD Cape, Cape Osbourne, King 01/02/03, USS McInerney (FFG-8) and CGC Legare (WMEC-912) preparing for the launch of Space Shuttle mission STS-61 in early December. The launch was delayed for 24 hours due to bad weather. 24 hours later: DoD Cape talking to King 01 about imminent Space Shuttle launch. Cape asked '01 "in the event of a catastrophic breakdown of the vehicle, which direction do you intend to flee towards?", '01 said they would head 180 degrees. *Just to prove that you can hear 'NASA' stuff' on h.f.*
5.538	'Gulf Air' flight ops talking to an unidentified aircraft.
5.610	An Air New Zealand flight working Portishead, with a phone patch to their company ops in Auckland. The aircraft was one hour out of Gatwick, going to Los Angeles, and reported trouble with three engines. *The aircraft, a Boeing 747, returned to Gatwick.*
5.616	Air Force 1 working Shanwick, returning to the USA after visiting Europe. Position 49°N 15°W at 18.57 at FL 280, 48°N 20°W at 19.22 and 46°N 30°W next; Selcal check on AE-MP.
5.680	Stavanger RCC calling Edinburgh RCC to wish them a 'happy new year'.
6.730	Broadway 20 working S1M. A new frequency for 'Grove Control', or have they moved from 6.719?
6.749	German Air Force 6DI requesting weather for EDCG (Eggebek, N. Germany).
8.171	RAFAIR 11M3 calling Portishead for a phone-patch. No reply from Portishead.
8.240	HMS *Sheffield* with several crew phone-patches via BT Portishead. *8.240 is the 'ship' frequency, and is paired with the 'shore' frequency of 8.764MHz.*
8.768	Norddeich Radio with traffic lists in English and German.
8.930	A LAN-Chile Boeing 707 on the ground at Seville with a phone-patch to Santiago, Chile via Stockholm, complaining about the delay in off-loading their cargo.
8.964	SAM 26000 working US State Dept. via Lajes GHFS. *Not a 'Mystic Star' channel, just a discreet frequency used by Lajes.*
11.176	MacDill and Offutt GHFS's making 'all frequency calls' for "Ace 01". "Ace 01" *was the delivery flight of the first of the USAF's new B-2A bomber from California to Missouri.*
11.397	Sydney VOLMET reporting heavy smoke and flames during the bush-fires in early January.
13.089	WOM/Miami Radio from Fort Lauderdale, Florida with weather forecast and navigation warnings for the Caribbean.
13.291	Italian radio ham IK0YGL well out of band! *Probably thought he was on 14.291.*
19.800	(l.s.b.) 'Amiri 3' calling A7A211, reporting departure from Heathrow at 1405Z, estimating Doha, Qatar at 2025Z
23.035	AirForce 1, SAM 28000 and various other SAM aircraft, *en-route* from Moscow to Geneva.

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

Amateur Bands Round-up

Listening to the Amateurs

This time we start by trying to resolve the confusion in some readers' minds as to the relationship between an attenuator and an antenna tuning unit.

Any a.t.u. is essentially in the form of a tuned circuit, to transform whatever odd impedance the station antenna might offer it, into 50Ω pure resistive. In listening terms, to squeeze that bit of wire dry of signals! The tuned circuit aspect has the effect of reducing to some extent the amplitude of off-frequency signals the antenna picks up but which upset our operation. In a practical case a good a.t.u. will make hearable signals that previously were too weak to overcome the receiver's inherent noise

In a perfect receiver we wouldn't need an attenuator. Alas no receiver is immune to the effects of big signals spaced more or less away from the weaker one we want. Both the a.t.u. and the input to the receiver are low-*Q* circuits, simply because they have our 50Ω to damp them. Hence they are very broadband. Now, imagine a very big signal, several kilohertz away from ours, and big enough to drive the first mixer (usually) out of its normal operating conditions. The mixer is now totally non-linear, so every signal on the mixer input beats with every other signal; the result is noise as well as signals. The signal we wish to hear has been swamped by the noise arising.

Now our attenuator (or even r.f. gain control) comes into play. An attenuator is essentially not frequency conscious; a 20dB attenuator between the antenna terminals knocks everything down by 20dB. Hence if we gradually increase the attenuation we will eventually reduce the biggest unwanted signal to the point where it stops causing overload. Suddenly, the overload noise vanishes, and signals can be heard.

It's a compromise; obviously if your man is say 10dB above the noise of the receiver in the absence of overload, and you need 20dB to stop the mixer overload, hard luck, you've lost him anyway! On the other hand, lots of others will have poked up out of the noise, so on balance you win.

In an ideal world, we would have a perfect receiver of zero noise and immune to overload, coupled to a perfect antenna which would only respond to whatever signal you want to hear. With a practical receiver and practical antenna, both a.t.u. and attenuator are needed in order to get the best from the receiver.

It follows that, given only that the receiver is not out of kilter, to put a pre-amplifier between a.t.u and receiver can only reduce the ability of the receiver to resist mixer overload, by exactly the gain of the pre-amp. If the receiver is out of kilter - mend it.

End of sermon!

Letters

Welcome back **Philip Ford**, from Gloucester after an eight-year lay-off. In those distant days Philip used to chase the prefixes, and he has gone back to the sport again. However, he obviously has a copy of the old HPX Rules, as he asks about what to count, say, SV/P/WY3Y. When the rules were drawn up, such a call would have been WY3Y/SV/P, but the fashion has changed and many such calls now have the 'suffix' tacked on the front. The station is still WY3Y operating portable in Greece. The modern way is probably best insofar as you know straight away where the station is located. Philip doesn't say what he has up in the air, but he still sticks to his old FR101 receiver.

A first letter comes in from **F. Lennon** of Hyde, Cheshire, who has a Lowe HF150 coupled either to a G5RV in the loft or about ten metres of wire outside but lower than the G5RV. Behind the receiver there is a Datong filter. On Top Band, one evening, around 2100, he noted ON and OZ, while on 3.5MHz we see KO1P and W2HCR as early as around 2200, UTC of course. plus C3ILU, for Andorra, VO1PG, EA9KQ, 9K2MUP, KO4KS, 5B4OBA, N8ATQ, K1JJ, VO1MZ, and W0LVI in New Hampshire. Up to 7MHz where HV3SJ was logged, and on to 14MHz one morning for ZL3ZZZ, and VK7AZ in Hobart. 18MHz saw KO4AI and W0RQW while 21MHz yielded VP2EY and W5QWP. Finally, a lunchtime spin round 28MHz gave ZC4ML and WP4WJJ for Puerto Rico, plus f.m. from 9H4AC and EA8/DJ3OS, both by slope-detection.

What, you may ask, the blazes is slope detection? Well now, if your i.f. has a suitable characteristic, a narrow-band f.m. signal, such as we amateurs use, can be resolved in the receiver's a.m. mode by careful tuning. The receiver i.f. has turned the f.m. into a.m. Obviously, not all receivers are equally good at this, nor all f.m. signals right for a particular receiver; but the recovered audio is usually good enough on a clear channel. Back in the old days of 405-line Band 1 TV, narrow-band f.m. was a possible way to use 'phone in TV hours; the amount of deviation used would be adjusted when the guy at the other end told you what receiver he had - so much for an HRO, so much for an AR88D and so on.

Logging Program

Matt Spencer of Redhill, it will be recalled, asked about this one, and here comes at least one answer. **Keith Goodchild**, who lives in the Tring area, mentions that he got an 'AM191 SWL LOG' program from Venus Electronics Shareware. Keith says he finds this program easy to work and easy to run.

Next we have **Mark Borthwick** from Hawick in the Scottish Borders. Mark says he now has a Trio R-1000, with which he heard, on 21MHz W1-2-3-4-5-9, YV5ENI, 7X2WAK, PY2HY, PT7YS, Z22JE, TI2CC, EC6QY, 5N7WFU, ZS6AMX, A43YY, ZB2JO, 7X2VZK, SV1BRL/P8, on IOTA EU 52, and a Portuguese special in CQ7GBI. on 18MHz W1 and W4, plus WB2CWO/MM in the Mediterranean, VO1NE VO1IA, and VO1XC, VE3YJ, 9X5DX, 4Z5DG, OD5ZZ, CO2QQ, 7Z2AB and VK6APH. Down on Twenty, Mark noted WZ1Y, K3KED, KQ4NW, WB4WUK, K9PPY, VY2RO, 4X6ES, CU2YA, and EA6ABM. At 7MHz the score was CX2TL, LU1FCJ, 9K2MU, and FM5FE, leaving us to note eighty-metre catches by way of KC1PY, AK1N, WB1J, WB2EBS, W3KDD, W3MFW, N3BQW, WB4DBB, KD9EEV, W8TJQ, W8MMC, VE1PZ, VE2ZV, VE2HQ, VE3YJ, EA6WX, SV8CS, and JA6XMM.

Another new reporter is **Steven Sawyer** from Ashington in Northumberland, who has built an MFJ8100 kit receiver up and hooked it to a random wire antenna. On 3.5MHz he logged T94ON K4PJD, PA0VRN, T93M, HB9VW, and F5QM, while on 7MHz there were a string of Fs plus ER2OZ and GU2FRO. On 14MHz the receiver had to cope with LA1CI working G4VYX a few doors away, 9A1KDE, ZA1B, PA3CJQ, 4N7DW, ES2WX, LZ1KOZ, 5B4ES for a school club station, and F5JOE/ER1WW. For 21MHz there were TA1BY, W1JI, and LZ2RS. Finally, some specials and club stations: GB2HVS for Hartlepool Venture Scouts, and GB4CST for Oxford Scouts. GB0TOV was the Astronomy station Carhouse, and GB2SEG was the Scottish Expedition Group on the Isle of Mull. GB8SR was for 25 years of Solihull RS, and GX0WRS for William Roberts School, while GX4SKE was for a King Edward's School.

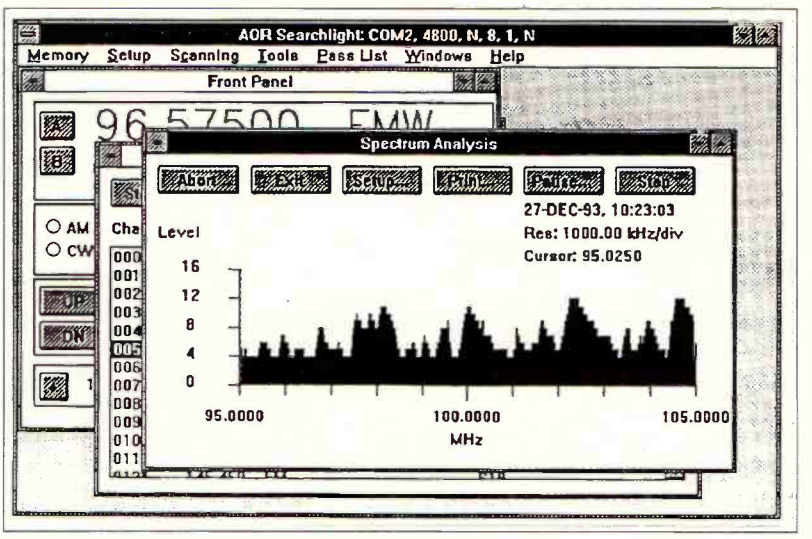
There is always a bumper list from **Gerald Bramwell** of Swinton; not only is he keen enough to put the hours in, but he listens also on c.w. and RTTY. On Top Band c.w. W4MYA was logged, along with sideband from HH7PV, VE1ZZ, K1PE, and RA9FMA. 3.5MHz yielded the r.t.t.y ofUZ9LWA and UX0KC, but c.w. was not used. Sideband showed W1-3-4-0, VE1-2-9, 9V1XQ, 9M2DM, EA8BYR, TL8MS, JH7SMJ, EY8MM, ZL4AB, VOs, WB3KBZ/VP9, UA0APA, 5N0MVE, 9K2MU, 5B4ADA, 5T5JC, EA8LS, D2SA, V85PB, EA9PY, SU2MT, VK5MS, TI4CF, HH7PV, TU5DX, TA2BK, 9M8DB,CN8HR, and UN7JHI. For 7MHz we see RTTY from ER0Q and UR0HQ, plus an assortment of sideband, mainly S America and W Africa. On 14MHz the pile is enormous, so we must prune Teletype from 14 stations, mainly N American plus A22MN, and phone from worldwide, though we must express a doubt as to YI1EYT. On 18MHz c.w. comes back into play for K3PV, K8WSF, K5ESW, plus sideband from UX0ZZ, UX0FF, PJ8AD, 4X6DK, VE3SGU, EA8AMT, V47N, EA9JL, ZF1CQ, AP2JZB, 7X2BK, 7X2DG, EA8BYR, and shoals of N Americans. The story repeats on 21MHz though here the Teletype is much more prominent in the list, with 35 stations over N and S America, Africa and Asia, while on sideband CN8US, VP9KK, several ZSs, UX0ZZ, UX0FF, HZ1AB, 5N0MVE, ET3YU, and the usual N Americans. W1PXA came up on 24MHz c.w., and telephony from Ws, 9X5DX, ZD8M, YV5CMI, 4X1MO, V47N, 9G1SD, KP2AD, HT1T, V51P, TA2ZA, TA2PO, PY0FF, CT3FT and a shoal of W/VEs. There was even time to find pay-dirt on 28MHz s.s.b., where EA8AB and WP4LWN were noted.

IOTA Contest

The 24 hours, noon UTC to noon, July 30-31, are slated for the IOTA Contest. There is an s.w.l. section. Separate logs for each band, marked date, time, call of station heard, RST/serial number/IOTA reference sent, call of station being worked, multiplier claimed and QSO points claimed. Under 'callsign being worked' there must be at least two other callsigns before a call re-appears. Add the usual summary sheet and signed declaration. IOTA means 'Islands On the Air', so stations in places having an IOTA reference will use that (mainland G/GW/GM is EU005, mainland GI/EI is EU015), while others will send a serial number. Each hearing of an IOTA island counts 15 points, others five points, own country or IOTA reference two points. The multiplier is the total of different IOTA references for each band on c.w., plus the same for sideband, so the total score is QSO points times multiplier points for each band added together. Entries, and check logs, to **S. Knowles, G3UFY, 77Bensham Manor Road, Thornton Heath, Surrey CR7 7AF,** postmarked before August 26.

Alan Gardner, PO Box 1000, Eastleigh, Hants SO5 5HB

Scanning



Example of an AOR Searchlight screen display.

As I first mentioned in the January column, AOR have been very busy finalising the design of their new hand-held. When I first mentioned the model I had only a few snippets of information regarding the features likely to be included in the final production version.

Well, by the time this issue of *SWM* hits the news-stands the new AR-8000 should have made its public debut at the Picketts Lock Amateur Radio Show in London. Just one look at the receiver specification is enough to tell me that AOR have come up with a winner. As well as features such as the 100kHz to 2GHz frequency coverage I previously mentioned, there are a whole host of other innovations that I'm sure will be appreciated by experienced users as well as those new to the hobby. Because of this AOR have designed the receiver to have two operating modes that they have termed 'Expert' or 'Newuser'.

The 'Newuser' function restricts the number of ways in which the receiver can be programmed in order to simplify operation for less experienced operators. Once the basics have been learnt the 'Expert' mode can be enabled to permit access to the whole range of commands. It is hoped that this will help owners to work their way through all the features without becoming too bewildered by the choice of options available to them.

Alphanumeric Display

The most noticeable feature of the new model is the large alphanumeric dot matrix display. This indicates the status of the twin v.f.o.s that can be configured as primary and secondary receive frequencies as well as other information relating to operation such as mode and signal strength. In addition, comments can be added to memory contents if the unit has been programmed externally (more on this later). The memory and search groups are arranged in 20 banks of 50 giving 1000 channels that can be whisked through at speeds of up to 30 steps per second. Various modes can be selected including delay; audio; free; signal level or manual search/scan. Auto memory store during a search is also available to help you find those elusive signals as well as a novel 'Bandscope' function that produces a simple spectrum type display of band occupancy on the l.c.d. screen.

Serial Data Port

Memory information is stored in EEPROM, which should mean that the contents will remain intact even if the batteries are left discharged for a long period. Additionally, the ability to add password protection will also help to prevent anyone else from examining or changing them.

If you want to exchange information with another AR-8000 owner, you can connect them together and 'clone' the contents from one to the other. This also offers the facility for computer control, although a small interface is required if you want to use your PC's RS232 comms port to upload and download memory contents.

The receiver comes supplied with NiCad batteries and a mains charger as well as a wideband helical whip antenna. This is required on most frequencies but an additional internal ferrite rod antenna gives exceptional performance on the long and medium wavebands. Short wave reception of s.s.b. amateur and utility stations is also enhanced by the inclusion of a good quality 2.4kHz i.f. filter and the availability of 50Hz tuning steps.

By now you must be thinking Great but how much does it cost? Well AOR are aiming to beat the price of their main competitors, so if you are thinking of buying a new model why not ask AOR for more information.

Shine A Light

Whilst we are on the subject of AOR products if you own an AR-3000 and run Windows on your PC then a new software package should be of interest to you.

Called 'AOR Searchlight' the new program has been written by Simon Collings and is a logical development of 'AORSC' that was also produced by him. The software takes advantage of the Graphical User Interface provided by Windows and allows you to display several different screens at any time, as well as the ability to export data to other programmes by use of the clipboard facility.

The main purpose of the program is to enable the operator to receive, identify and log radio transmissions and to simplify the management of stored information and frequencies. You can create an unlimited number of disk based memory banks each of which can contain up to 400 individual frequencies. These can be up or downloaded to the receiver and moved around within the programme.

I found one of the best parts of the program to be the programmable search function. This permits unattended operation of the receiver and PC and saves literally hours of monitoring for new signals without having to remain within earshot of the radio. You simply set the software running and upon your return it has neatly logged all the signals detected within the search band and sorted them into order for you to examine at your leisure.

Digital Storage

But the best bit is yet to come. If you have a sound card fitted in your PC you are in for a real treat - the program can digitally record any signals detected during the search period. This really speeds up the process of identifying signals. As an example, I left the software running for a day whilst I was at work, when I checked the log in the evening I was able to identify the use of 150 different frequencies by playing back short snatches of speech stored during the day. It also allowed me to sort out which signals were genuine and not just bursts of noise or interference. I would estimate that prior to using the software such an exercise would probably have taken me several months to complete as I would have to use a cassette recorder to monitor just one frequency at a time.

Once you have identified active channels you can also use the single frequency watch facility to produce occupancy statistics or alternatively use the spectrum analysis function to spot other active frequencies on adjacent channels. I had great fun using the software and found the Windows format made operation much more user friendly than the previous 'AORSC' package. The only slight disadvantage is that you need a fairly powerful PC to run the software. The minimum requirement is a 25MHz 386 machine with at least 4Mb of memory, a mouse, a free serial port, Windows 3.1 software and 2Mb of empty hard disk space.

If you want to use the audio recording function, and I think you will, you also need a multimedia compatible sound card such as Creative Labs 'Sound Blaster' and a lot of free disk space. This is because even at the lowest sampling rate each second of recording time uses up 8Kb of memory.

For further information on 'AOR Searchlight' or the new AR-8000 new hand-held receiver contact:- **AOR (UK) Ltd, Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbyshire DE4 4BG or Tel: (0629) 825926.**

Rubber Ducks

I had an intriguing letter from **Peter Lepino** of Surrey who has been interested in radio for a number of years. During that period he has collected a number of helically wound antennas or 'Rubber Ducks' as they are commonly nicknamed. He wonders if there is an easy way of determining their operating frequencies.

Providing the construction of the antenna follows standard design techniques it should be possible to calculate the operating frequency from parameters such as the length and diameter of the coiled element, the total number of turns and the spacing between them.

This was detailed in an article written by Dr D.A. Tong (of Datong fame) in the July 1974 issue of the RSGB magazine *Radio Communication*. The article is titled 'The Normal Mode helical antenna' and contains design formulae and practical examples of helical antenna based on calculated values. However, it does take a fair amount of effort to work back through the examples before you can determine the operating frequency of an existing design. This may not always be 100% accurate as the

construction of the antenna and the type of material it is made from can alter the design frequency slightly.

Measured Values

Some time ago I acquired a box of helical antennas that were marked as operating at around 70MHz. Fortunately, I had access to some professional impedance measuring equipment and so was able to perform some experiments with them.

I set up one of the antennas to operate over a small ground plane made from a sheet of aluminium and connected the test gear to it. I then shortened the antenna a few turns at a time and made a note of the change in resonant frequency. The next step was to plot the results onto some graph paper, which luckily gave a smooth curve indicating that the values I had obtained were fairly consistent. By examining the graph I can now tell how many turns are needed if I want to modify one of the antennas to operate on a different frequency.

Most commercial helical antennas tend to be constructed in the same way utilising similar materials. Usually this is a copper-plated steel spring with fairly widely spaced turns attached to some form of coaxial connector and covered in heat shrink sleeving. If this is the case, the graph will probably give a good indication of the operating frequency - but beware. A lot of the helical antennas supplied with Japanese equipment tend to use much more tightly spaced turns in order to make the antenna more flexible and this can change the results slightly.

My advice would be to use the graph as a rough guide and try to compare the performance of the antenna with that of a known one at frequencies above and below those obtained from the graph. This should give you an indication of the true centre frequency.

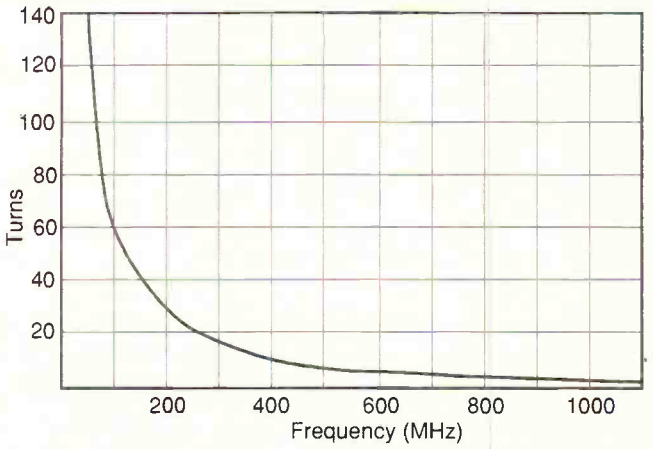
If you intend to use it for transmit as well as receive, a v.s.w.r. bridge will give you a more accurate result. Try transmitting on different frequencies to see if the antenna is of the correct length or if it needs adjusting slightly. The graph will help you judge how many turns need adding or removing to alter the resonant frequency. I hope this answers the question Peter and thank you for your letter.

Satellite Reception

A few readers have replied to my request for information on the subject of telephone links via geostationary communication satellites. As I originally thought, it would seem that many of these circuits now use digital techniques such as Time Division Multiple Access to convey speech information.

This type of transmission cannot be demodulated by the method I described in the January column. However, after looking through some of the publications you suggested to me, there may be the possibility of Frequency Division Multiple Access transmissions being carried on satellites located at 21.5 and 34° West. These signals should be in the frequency band of 10.950 to 11.7GHz that is within the tuning range of most domestic satellite receive systems. Unfortunately at my location the western segment of the geostationary arc is obscured by nearby houses, so I haven't been able to confirm the presence of any likely transmissions - but I would be pleased to hear from anyone who has.

Until next month - Good Listening.



Graph showing Turns vs Frequency for typical helical antennas.

Godfrey Manning G4GLM, c/o The Godfrey Manning Aircraft Museum, 63 The Drive Edgware, Middlesex HA8 8PS

Airband

Jetstream 41 (41010) G-WAWR of Manx. *(Christine Mlynek)*

Christmas seems so long ago. It takes this long for me to print the results of the Christmas Quiz (see January 'Airband') because I have to allow a fair chance for overseas readers to get their entries in.

Yes, it was an Antonov An-26 (NATO codename 'Curl') and the following got it right: **D.R. Benfield** (Northampton), **Darren Bruton** (Birmingham), **A. Clarke** (Loughborough), **Robert Golds** (Copthorne), **R. McKenzie** (King's Lynn), **Andrew Medcalf G1IPE** (Pershore), **R.L. Michelin** (Cheltenham), **Aidan Murphy EI5HW** (Eire), **Colin Nixon** (Stornoway), **Gordon Partridge G3RJD** (Willenhall), **Curtis Smith** (Oldham), **Graham Tanner** (Harlington) and **David Webb** (Cheadle Hume). I'm disqualifying **Steve Blanchard** (Rugby) for hedging his bets and putting An-24 as an optional alternative - hard luck. Wrong answers were from **L.J. Shaw** (Basildon); the An-32 is similar but look more closely at the engines. Also, **H.T. Turner** (Plymouth) was wider off the mark with Fokker F.27; although similar in configuration, there are many differences in detail. Well, that was a record number of entrants!

With so many correct answers to choose from, I must narrow the field with some hard decisions. First, I am disqualifying all those who didn't conform to the postcard-sized entry requirement. This was imposed to prevent excessively long tie-break answers. Tough luck - but with so many correct responses, you've got to stick to the rules to stand a chance! The entry on the back of a picture postcard depicting a DC-3 is very nostalgic but I won't let my admiration for this aircraft bias my judgement - nice try. Some entrants gave extraneous information (one clever person, who'll doubtless get his own back when we next meet on the *SWM* stand at a rally, even told me which way the camera was pointing!). Again, very interesting, but I won't let this sway my decision as the information is gratuitous.

Of the nine acceptable entries, one has to be chosen by the tie-break. I've selected that from D.R. Benfield as being the most practical and in keeping with the aims of this column. That is: more explanations of air traffic control procedures and how to interpret navigation charts. Now, here I need the help of you, the reader. I can't turn 'Airband' into a systematic textbook covering all aspects, but I can try to answer the problem that's troubling you currently. I need all of you to write in and tell me what aspects of air traffic control, etc. you are having difficulty with. Other (non-entrant) readers, such as **Terence Thomas** (Great Barr), also agree that they would find this helpful.

It's a hard life being a columnist. Only one entrant can win. I do hope that the rest of you will take the competition in the fun spirit in which it is intended, won't be too disappointed, and will continue to read - and participate in - 'Airband.' One gratifying outcome was the number of readers who are pleased with the column.

Future Ideas

All of your tie-break suggestions as to future ideas for this column have been looked at and many will appear in forthcoming issues. A popular one was a description of the types of airborne equipment and this was also requested by **Anton Lillis** (Medway) although he didn't enter the competition.

Readers' help is also needed to bring in information from distant parts and one request was about aviation in the CIS. I suspect this is a minority interest, but would include short extracts from any significant foreign experiences you send me.

Many suggestions are not practical for application to this column. In particular, readers wanted airshow reports, fleet lists, aircraft movements, and air show dates. Most of this can't be fitted into a short monthly column and my lead time is also too great (rarely does any submission appear in print less than six weeks later). So I'm going to recommend that this sort of information be obtained from specialist sources that devote themselves to nothing else.

Start by sending off for membership details from Air-Britain: write to **Barry Collman (1 Rose Cottages, 179 Penn Road, Hazlemere, Buckinghamshire HP15 7NE).** Local branches of Air-Britain might also be of interest. You can join Luton Branch by sending £6.50 (UK members) to **Dennis Russell (29 Barnfield Road, Harpenden, Hertfordshire AL5 5TH).** The Midlands also have their own branch, you can join by sending £15.00 to **John Withers (7 Nailers Drive, Burntwood, Staffordshire WS7 0ES).**

In all three cases, members receive detailed monthly magazines giving the sort of information referred to above. Air-Britain publishes its *Airline Fleets* listing each year and when you see the size of it you'll realise why I can't print that sort of detail here. Remember to send a stamped/addressed envelope with any enquiry.

Here are some more practical ideas. How about a true or funny aviation story? Submit your experiences for this one please! Details of oceanic tracks were asked for. Yes, I'll cover the basics - but the actual tracks themselves change twice a day and won't appear here. Search and rescue is another topic.

I was a bit worried that some readers wanted news of frequency changes, etc. I've been giving this nearly every month in the 'Frequency and Operational News' feature in this column! Then, some requests are for information that may not be released. The CAA have made it clear that detailed frequency/location tie-ups for LATCC relay transmitters are a no-go area, but I'll be listing the locations only. Likewise, military topics can run into trouble, although requests for this sort of thing are in the minority.

All I can say is: if asking/mentioning about military/u.h.f. first make sure that the information is allowed in the public domain. Similar comments apply to stations heard/logged: I can't print these unless the submitter is authorised to both hear and also disclose the information. As to air-to-air refuelling areas, I will at least be disclosing where they are.

This has been a revealing exercise, so thanks to all who took part. I'm sorry I can't provide everything you asked for, but I hope you'll see the reasons why this is and won't be disappointed if your particular aspect doesn't come up. Future suggestions are welcome at any time. Don't wait until next Christmas!

Frequency and Operational News

Let's look at what's new in the January *GASIL* from the CAA. At Cardiff, Radar 120.05 is replaced by 124.1; at Luton, Radar 127.3 is replaced by 126.725; and at Norwich, Radar 118.475 is replaced by 128.325MHz. Pilots: you do remember to check all this in your NOTAMs, don't you? Readers with no direct access to NOTAMs could try asking nicely at their local flying club.

Sumburgh once had its own a.t.i.s. (125.85) but this has now ceased. The same information can be heard, though, over the SUM v.o.r. on 117.35MHz. Some readers query why they need to know beacon frequencies, and some manufacturers presume to offer airband receivers that omit the beacon segment (108-117.95MHz). Now you know one reason why beacons really do matter!

A new a.t.i.s. is reported on 128.225MHz at East Midlands by **Fred Clarke** (290C 17nm from the airport). Graham Tanner passes on unattributed Scottish information originally submitted to his 'SSB Utility' column: ScATCC 126.25 has been replaced by 125.675 and 124.04 by 133.675MHz. The replacements seem to be new allocations for that Centre. Bristol (Lulsgate) Airport had their Approach moved to 132.4 but now **George Nichols** (Bristol) expects this to change again to 120.6MHz.

A familiar sight in the south-east is G-HEMS. To an injured victim, this medical evacuation helicopter from the London Hospital is a welcome sight! Calling 'Mike Sierra' unless actually on task, in which case it calls 'Medevac,' the originally white Dauphin was resprayed fluorescent red/orange. This faded rapidly and now it has been repainted yellow. **Ron Galliers** (Islington) asks if Depcom, 122.95MHz, is available nationally for these operations (e.g. air-to-air or talk-back to the hospital). The official answer (see March 'Airband') is NO! Definite restrictions have been placed on this frequency to prevent interference and air-to-air is forbidden. Ron: you ask about a London frequency but I'm not sure if you mean Heathrow or Airways, could you write back and confirm?

Information Sources

Please note, as ever, that I am unable to reply directly to individual readers. Answers appear here for all to share. One of the commonest requests is for sources of frequency lists and charts. I've put the addresses of suppliers on my Airband Factsheet, which is yours for the asking if you simply send a stamped/addressed envelope to the Editorial Office in Broadstone. The Factsheet is a single A4 page. Newcomers such as **E. Hinchliffe** (King's Lynn) will find this especially useful.

More specialised documentation comes direct from the **CAA, Printing and Publication Services, Greville House, 37 Gratton Road, Cheltenham, Gloucestershire GL50 2BN.** Their latest (1994) *Publications Catalogue* is now available, but you have to pay postage: £1.90 inland, £2.40 overseas. While you're at it, you might like to order item 0850: the complete set of 16 *General Aviation Safety Sense Leaflets.* Ordered with the catalogue, they won't cost you any extra.

Follow-Up

In February, I gave hints as to what you as a passenger can do if involved in an emergency. Contrary to the advice on some flight safety cards, I suggested that plug-type emergency exit hatches should be thrown clear through their aperture. Many airlines ask you to leave the hatch on the seat in the aircraft. The thinking behind this is that, when left on the seat, the hatch will impede egress and even cause injury. However, you need to be careful when throwing the hatch outwards, especially over the wing. Other passengers might be in your firing line, particularly if they've just popped out of the other, adjacent, over-wing exit. There's no hard and fast rule. Only you can judge correctly if you're the one on the spot at the time. Anyway, it's soon time to book those summer hols so let's be prepared but fly off to the sun knowing how unlikely an untoward incident really is.

The next three deadlines (for topical information) are April 15, May 13 and June 17. Replies always appear in this column and it is regretted that no direct correspondence is possible. All letters to 'Airband,' c/o The Godfrey Manning Aircraft Museum, 63 The Drive, Edgware, Middlesex HA8 8PS. Genuinely urgent information/enquiries: 081-958 5113 (before 21:30 local please).

Irish military Gazelle helicopter at Waterford. *(Christine Mlynek)*

Abbreviations

a.t.i.s.	automatic terminal information service
CAA	Civil Aviation Authority
DC-	Douglas Commercial
GASIL	General Aviation Safety Information Leaflet
LATCC	London Air Traffic Control Centre
MHz	megahertz
NATO	North Atlantic Treaty Organisation
nm	nautical miles
NOTAM	NOTice to AirMen (& AirWomen!)
ScATCC	Scottish Air Traffic Control Centre
s.s.b.	single sideband
u.h.f.	ultra high frequency
v.o.r.	very high frequency omni-directional radio range

Mike Richards G4WNC, PO Box 1863, Ringwood, Hants BH24 3XD

Decode

All the Data Modes

Steve Walker's station.

As promised last month, I'm including a wide selection of readers stations as a way of helping newcomers see the type of equipment currently in use. Let's start with **Steve Walker** of Aylesbury who's sent me a very full description not only of his current set-up but also most of his previous gear as well.

His serious listening began with a Yaesu FRG-7700 receiver and a Tono-550 decoder. Although this got him started, he soon became frustrated with the decoder and started to look for something a little more sophisticated. After some detailed research he settled on an Info Tech M-6000, which was the predecessor of the Universal M-8000 system I reviewed last year. Next change was to upgrade the receiver to a new Icom IC-R71E, which worked very well in combination with the M-6000. With this very competent station Steve was still finding modes that were outside the decoding capabilities of the M-6000.

A search around the adverts at the time showed the Hoka Code-3 to be the next move. This also linked well with his desire to get himself a computer to help with his logging. By now, Steve was well and truly hooked and was looking to build the ultimate decoding station. He looked at a number of the top receivers available on the amateur market and decided that he wanted more. After talking to a professional radio engineer he was directed towards the Racal RA1792 receiver. This is a very stable commercial receiver with 1Hz tuning steps and filters from 300Hz through to 16kHz.

He has now acquired two of these impressive receivers, both of which are fed by a 33m long wire antenna with a magnetic long wire balun. The final upgrade was to change to the Hoka Code-30 decoder which is professional equivalent of Code-3. So to summarise, his station now comprises: 2 x Racal RA1792 receiver, Code-30 decoder, IBM 486DX2 66MHz PC, HP Laserjet 4 printer and the evergreen Datong FL3 audio filter.

Alex Tulloch of Edinburgh is just getting started have recently received a copy of JVFAX. His station comprises a Lowe HF-225 receiver combined with a Datong FL-3 audio filter. The antenna is around 11m of wire and a home-made balun. Alex reports that the FL-3 'doesn't do much' I think he must be doing something wrong as the FL-3 is a very effective filter and is especially useful for utility work.

The trick is perhaps in the way it's set up. The best mode to use is CW(2) where the middle knob sets the centre of the pass band and the right-hand know adjusts the bandwidth. To tune a utility signal, you start with the right-hand knob fully clockwise to give the widest bandwidth. Once you've found the correct tuning point according to your decoding system, you then slowly turn the right-hand knob to give the lowest error rate. One of the most common problems with new users is setting the bandwidth too narrow.

P.G. Tinkler of Nottingham has based his decoding around an IBM compatible PC using a 386 processor. The current software comprises the ICS FAX III and SYNOP III (see review in this issue) plus a recently received version of JVFAX. The receiver is a trusty Icom IC-R70 which is fed by both an active antenna and a long wire.

Laurance Jamieson from Shetland is an experienced listener who has comparatively recently become interested in utility monitoring. His favourite antenna is a random length wire fed to the receiver via a magnetic longwire balun. The receiver is the Lowe HF-225 with a Datong FL-2 adjustable audio filter. For decoding he uses a Ness 386DX 33MHz PC running PC HFFAX, JVFAX 5.2 and Hoka Code-3 v4.13. The set-up works very well and Laurance has been regularly receiving TORG 11 transmissions on 18.489MHz.

Les Crossan is a regular contributor to the column and takes great pride in customising received FAX charts. He does this by saving the FAX charts in GIF or PCX file format and then processing them using standard graphics packages such as CorelDraw.

One recent image had been enhanced to full colour and was really very impressive - perhaps it'll make the front cover one day! Les manages to achieve these excellent results using fairly modest receiving equipment. The receiver is a Sangean ATS-803A that is fed by a 10m long wire and a.t.u. The decoder is the Lowe Modemaster which runs on his 486DX33 PC with 8Mb RAM and Super VGA. Les did suffer a few problems with interference, but has found a neat, but perhaps unconventional, way to cure this. He cut the lead between the receiver and decoder, left the screen disconnected and inserted a low value resistor in the centre conductor.

Moving away from IBM PC based systems for a while, **Derek Brooks** of Bridgnorth has been listening for around thirty-five years and is currently using the Technical Software RX4 plus Commodore C64 computer. The receiver is a Yaesu FRG-8800 and is fed with a Datong active antenna.

Malcolm Jennings of Stoke-on-Trent has a Tatung-7602 working with an old Codemaster RTTY/c.w. decoder. This has provided good service over the years but he is now hoping to upgrade to a PC based system using JVFAX.

Whilst my mailbox seems to be dominated by readers using PC based decoding systems, I know there are many of you using self-contained compact units such as the excellent Microreader from ERA or the Easy Reader from Momentum. There are also some excellent sophisticated decoders such as the Wavecom 4010/4100 series and the Universal M-8000. Just to provide some balance, how about writing with details of your non-PC systems explaining the pros and cons.

Satellite Utilities

I'm still gathering data on this aspect of the hobby but **Peter Thompson** of Crewe has written with a few snippets. Peter uses a satellite receive system much like my own from Aerial Techniques in Parkstone (look for their ad in *SWM*). This comprises a 900mm steerable dish, LNB and polariser plus the Echostar SR-50 receiver and an Alba positioner. Whilst searching around the satellites Peter has found the following potential utilities:

Eutelsat II F1 13 E (10,987MHz vert) Superchannel 7.75MHz fast but weak data signal.

Eutelsat II F1 13 E (11,163MHz vert) Worldnet 8MHz Morse code from US Information Agency?

Eutelsat II F2 10 E (11,149MHz horiz) TVE International 7.93MHz fast weak data.

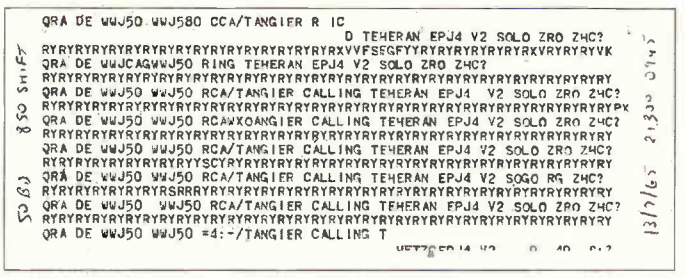
Intelsat K 21.5W (11,532MHz vert) TV feed - 7.43MHz what sounded like fast Morse Code.

For any of you who'd like to try this but missed my earlier write-up, here's a quick resume of how to link your satellite receiver to your h.f. receiver.

First you need to locate the Baseband output on the rear of the satellite receiver. This can then be connected to the antenna socket of your receiver, preferably via a 10-20dB attenuator to prevent overload from strong signals. Once the connection is made, you just tune across the various satellite transponders using your satellite receiver and then use your h.f. receiver to tune between about 6MHz and 8MHz to search for utilities. If you only have a fixed dish set to the popular Astra satellite you probably won't find any utilities. For best results you really need to be able to steer your dish to the satellites that are used to carry international feeds. As soon as I've acquired sufficient data, I'll be putting together a full feature on how to receive and decode these signals.

Guy Denman's RTTY equipment.

Guy Denman's Radio equipment in 1965.



1965 RTTY with a Creed 7B.

Experts Needed!

I know I spend a lot of time dealing with the basics of decoding, but now there's a chance for the experts to do some investigative work. **Dr Martin Th A. van Duinen** of Holland has a very advanced decoding system with a Hoka Code-30 and the latest Wavecom 4100. These decoders being driven by the impressive Icom IC-R9000 receiver. Whilst tuning around recently he came across an unusual multi-frequency signal on 12.101 and 14.397MHz at around 0950UTC. The format appears to be 1 x 10 + 2 x 11 tones. Can anyone out there provide any further details? Just to help with the analysis, I've included a spectrum analysis print from the Wavecom 4100.

Black Holes!

Robert Hall of Capetown, South Africa asks just what are all those indecipherable RTTY like signals that are found throughout the marine bands. I'm sure we've all been fooled by these signals at some time or other as they sound just like a standard RTTY signal.

If you're lucky enough to own a decoder with speed and shift analysis you will usually find these signals give a reading of 75 baud and 850Hz shift. As you can imagine, I've received many queries over the years and the answer given by those who should know is that these are NATO signals using a pseudo random code. The problem with this type of signal is that even if you are correctly tuned and decoding perfectly you will still only receive garbage because of the encryption! I'm afraid you just have to accept that they cannot be received. The only plus point is that if your decoder tells you the signal is 75 baud 850Hz shift you needn't waste any time trying to resolve it!

Pioneering RTTY

As I spend most of my time trying to get my hands on the latest equipment for review, I thought it might make a change to take a look back at the good old days! This idea was prompted by **Guy Denman** of Portsmouth who wrote with details of his early days of listening.

Although he now runs a sophisticated all mode station using Code-3 and a Yaesu FRG-100 receiver, things were quite different back in the early sixties. Guy started listening to RTTY in 1962 when some ex-government equipment came up for sale. To build a station you had to have a stable receiver some form of printer and a terminal unit. This terminal unit was required to convert the audio signal from the receiver in to ±80V to drive the printer magnet.

The terminal unit in Guy's case was an ex-RAF AP66862 and his first printer was an ex-GPO Creed 3X. This printer produced the characters on tape using an ink roller. As time went by, Guy was able to upgrade to the popular Creed 7B teleprinter which gave a more conventional page of text on a continuous roll of paper. Although the Creeds were wonderful mechanical devices, they did make an awful lot of noise and the carriage return could move a table across the floor! To illustrate the type of station used in the sixties, Guy has sent me a couple of photos of his 1965 set-up.

The 19in rack houses from top to bottom: Heathkit monitor scope, AP66863 p.s.u., AP66862 terminal unit, 80-0-80V p.s.u. for the printer and tuning scope. The table on the right carries two Creed 7B teleprinters. The second photograph shows the radio equipment in use at the time which was: KW *Vanguard* 3.5MHz to 28MHz a.m. and c.w. transmitter, Hallicrafters SX110 receiver and KW-160 10W a.m. transmitter for 1.8-2.0MHz. Just to complete the picture, I've also included sample prints from the Creed 3x tape printer and the 7B teleprinter.

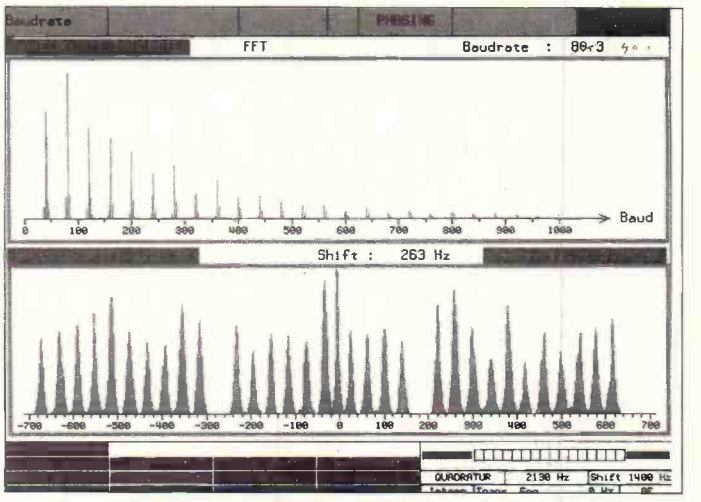
Special Offers

I can offer a number of services that are designed to make life easier for the utility listener.

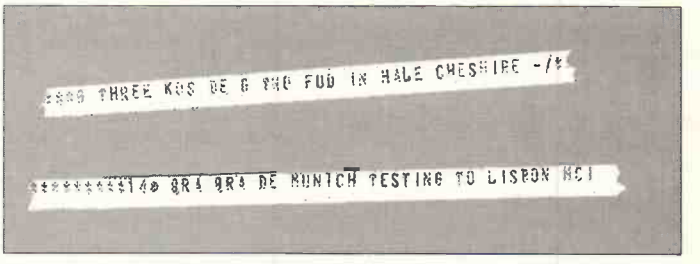
Perhaps one of the most popular is JVFAX v6.0. This software package for IBM PCs and compatibles gives access to the world of FAX and SSTV for very little outlay. For your copy, just send me a blank, formatted 3.5in disk (720Kb or 1.44Mb), sticky return address label and three first class stamps.

Next in line comes the Day Watson Beginners frequency list that has just been updated to version 1.94. I can also offer the latest Decode list of stations reported by regular readers. For either of these list just send three first or second class stamps and a sticky return address label to the address at the head of the column. I'm currently working on a series factsheets, so watch this space for more information.

If you recently sent for a copy of JVFAX and haven't had a reply, please contact me again. We've got a left-over disk after bashing through the lastest batch (about 40 copies of the program). This reminds me if you could possibly put your name and address on the disk - a sticky label is ideal - it will prevent this happening again. Mind you one lost disk in over 450 copies isn't that bad.



Dr M. Th. A. van Duinen's mystery station.



Sample print from Creed 3X printer.

Frequency List

Now for this month's selection of frequencies as supplied by Decode readers. As all the reports have been logged within the past few months they should be receivable by most. The only point to watch is that you should listen at around the times specified. This is because many stations, especially press broadcasts operate to a strict schedule. The list is totally dependant on contributions from readers, so please keep those letters coming. If you can supply the information in the same order as my list, e.g. freq, mode, speed, shift, etc. it makes life easier for me. Don't worry if your loggings don't contain any exotic stations - it's repeatability that's really needed.

Freq (MHz)	Mode	Speed	Shift	Call	Time	Notes
0.518	FEC	100	170	G	848	Cullercoats (NAVTEX)
0.518	FEC	100	170	L	0148	Rogaland (NAVTEX)
0.518	FEC	100	170	J	1930	Stockholm (NAVTEX)
2.374	FAX	120	576	GYA	0300	RN Northwood
2.4601	ARQ625	100	170	UDH	1820	UDH RIGA Lithuania
2.5258	RTTY	100	400	-	1840	Ships telex
2.8211	RTTY	100	400	DHN37	1925	Grengel Met
3.196	RTTY	50	400	-	0120	Prague Met
4.365	FAX	60	576	-	2105	Tashkent Met
5.234	RTTY	50	400	-	2320	TANJUG Press
6.4185	ARQ	100	170	-	1950	Hamburg Press
7.52	RTTY	75	400	-	0115	Xinhua Press
7.613	ARQ-E	72	170	RFFH	1650	Marseille
8.1224	TDM342	96	400	-	2050	TNL Brazzaville Met
8.165	RTTY	50	400	5YD	2100	Nairobi Air
10.634	RTTY	50	400	-	1610	MAP Press Morocco
16.806	FEC	100	170	NMF	1615	Boston wx/tfc
11.270	RTTY	75	850	-	1440	USAF/AWACS coded
14.405	ARQ	100	170	-	1450	UN HCR
13.399	RTTY	75	425	DFZG	1525	MFA Belgrade news
11.139	RTTY	75	425	DFZG	1525	MFA Belgrade news
9.057	RTTY	75	425	DFZG	1525	MFA Belgrade news
7.621	RTTY	75	850	EGWR	1555	USAF wx

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

Info In Orbit

Fig. 1: METEOSAT 4 from Roger Ray.

Fig. 2: METEOSAT 3 from Brian Dudman.

It seems that everyone is wanting to learn about Kepler elements! Within one day of publication of the February *SWM*, disks started to arrive with requests for copies of the Kepler teaching program that I offered in that edition. Within five days I received forty requests, with more in each post. I hope that everyone has enjoyed running it - I know I did. This month we have a unique opportunity to inform NOAA about what we want from their WXSATs! Read on.

Current WXSATS

The new CIS WXSAT METEOR 3-6 spent the first few days of its life in an off-on state. Following the launch around 0025UTC on January 25, METEOR 3-6 came over my horizon at 1134UTC on the eastern side, transmitting good quality infra-red - typical reversed-grey-scale video, on 137.30MHz. It remained operational for at least 24 hours, but then apparently ceased transmissions. After a day's absence, I started to receive queries about a new signal, and found METEOR 3-6 was again transmitting, but in sunlight only - so no overnight infra-red. After further spells of on-off operations, I failed to pick up any more signals until February 16. Its transmissions then showed an apparent fault with the infra-red - occasional missing sync bars.

I have seen variable early-orbit behaviour with previous CIS launches, but I had expected 3-6 to continue transmissions, noting that it was in full sunlight, so unlikely to suffer from power constraints. In addition, there was only one other METEOR operating - METEOR 2-21 on 137.85MHz, so the Commonwealth of Independent States is running low on active WXSATs.

In early February, the signal from NOAA 9 was sounding distinctly different. Noise levels in the channels were affecting the data, so controllers de-activate the infra-red channels and switched on the cooler's heater. This vaporises (or outgasses) impurities. The process is continued for about nine days.

During outgassing, only one visible image is transmitted. The other frame is blank so the a.p.t. audio has a distinctly 'hollow' tone, normally associated with images of evening landscapes.

METEOSAT-4

Severe image corruption of METEOSAT-4 data occurred around February 4 so the controllers made an immediate swap of all operations to METEOSAT-5. Because of manoeuvring, METEOSAT-5 was then at 2°W so administration messages warned of the possible need to adjust dishes temporarily while the satellite was moved eastwards. The impact on WEFAX users was minimal.

This new situation may affect plans to replace METEOSAT-3, currently part of the American WXSAT system, pending launch of the next GOES.

Pictures

Some of the pictures that I receive have been enhanced with artificial colour, and, in my view, are stunning! *SWM* is not yet able to print such pictures in their original colour, but I am including them where it is likely that they will reproduce well in black-and-white.

Roger Ray of Telford sent me a selection of which I have chosen a METEOSAT 4 whole-disc visible light image - see **Fig. 1**. Roger has used some software called Joinpix that allows adjacent METEOSAT images to be stitched together.

Brian Dudman sent a whole-disc METEOSAT-3 image, taken with his PDUS system - see **Fig. 2.** The large-scale storm activity near the west coast of America can be seen.

Hilda and Jim Richardson of Fife use their 386SX for WXSAT operations and have sent me a selection of prints, **Fig. 3** is a METEOR 3-4 image that illustrates the manner in which CIS WXSATs show greater sensitivity to snow and cloud spectral ranges than the NOAAs. With so much of Russia in northerly latitudes this seems to be a reasonable choice. The manner in which clouds stay within the area of the Gulf of Bothnia is seen in other regions - perhaps meteorologists can explain this effect?

Les Sherlock of Bridgnorth sent **Fig. 4** - a NOAA evening picture taken using the JVFAX program. I hope to include notes on the WXSAT use of JVFAX version 6.0 next month.

Non-IBM Computers

I get regular requests from correspondents wanting information on software for Commodore, BBC, Mac and other computers. One letter came from a reader in Solihull who has an Amiga 1200 being used to run an old satellite tracking program called SatTrack. He asks whether anyone knows of more recent Public Domain or Shareware programs for this machine? If anyone knows of WXSAT software for non-IBM computers I will be happy to pass on details.

For anyone contemplating purchasing a new computer for WXSAT operations, I would always recommend giving serious consideration to IBM-compatible computers. It is not a matter of these being (or not being) the best, because of the enormous range of software that is available.

Other Satellites

From my log of satellites heard near the 137MHz band, X3 (PROSPERO) remains active on 137.56MHz; the MIR cosmonauts are heard regularly on their voice communications frequency of 143.625MHz; MAGION 3 sometimes interferes with NOAAs 10 and 12 because it also uses 137.50MHz - though fortunately its orbit is so different that such interference is rare. TEMISAT transmits a powerful but intermittent signal on 137.72MHz.

Digital APT - the Future

I have received more than one call from concerned users and potential users of a.p.t. transmissions from the polar orbiters. They have heard that digital transmissions are around the corner and wonder whether expensive equipment is about to be rendered obsolete. In a word - no.

Proposals for the change-over from analogue (a.p.t.) to digital transmissions are currently scheduled for implementation in the year 2002. The lifetime of electronic boards, receiver components and computer parts is normally several years, so I personally would not be concerned about upgrading hardware for some years yet.

The new digital service will be called Low Resolution Picture Transmission (l.r.p.t.), and there will be a period of overlap between the digital and analogue service. The change could be implemented earlier on the new European satellites. The transmissions will provide more information to users than the a.p.t. images currently received.

It is important to realise that despite the enormous strides made in electronic engineering, the a.p.t. format used by WXSATs has not materially changed since its inception over 30 years ago!

The National Oceanographic and Atmospheric Administration (NOAA) is now embarking on a process of consultation with a.p.t. users to identify those aspects of imagery which users wish to maintain. This is an exceptional opportunity in which readers of this column can participate. I am therefore summ-arising a fairly lengthy document to enable readers to take part.

An Important Opportunity

You are invited to rate, on a scale of one to five, the importance that you attach to each of the following:

1: How important is it to obtain higher resolution (1-3km) images with constant resolution across the scan?
2: How important is it to obtain more channels in the l.r.p.t. data stream?
3: How important is it to obtain an increased number of channels and/or resolution by implementing a data compression scheme?
4: How important is it to have coverage below 25° elevation with acceptable signal-to-noise ratios, using non-steerable antennas?
5: How important is it to have data from other instruments?

NOAA request that the above five items are ranked in importance,

Fig. 3: METEOR 3-4 from Hilda and Jim Richardson.

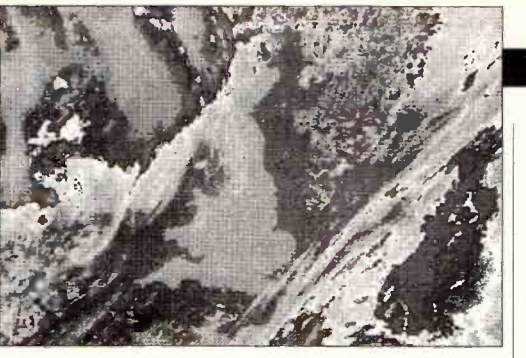


Fig. 4: NOAA from Les Sherlock.

e.g., perhaps you grade item four as five, down to perhaps item three ranking as one.

To help with an appreciation of the significance of these questions, I am including some edited notes provided by NOAA.

Question 1
The current resolution (the smallest distinguishable part) of a.p.t. images is 4km at nadir and grows to approximately 6.5km toward the limb (at the extreme scan angles).

Question 2
The number of different channels transmitted in the l.r.p.t. data stream will have a significant impact on the design of the transmission scheme. Current a.p.t. can transmit only two channels. Some examples of the types of products produced from each of the seven imagery channels are:

Channel 1 (0.6µm): clouds/aerosol/ surface, vegetation index.
Channel 2 (0.8µm): clouds/aerosol/ surface, vegetation index.
Channel 3 (1.5µm): clouds/aerosol/ snow/ice properties, vegetation stress.
Channel 4 (3.7µm): surface temp, cloud properties, fire detection.
Channel 5 (8.5µm): surface temp, desert mapping, cloud/aerosols.
Channel 6 (11µm): surface temp, day/night clouds, water vapour.
Channel 7 (12µm): surface temp, day/night clouds, water vapour.
[note µm = micrometres]

The more channels transmitted, the greater the bandwidth required, and schemes such as data compression must be utilised.

Question 3
As has been discussed previously in this column, current a.p.t. imagery is a reduced resolution subset of the scene provided by the satellite's Advanced Very High Resolution Radiometer (AVHRR). The AVHRR has an Instantaneous Geometric Field of View (IGFOV) of 1.3 milli-radians (0.074°), which provides a basic resolution of 1.1km directly below the satellite.

Because of the earth's curvature and the greater slant distance, the AVHRR's field-of-view increases considerably near the earth's edge. At a point 1400km from the satellite's ground track, the field-of-view has enlarged to an ellipse 2.2km by 5.9km. For a.p.t., every third scan of the AVHRR is used to produce an along-track resolution (line-to-line) of approximately 3.3km. In the cross-track direction (left-to-right) some AVHRR picture elements are averaged over the scan to produce a roughly constant resolution across the picture. The a.p.t. resolution in the cross-track direction varies between 3.6 (below the satellite) to about 6km (at the extreme left and right sides).

Higher Resolution - Higher Cost

For l.r.p.t. it is possible to consider transmitting more picture elements, thus providing a greater resolution, so enabling the user to discern smaller features. Unfortunately, the amount of data to be transmitted increases with the square of the resolution; for example, a 2km resolution picture would require approximately 2.72 times more picture elements than the current 3.3km resolution scene.

Because the frequencies available for transmitting from the satellite are limited, this increased amount of data would necessitate that fewer spectral bands from the AVHRR could be transmitted at the same time.

As noted above, near the limb of the earth (left and right edges of the scan) the basic resolution of the AVHRR is limited, so that a significantly higher resolution could not actually be obtained over the entire area scanned. At least for the areas near the satellite's ground track, higher or lower resolutions than the 2 or 3.3km values mentioned above are possible.

Data compression techniques can increase the effective data volume dramatically (from 3 to 10 times) but will add slightly to the complexity of the receive system, (and therefore its cost,) and could add some noise to the individual picture elements. This additional noise could affect numerical uses for the data, but not pictorial (visual) applications.

Instrumentation

In addition, NOAA are providing us with an opportunity to give preferences for instrumentation data for possible inclusion in the l.r.p.t. data stream!

Question 5
Which of the following instrument data would you prefer to have included, if they could be transmitted in the l.r.p.t. data stream? Please rank the instruments in priority order 1-8 (with 1 being the highest in rating), according to your needs:

AMSU-A	☐	MHS	☐
HIRS/3	☐	SBUV	☐
TOMS	☐	SEM	☐
LEFI	☐	DCS/ARGOS	☐

Background Information

In addition to the AVHRR imager data that will be provided in the l.r.p.t. downlink, data from all or some of the following instruments may be included in the data transmission.

Advanced Microwave Sounding Unit (AMSU-A): The AMSU-A is a 15-channel, total power microwave radiometer that measures scene radiances to permit the calculation of the vertical temperature profile from the earth's surface, to about 1 millibar pressure altitude.

Microwave Humidity Sounder (MHS): The MHS is a 5-channel, total power microwave radiometer that measures scene radiances to permit, in conjunction with the AMSU-A data, calculation of atmospheric humidity profiles.

High Resolution Infrared Sounder/3 (HIRS/3): The HIRS/3 is a scanning instrument used to measure radiant energy emitted by the atmosphere in 19 infra-red spectrum channels. A 20th channel measures solar irradiance. The data acquired allows a profile of the earth's atmosphere to be generated to an altitude of about 40km.

Solar Backscatter Ultraviolet Radiometer (SBUV): The SBUV, a nadir viewing instrument, measures the spectral radiance of the ultraviolet radiation backscattered from the earth, and the direct solar spectral radiance at 12 discrete wavelength bands. This provides measurement, on a global scale, of total ozone concentrations and the vertical distribution of ozone in the earth's atmosphere.

Total Ozone Mapping System (TOMS): The TOMS, a scanning instrument, measures the earth albedo, i.e., the ratio of the ultraviolet radiation backscattered from the earth, to the direct solar spectral radiance, at six discrete wavelength bands. The instrument provides a two-dimensional map of the global total ozone distribution.

Space Environment Monitor (SEM): The SEM is a multi-channel, charged particle spectrometer. It provides measurements indicative of the population of the earth's radiation belts, and of particle precipitation phenomena resulting from solar activity.

Local Electric Field Instrument (LEFI): The LEFI measurements are used to determine the magnitudes of the directional components of the ambient electric field. The data will be used to do Joule heating analysis on the upper atmosphere, to study the connective drifts and flow patterns, to study the aurora, and to study the solar-terrestrial interaction.

Platform Location & Data Collection System (DCS/ARGOS): The DCS/ARGOS receives uplink data from remote, autonomous-data collection platforms. The DCS measures both the frequency and relative time of occurrence of each transmission, to determine platform position. Both the platform data and position are included in the spacecraft downlink data transmissions.

Summary

NOAA point out that inclusion of these instruments' data will affect the implementation of the imager data transmission. Information from users will assist in performing trade-off analyses to determine which instruments are included in the l.r.p.t. downlink, and to lessen the impact on the imager data transmission.

Send your ratings to:
Mary Hughes, APT/HRPT Co-ordinator,
NOAA/NESDIS/DCDB, E/SP21,
NOAA Science Center,
5200 Auth Road, Room 806,
Camp Springs, MD 20746,
USA

The most economical method to use is probably an Aerogramme.

Kepler Elements

I will send a print-out of the latest elements upon receiving an s.a.e. and extra stamp. All known weather satellites plus MIR can be included, together with their transmission frequencies if operating. This data originates from NASA.

I also maintain a massive datafile containing Kepler elements for over 200 satellites, not all being operational. A disk copy of this file is available by sending a cheque/postal order for £3, plus a disk with a self-addressed, stamped envelope. The costs of obtaining this data are not minimal; this is offered as a service to the readership of this column. On occasions many years ago, I was desperate to obtain Kepler elements when trying to identify satellites heard in the various bands.

Frequencies

NOAAs 9, 11 a.p.t. on 137.62MHz; NOAAs 10, 12 on 137.50MHz; METEOR 2-21 on 137.85MHz; METEOR 3-5 or 3-6 on 137.30MHz and FENGYUN 1-3 monitor 137.06 & 137.80MHz

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

LM&S

Long, Medium and Short Waves

Musical signature tunes or other jingles are used by many short wave broadcasters to help listeners identify their station. They are often played just before the start of a broadcast. A useful aid to station identification can be made by recording them. If a gap is left between each recording it will be possible to add a verbal ident later.

Long Wave Reports

Note: l.w. & m.w. frequencies in kHz; s.w. in MHz; Time in UTC (= GMT). Unless stated, logs compiled in the four week period ending January 30.

The RAI 10kW outlet in Caltanisseta, Italy on 189kHz was heard by **Ted Bardy** in N.London at 2029UTC on January 9. At best, it was SINPO 23243. On January 11 he heard their time signal (pips) at 2100, followed by a news bulletin.

While checking the band on January 30, **Roy Merrall** (Dunstable) found that Atlantic 252 was inaudible at 0200. Instead he heard a broadcast in Russian! It peaked SIO243 and he suspected it was coming from Kazan (150kW). He confirmed this by listening to parallels on 234 and 4.055MHz.

Medium Wave Reports

An impressive list of m.w. transatlantic DX was complied during January by **Paul Logan** in Lisnaskea, Co.Fermanagh. Most were logged with his trusty Silver XF900 portable and a 1.5m square loop but he also used a new Yaesu FRG-8800 receiver plus r.w. antenna. Reception was between 2300 and 0200.

Four stations in the USA and two in Canada were logged by Ted Bardy on January 11. He used a large fixed loop (NW/SE) ahead of his NRD-535 receiver. CJYQ in St.John's on 930, often used by DXers as a guide to conditions, rated 33232 at 0210.

Good signals from CJYQ on 930 were also heard on January 16 by **Ron Damp** in E.Worthing. They rated 33333 at 0138. Later, he logged WSSH in Boston on 1510 as 32222 at 0213. Despite further checks, no other signals were heard.

Very favourable conditions were noticed by **Gerry Haynes** (Bushey Heath) on January 26. It was not only the number of stations but also the signal strengths hat amazed him. The first to reach him came from VOCM in St.John's, on 590 - it was 34222 at 0130 with the attenuator on his Kenwood R5000 set to -10dB!

While searching the band on January 30, Roy Merrall picked up the broadcasts from four stations, see chart. He says, "That practically doubled my usual transatlantic score!"

The sky wave signals from some N.Africa and Middle East stations also reached here after dark, see chart. Somewhat unusual daylight conditions were noticed by **George Millmore** in Wootton, IoW. Between 0900 & 1000 on January 5 he logged 68 stations outside the UK! They included Sidi-Bennour, Morocco on 540, SIO211 at 0900 and Les Trembles, Algeria on 549, SIO222 at 0908.

Although Westdeutscher Rundfunk (WDR) have now left 1593, the promised closure of the Deutsche Welle (DW) outlets on 1269 and 1539 has not occurred. The English programmes from DW are carried by the Astra satellite. Vatican Radio was said to be leaving 1611, but several listeners have logged their signals.

Virgin Radio are now using an additional transmitter at Pirbright, Surrey on 1260kHz. **John Wells** (E.Grinstead) suspects it will make his reception of co-channel Brunel Radio quite difficult in future. He says the Midlands' outlet of Sunshine Radio, which is also on 1260, has always been a difficult catch for him.

Whilst visiting Broxbourne (Herts) and Cannock (Staffs), **Ross Lockley** logged some local radio outlets that he cannot hear at his home in Stirling - Spectrum R, London Talkback R, Capitol R, CD603 and Sunshine R. He says, "I was a little surprised to hear Max AM whilst in Cannock, as it's one of my locals up here. I couldn't hear County Sound 1521/1476 at either location, despite it being a very easy catch up here".

Short Wave Reports

Effects of solar flares resulted in a number of sudden ionospheric disturbances (s.i.d) in January. Most lasted only a short while, but a prolonged fade-out occurred on January 29.

Four broadcasters are still using the **25MHz (11m)** band to reach Africa. Reception there may be unreliable, but there were no reports confirming this. At times they were heard in the UK via back scatter and other modes. R.Norway Int, Oslo 25.730 (Norw 1300-1329) was 15241 at 1300 by **Eric Shaw** in Chester; R.Denmark via RNI 25.730 (Da 1330-1355) SIO242 at 1330 by **Kenneth Buck** in Edinburgh; RFI via Allouis 25.820 (Fr 0900-1555) 25232 at 0918 by **Harry Richards** in Barton-on-Humber; R.Nederlands via Flevo 25.970 (Du 1030-1125, Sun only) 45243 at 1030 by **Eddie McKeown** in Newry.

Propagation in the **21MHz (13m)** band has been more favourable. R.Australia's Asia signals often reached here in the morning: 21.595 from Carnarvon (Eng 0100-0900) was 24222 at 0851 in Bushey Heath; 21.725 from Darwin (Eng 0630-1100) 35553 at 1020 by **David Edwardson** in Wallsend.

Also heard here in the morning were UAE R, Abu Dhabi 21.735 (Ar to Eu 0800-1300) 45554 at 0820 by **John Parry** in Northwich and 21.605 (Eng to Eu 1030-1055) SIO455 at 1030 in Edinburgh; R.Japan via Moyabi 21.575 (Eng, Jap to Eu, M.East, Africa 0700-0900) 33333 at 0850 by **Robert Connolly** in Kilkeel; BBC via Limassol, 21.470 (Eng to E.Africa 0430-1615) 33333 at 0952 by **Bill Clark** in Rotherham and via Kranji 21.715 (Eng to SE.Asia 0900-1030) 24222 at 1023 in Barton-on-Humber; R.Vlaanderen Int, Belgium 21.815 (Eng to Africa 1000-1025) 45333 at 1011 by **Darren Beasley** in Bridgwater; R.Moscow Int 21.450 (Eng WS 0800-1300) 25443 at 1100 in Chester; BSKSA Riyadh, Saudi Arabia 21.670 (Ind to SE.Asia 1000-1200) 44444 at 1130 by **Rhoderick Illman** in Oxted.

After mid-day, RFPI, Costa Rica 21.465 (u.s.b. + p.c. 1200-0000) was SIO342 at 1320 in Dunstable; HCJB, Quito 21.455 (Eng, u.s.b. + p.c.) SIO244 at 1520 by **Phil Townsend** in E.London; R.Portugal Int via Sines 21.515 (Eng to India, M.East 1530-1600) 35122 in Newry; BBC via Ascension Is 21.660 (Eng to Africa 0730-1745) 33333 at 1609 by **Charles Beanland** in Gibraltar; WYFR via Okeechobee 21.525 (Eng to Eu, Africa 1600-1700) SIO333 at 1625 by **Sid Morris** in Rowley Regis; also 21.500 (Eng to Eu, Africa 1700-1900) SIO212 at 1700 by **Tom Smyth** in Co.Fermanagh; R.Nederlands via Bonaire 21.515 (Eng to Africa 1730-1925) 35222 at 1740 by **Ronald Kilgore** in Co.Londonderry also 21.590 (Eng to Africa 1730-2025) 24342 at 1751 by **Tim Allison** in Middlesbrough; Monitor R.Int via WCSN 21.640 (Eng to S.Africa 1800-2000) 33333 at 1815 by **Bernard Curtis** in Stalbridge.

Two of R.Australia's **17MHz (16m)** Asia broadcasts have also been heard here quite well: 17.695 from Darwin (Eng to S.Asia 0700-0900) was 34233 at 0834 in Newry; 17.750 from Carnarvon (Eng to Asia 0700-0900) 44333 at 0850 in Bushey Heath.

Morning occupants of this band include AIR Delhi 17.387 (Ind to Indonesia 0845-0945) 33233 at 0850 by **Ron Galliers** in Islington; R.Japan via Yamata 17.860 (Eng to Oceania 0900-1000) 43333 at 0900 in Kilkeel; R.Tunisia Int via Sfax 17.500 (Ar 0700-1800) 34332 at 0920 in Oxted; Voice of Greece, Athens 17.525 (Gr, Eng to Aust 0850-0950, to Japan 1000-1050) SIO433 at 0948 in Rotherham; RFI via Issoudun 17.620 (Fr to M.East, Africa 0800-1230) 44444 at 1103 in Gibraltar; R.Pakistan, Islamabad 17.900 (Eng to Eu 1100-1120) 44444 at 1107 by **Vera Brindley** in Woodhall Spa.

Those noted in the afternoon were R.Tashkent, Uzbekistan 17.745 (Eng to Eu 1200-1228) 44433 in Stirling; HCJB Quito 17.490 (Eng, u.s.b.+ p.c.) SIO455 at 1230 in Edinburgh; BBC via Ascension Is 17.880 (Eng to Africa 1400-2030) 23322 at 1512 in E.Worthing; Africa No.1, Gabon 17.630 (Fr, Eng to W.Africa 0700-1600) 55555 at 1550 by **Chris Shorten** in Norwich; VOA via Morocco? 17.790 (Eng to Africa 1630-1730) 45334 at 1609 by **John Eaton** in Woking; WEWN, Birmingham 17.510 (Eng to Eu 1600-1700) 44333 at 1630 by **Sheila Hughes** in Morden.

Later, RAI via Prato Smeralto 17.780 (It to USA 1830-1905) was 25333 at 1840 in Chester; HCJB Quito 17.790 (Eng to Eu 1900-2000) 45434 at 1930 by **Michael Griffin** in Ross-on-Wye; R.Nederlands via Bonaire, 17.605 (Eng to Africa 1930-2025) 45444 at 1935 in Bridgwater.

Good reception from many areas was noted in the **15MHz (19m)** band. R.Australia via Carnarvon on 15.170 (Eng, Chin, Cant to China, Korea 0900-1400) was a potent 44444 at 0925 in Kilkeel! Their signal to S.Asia on 15.565 (Eng 1100-1300) was 35543 at 1210 in Wallsend.

In the morning the BBC via Limassol 15.575 (Eng to M.East, India 0400-1500) was SIO333 at 0954 in Rotherham and via Antigua 15.220 (Eng to N/S.Am 1100-1400) 43333 at 1132 in Co.Londonderry; Israel R, Jerusalem 15.640 (Eng to Eu, USA 1100-1130) 55555 at 1100 by **Clare Pinder** in Appleby also 15.615 (Heb to Eur, USA 0400-2300) 55545 at 1115 by **Alec Griffiths** in Inverness; R.Norway Int, Oslo 15.160 (Norw to S.Am 1100-1200) 33333 at 1117 in Gibraltar; VOA via

Long Wave Chart

Freq kHz	Station	Country	Power (kW)	Listener
153	Bechar	Algeria	1000	A,D*,Q*
153	Donebach	Germany	500	A,B,C,D*,E,F,G*,I,J*,L,N,O*,P*,Q,R,S,T*,U
153	Brasov	Romania	1200	D*,L*,P*
162	Allouis	France	2000	A,B,C,E,F,G*,J,L,N,O*,P*,Q,R,S,T*,U
171	Kaliningrad	Russia	1000	A,F,G*,L*,N,P*,Q*,U
171	Medi 1-Nador	Morocco	2000	F*,I*,Q*
177	Oranienburg	Germany	750	A,B,F,G*,I,L,N,O*,P*,Q*,U
183	Saarlouis	Germany	2000	A,B,C,E,F,G*,J,L,N,O*,P*,Q,R,S,T*,U
189	Caltanissetta	Italy	10	A*
189	Tbilisi	Georgia	500	P*
198	BBC Droitwich	UK	500	A,B,E,L,N,Q,P*,R,S,T*,U
198	St.Petersburg	Russia	150	L*,P*
207	Munich	Germany	500	A,C,F*,G*,I*,J*,L,N,O*,P*,Q,R,S,U
216	RMC Roumoules	S.France	1400	A,E,G*,L,N,O*,P*,Q,R,S,T*,U
216	Oslo	Norway	200	F*,G,J*,L*,Q
225	Raszyn Resv TX	Poland	?	A,G,I*,J*,L*,N,O*,P*,Q,T*,U
234	Beidweiler	Luxembourg	2000	A,B,E,F*,G,L*,N,O*,P*,Q,R,S,T*,U
234	St.Petersburg	Russia	1000	L*,Q*
243	Kalundborg	Denmark	300	A,C,G,I*,J*,L*,N,O*,Q,R,T*,U
243	Alma-Ata	Kazakhstan	500	M*
252	Tipaza	Algeria	1500	B*,F*,J*,L*,N*,T*,U*
252	Atlantic 252	S.Ireland	500	A,B,C,E,H,I,J*,K,L,N,O,P*,Q,R,S,T,U
252	Kazan	Russia	150	M*
261	Burg	Germany	200	A,B,G,I*,N,O*,Q,T*,U
261	Taldom(Moscow)	Russia	2000	B*,F*,L,P*,Q*,R
270	Topolna	Slovak Rep.	1500	A,G,I*,J*,L,N,O*,P*,R,T*,U
279	Minsk	Belarus	500	A,B*,F*,G,L*,N*,O*,P*,Q*,R

Note: Entries marked * were logged during darkness. All other entries were logged during daylight or at dawn/dusk.

Listeners:
A: Ted Bardy, N.London.
B: Clive Boutell, Dovercourt.
C: Vera Brindley, Woodhall Spa.
D: Tim Bucknall, Congleton.
E: Martin Dale, Stockport.
F: John Eaton, Woking.
G: Ron Galliers, Islington.
H: Alec Griffiths, Inverness.
I: Simon Hockenhull, E.Bristol.
J: Sheila Hughes, Morden.
K: Ronald Kilgore, C.Londonderry.
L: Eddie McKeown, Newry.
M: Roy Merrall, Dunstable.
N: George Millmore, Wootton, IoW.
O: Sid Morris, Rowley Regis.
P: John O'Halloran, Harrogate.
Q: Fred Pallant, Storrington.
R: Martin Price, Shrewsbury.
S: Tom Smyth, Co.Fermanagh.
T: Andrew Stokes, Leicester.
U: Phil Townsend, E.London.

Medium Wave Chart

Freq (kHz)	Station	Country	Power (kW)	Listener
520	Hof/Hurzburg (BR)	Germany	0.2	A*,C*
531	Ain Beida	Algeria	600	J*,L*,U*
531	Torshavn	Faroe Is.	100	H,U*
531	Leipzig	Germany	100	A,C,J*,O,Q,R*,S*,U
531	RNE5 via ?	Spain	?	F*,H,J*,O*,Q
531	Beromunster	Switzerland	500	J*,X*
540	Wavre	Belgium	150/50	A,C,F,O,Q,R*,S*,U
540	Solt	Hungary	2000	H,J*,O*,S*,U*
540	Sidi Bennour	Morocco	600	H*,Q,U*
540	Vitoria (EI)	Spain	10	J*,O*
549	Les Trembles	Algeria	600	E*,J*,L*,Q,S*,U*
549	Thurmau (DLF)	Germany	200	A,C,D,F,H,O,Q,R*,S*
549	St.Petersburg	Russia	1000	J*,X*
558	Espoo	Finland	100	B*
558	Rostock (NDR)	Germany	20	O*,S*
558	RNE5 via ?	Spain	?	J*,O*,Q*,S*,U*
567	Berlin	Germany	100	J*,L*,O*,Q,S*,U*,X*
567	Tullamore (RTE1)	Ireland (S)	500	C,D,F,G,H,J*,Q,R, S*,U,W
567	RNE5 via ?	Spain	?	J*,O*
576	Muhlacker (SDR)	Germany	500	A,H,Q,S*
576	Riga	Latvia	500	J*,U*
576	Barcelona (RNE5)	Spain	50	A,H*,J*,O*,Q*,U*
585	Orf Wien	Austria	600	Q,U
585	Paris (FIP)	France	8	C,G,H,O*,Q,S*
585	Madrid (RNE1)	Spain	200	A,C*,F*,G*,H*,J*,O*, Q,R*,S*,U*,W*
585	Dumfries (BBC Scot)	UK	2	U
594	Frankfurt (HR)	Germany	1000/400	A,C,O,F,H*,O,Q,S*,U
594	Oujda-1	Morocco	100	J*,O*
594	Muge	Portugal	100	J*,X*
594	Duba	Saudi Arabia	2000	U*
603	Sevilla (RNE5)	Spain	50	H*,J*,O*,S*
603	Newcastle (BBC4)	UK	2	O,W*
612	Athlone (RTE2)	Ireland (S)	100	A,F,G,I,K,Q,R,U,W
612	RNE1 via ?	Spain	10	H*,J*,O
621	Wavre	Belgium	80	A,C,G,H*,O,Q,R*,S*,U
621	RNE1 via ?	Spain	10	J*
621	Barcelona (OCR)	Spain	50	J*,O*,Q*
630	Vigra	Norway	100	Q,Q*,S*,U*
630	Tunis-Djedeida	Tunisia	600	J*
639	Praha (Liblice)	Czech	1500	H*,O,Q*,U*,X*
639	RNE1 via ?	Spain	?	A,F*,H*,J*,O*,Q, R*,S*,U*
648	RNE1 via ?	Spain	10	J*,U*
648	Orfordness (BBC)	UK	500	C,G*,K,O,Q,R,U*
657	Neubrandenburg (NDR)	Germany	250	O,Q,U*
657	Napoli	Italy	120	J*
657	Madrid (RNE5)	Spain	20	H*,J*,O*,Q
657	Wrexham (BBC Wales)	UK	2	F*,R,U*
666	Bodensees'dr (SWF)	Germany	300/180	H,J,O,Q,U*
666	R.Vilnius	Lithuania	500	B*,C,J*,O*
666	Lisboa	Portugal	135	Q*,U*
666	Barcelona (COPE)	Spain	10	J*
675	Marseille	France	600	E*,H*,O*,Q,U*
675	Bodo	Norway	10	F*
684	Sevilla (RNE1)	Spain	500	F*,H*,J*,O*,Q*,S*,U*
684	Beograd	Yugoslavia	2000	H*,J*,O*,Q
693	Berlin	Germany	250	J*
693	Tortosa (RNE1)	Spain	2	J*
693	Droitwich (BBC5)	UK	150	C,F,R,S*,U,W
702	Flensburg (NDR)	Germany	5	A,O,Q*
702	Monte Carlo	Monaco	300	J*
702	Presov	Slovak Rep.	400	H*
702	Zamora (RNE1)	Spain	10	J*,O*,Q*,U*
711	Rennes 1	France	300	A,C,H,K,O*,Q,R*,U*
711	Heidelberg	Germany	5	H*
711	Laayoune	Morocco	600	H*,J*,O*,U*
711	Murcia (COPE)	Spain	5	J*
720	Langenberg	Germany	200	C
720	Lisnagarvey (BBC4)	Ireland (N)	10	F,Q*,R,S*,U*,W
720	Norte	Portugal	100	J*,U*
720	Santa Cruz	Tenerife	20	J*
720	Lots Rd,Ldn (BBC4)	UK	0.5	C,Q,U*
729	Cork (RTE1)	Ireland (S)	10	O*,Q*,R,U
729	RNE1 via ?	Spain	?	B,G*,H*,J*,Q,S*, U*,W*
738	Paris	France	4	C,Q
738	Poznan	Poland	300	Q*,W*
738	Barcelona (RNE1)	Spain	500	F*,H*,J*,O*,Q,U*
747	Flevo (Hilv2)	Holland	400	A,C,D,F*,H*,M*,O, R*,S*,U
747	Cadiz (RNE5)	Spain	10	G*,J*,U*
756	Braunschweig (DLF)	Germany	800/200	A,C,O,F,H*,O,Q,R*,S*
756	Lugoj	Romania	400	Q*
756	Bilbao (EI)	Spain	5	J*,O*
756	Redruth (BBC4)	UK	2	W*
765	Sottens	Switzerland	500	F,H,J*,L,O*,Q,U*
774	Abis	Egypt	500	J*
774	Enniskillen (BBC4)	Ireland (N)	1	O
774	Agadir	Morocco	50	J*
774	RNE1 via ?	Spain	?	H,J*,O*,Q*,U*
774	Plymouth (BBC4)	UK	1	S*
783	Burg	Germany	1000	H*,O,Q,U*
783	Miramar (R.Porto)	Portugal	100	J*,O*,Q*,U*
792	Limoges	France	300	H,O,U
792	Lingen (NDR)	Germany	5	O*,Q*,S*
792	Sevilla (SER)	Spain	20	H*,J*,O*,Q,S*,U*
801	Munchen-Ismaning	Germany	300	C,H,O,Q,U*
801	RNE1 via ?	Spain	?	H*,J*,O*,Q*,S*,U*
810	Voru	Estonia	5	Q*
810	Madrid (SER)	Spain	20	H*,J*,L*,O*,Q*
810	Burghead (BBC)	UK	100	W
810	Westerglen (BBC)	UK	100	C,F,K,L*,O,Q,R,U*
819	Batra	Egypt	450	J*,O*
819	Toulouse	France	50	O*,U*
819	Warsaw	Poland	300	C*
828	Hannover (NDR)	Germany	100/5	H*,O,S*
828	Barcelona (SER)	Spain	50	U*
837	Nancy	France	200	C,H,O,Q*,S*,U*
837	COPE via ?	Spain	?	H*,J*,O,Q,U*
837	Kharkov	Ukraine	150	U*
846	Ostrava	Czech. Rep.	30	J*
846	Rome	Italy	540	C,H*,J*,Q,R*,U*
855	Berlin	Germany	100	H*,O*
855	RNE1 via ?	Spain	?	H*,J*,O,Q*,R*,S*, U*,W*
864	Paris	France	300	A,C,O,F,O,Q,U*
882	Socuellamos (RNE1)	Spain	2	H*,J*,Q*
873	Frankfurt (AFN)	Germany	150	B*,C*,F*,H*,O*, Q*,R*,U*
873	Zaragoza (SER)	Spain	20	J*,O*,Q*,U*
882	COPE via ?	Spain	?	H*,J*,O,Q*,U*,W*
882	Washford (BBC)	UK	100	C,M*,O,Q,R,U*
891	Algiers	Algeria	600/300	E*,H*,L*,O*,R*,U*
891	Huisberg	Netherlands	20	C,O*,Q
900	Milan	Italy	600	C,F*,H*,J*,O*,Q*,U
900	COPE via ?	Spain	?	J*,O*,Q*,U*
900	Qurayyat	Saudi Arabia	1000	Q*
909	Mallorca (RNE5)	Spain	10	H*,J*
909	B'mans Pk (BBC2)	UK	140	C,Q,R,U,W
918	R.Ljubljana	Slovenia	600/100	Q,U*
918	Madrid (R.Int)	Spain	20	J*,O*,Q*,U*
927	Wolvertem	Belgium	300	A,C,H*,O,Q,R*,U
927	Velke Kostolany	Slovakia	40	D
936	Bremen	Germany	100	C,H*,O,Q*,U,W*
936	Venezia	Italy	20	D*
936	Agadir	Morocco	600	J*
936	RNE5 via ?	Spain	?	H*,U*
936	Lvov	Ukraine	500	C*,U*
945	Toulouse	France	300	H,O*,Q,U*
954	Brno (Dobrochov)	Czech Rep.	200	O*,U*
954	Madrid (CI)	Spain	20	H*,J*,O*,Q*,U*
963	Sofia	Bulgaria	150	Q*
963	Pori	Finland	600	A,C,H*,K*,O*,Q,R*,U*
963	Paris	France	8	Q*
972	Hamburg (NDR)	Germany	300	A,C,F*,H*,O,Q
972	RNE1 via ?	Spain	?	J*,U*
972	Nikolayev	Ukraine	500	J*,U*
981	Alger	Algeria	600/300	H*,J*,Q*,R*,U
981	Megara	Greece	200	J*
981	Coimbra	Portugal	10	J*,Q
990	Berlin	Germany	300	H*,L,O*,U*
990	R.Bilbao(SER)	Spain	10	H,J*,U*
990	Redmoss (BBC Scot)	UK	1	O*
999	Schwerin (RIAS)	Germany	20	O*
999	Madrid (COPE)	Spain	50	H*,J*,O*,U*,W*
1008	Las Palmas (SER)	Gran Canaria	?	J*,O*
1008	Flevo (Hilv-5)	Holland	400	A,C,O,Q,R*,U
1017	Rheinsender (SWF)	Germany	600	C,F*,H*,O,Q,R*
1017	RNE5 via ?	Spain	?	J*
1026	Graz-Dobl	Austria	100	O*,Q*
1026	SER via ?	Spain	?	H,J*,U*
1035	Tallinn	Estonia	500	Q*
1035	Milan	Italy	50	J*
1035	Lisbon (Prog 3)	Portugal	120	O*,Q*,U*
1044	Dresden	Germany	250	O*,Q,U*
1044	Sebaa-Aioun	Morocco	300	H*
1044	S.Sebastian (SER)	Spain	10	H,J*,O*,Q*,U*
1053	Zarogoza (COPE)	Spain	10	H*
1053	Burghead (BBC1)	UK	20	W
1053	Droitwich (BBC1)	Uk	150	Q,R,U*
1053	Postwick (BBC1)	UK	10	C
1062	Kalundborg	Denmark	250	A,C,O,Q,U*
1062	Cagliari	Italy	25	P*
1062	Diyabakir	Turkey	300	P*
1071	Brest	France	20	O*,Q,U*
1071	Lille	France	40	A,C,H,J*,U*
1071	Riga	Latvia	50	Q*
1071	Bilbao (EI)	Spain	5	H*,J*,O*
1080	Katowice	Poland	1500	C,H*,O*,Q,U*
1080	Toledo (QCR)	Spain	5	J*
1080	SER via ?	Spain	?	H*,O*,U*
1089	Weimar	Germany	20	J*
1089	B'mans Pk (BBC1)	UK	150	C,Q,R,U,W
1098	Nitra (Jarok)	Slovakia	1500	C,H*,J*,O*,Q,U*
1098	RNE5 via ?	Spain	?	H,J*,O*,U*
1107	Batra	Egypt	600	J*
1107	AFN via ?	Germany	10	F,H*,O*
1107	RNE5 via ?	Spain	?	H,J*,O*,Q*
1107	Wallasey (BBC1)	UK	0.5	U
1116	Bari	Italy	150	H*,U*
1116	Pontevedra (SER)	Spain	5	J*,O*
1125	La Louviere	Belgium	20	O*,Q
1125	Deanovec	Croatia	100	C*
1125	RNE5 via ?	Spain	?	H*,O*,Q*
1125	Vitoria (RNE5)	Spain	10	J*
1125	Llandrindod Wells	UK	1	U
1134	Zadar	Croatia	600/1200	C*,H*,O*,Q*,R*,U
1134	Sulaibiyah	Kuwait	750	J*
1134,	COPE via ?	Spain	2	H,J*,O*,Q,U*
1143	AFN via ?	Germany	1	U*
1143	Stuttgart (AFN)	Germany	10	H*,J*,O*,R*
1143	Messina	Italy	6	O*
1143	Bolshakovo (Mayak)	Russia	150	J*
1143	COPE via ?	Spain	2	H,J*,Q*,U*
1152	RNE5 via ?	Spain	10	U*
1161	Strasbourg (Fint)	France	200	H,O*,Q*,U,W*
1161	S.Sebastian (EI)	Spain	50	H*,U*
1170	Vila Real	Portugal	10	O*
1179	SER via ?	Spain	?	H*,J*,O*,U,W
1188	Kuurne	Belgium	5	A,H,O*,Q
1188	Szolnok	Hungary	135	J*,O*
1197	Munich (VOA)	Germany	300	J*,O*,V
1197	Vitoria (EI)	Spain	5	J*
1197	Virgin via ?	UK	?	A,C,M*,O*,Q,U,V
1197	Cheltenham (V)	UK	1	K
1197	Chesterton Fen (V)	UK	0.2	R
1197	Wallasey (V)	UK	2	B*
1206	Bordeaux	France	100	U
1206	Wroclaw	Poland	200	H*,O*,Q
1215	COPE via ?	Spain	?	O*
1215	Virgin via ?	UK	?	C,F,I*,M*,N,Q,U,V,W
1215	Droitwich (V)	UK	105	R
1215	Lisnagarvey (V)	UK	16	O*
1224	Vidin	Bulgaria	500	O*,W
1224	COPE via ?	Spain	?	U*
1233	Liege	Belgium	5	Q*,U
1233	Nitra	Slovakia	40	O*
1233	Virgin via ?	UK	?	A,M*
1242	Marseille	France	150	O*,U*
1242	Virgin via ?	UK	?	C*,K
1251	Marcali	Hungary	500	J*,O*,Q*,U
1251	Huisberg	Netherlands	10	O*,Q
1260	SER via ?	Spain	?	O*,Q*
1260	Virgin R, Pirbright	UK	?	A,Y
1269	Neumunster (DLF)	Germany	600	C,F,H*,O,Q,R*,U,W
1269	COPE via ?	Spain	?	J*
1278	Strasbourg	France	300	U
1278	Dublin/Cork (RTE2)	Ireland (S)	10	C*,H*,O,R,U
1287	Melnik	Czech Rep.	400	A,C,H*,J*,O*,Q*,U
1287	Lerida (SER)	Spain	10	J*,Q*,U*
1296	Valencia (COPE)	Spain	10	H*,J*,O*,Q*
1296	Orfordness (BBC)	UK	500	C,G,O*
1305	Marche	Belgium	10/5	U*,U*
1305	Rzeszow	Poland	100	H*,O*,Q,U*
1305	RNE5 via ?	Spain	?	J*,Q*,U*
1314	Kvitsoy	Norway	1200	A,B*,C,F,G,H*,O,Q, R*,U,V,W
1314	RNE5 via ?	Spain	?	J*,O*
1323	Shkoder	Albania	15	O*
1323	Wachenbrunn (RMWS)	Germany	1000/150	A,G,H*,L,O*,U
1332	Rome	Italy	300	H*,J*,O*,Q,U*
1341	Lakihegy	Hungary	300	O*,U*
1341	Lisnagarvey (BBC)	Ireland (N)	100	C,F,H*,I*,K,Q,R,U,W
1341	Tarrasa (SER)	Spain	2	J*,Q
1350	Nancy/Nice	France	100	A,H*,O,Q,R*,U*,W
1350	Cesvaine/Kuldiga	Latvia	50	J*
1359	Melilla	Morocco	5	H*,U*
1359	Arganda (RNE-FS)	Spain	600	J*,U*
1368	Foxdale (Manx R)	IOM	20	C*,L*,O,Q*,R*,U,W*
1377	Lille	France	300	A,C,G,H,J*,O,Q,R*,U,W
1386	Kaliningrad	Russia	500	A,G,H*,K*,O*,Q,R*,U*
1395	Lushnje (Tirana)	Albania	1000	H*,J*,O*,Q*,R*,U*
1395	Ufa	Russia	?	P*
1404	Brest	France	20	F*,G,J*,O*,Q,R*,U*
1413	Masirah Is (BBC)	Oman	1500	P*
1413	RNE5 via ?	Spain	?	J*,O*
1413	Pristina	Yugoslavia	1000	J*
1422	Heusweiler (SR)	Germany	1200/600	C*,F*,G,H*,O,Q,R*,U
1440	Kyzylorda	Kazakhstan	?	J*
1440	Marnach (RTL)	Luxembourg	1200	A,C,H*,O*,Q,R*,U,V,W
1440	Damman	Saudi Arabia	1600	O*,V*
1449	Berlin	Germany	5	O*
1449	Squinzano	Italy	50	H*,Q*
1458	Lushnje (Tirana)	Albania	500	C*,U*
1467	Monte Carlo (TWR)	Monaco	1000/400	D,F*,G*,H*,O*,Q*,U
1476	Wien-Bisamberg	Austria	600	H*,J*,O*,Q*,U
1485	Augsburg (AFN)	Germany	1	J*
1485	Bournem'th (BBC1)	UK	2	Q
1494	Clermont-Ferrand	France	20	G*,H,O*,Q,U*
1494	St.Petersburg	Russia	1000	H*,J*,O*,Q*,U*
1503	Stargard	Poland	300	I*,J*,O*,Q*,R*,U*
1503	RNE5 via ?	Spain	?	G*,H*,J*,Q*
1512	Wolvertem	Belgium	600	A,B,F,G*,H*,L*,M*, O*,Q,R*,T*,U
1521	Kosice (Cizatice)	Slovakia	600	J*,O*,Q*,U*
1521	Duba	Saudi Arabia	2000	U*
1521	R.Manresa (SER)	Spain	2	J*
1530	Vatican R	Italy	150/450	F*,G*,H*,J*,M*,O*, Q*,U*
1539	Mainflingen (DLF)	Germany	700	H,O*,Q,R*,U*
1539	Valladolid (SER)	Spain	5	F,G*,J*
1557	Nice	France	300	O*,U*
1566	Mayak	Russia	?	O*
1566	Sarnen	Switzerland	300	H*,U*
1566	Sfax	Tunisia	1200	O*
1575	Genova	Italy	50	H*,J*,O*,Q*,U*
1575	SER via ?	Spain	5	H*,J*,U*
1584	SER via ?	Spain	2	J*,Q*,U*
1602	SER via ?	Spain	?	J*,Q*,U*
1602	Vitoria(EI)	Spain	10	J*,U*
1611	Vatican R	Italy	15	J*,O*,P*

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Listeners:

A: Ted Bardy, N.London
B: Leo Barr, Sunderland.
C: Clive Boutell, Dovercourt.
D: Vera Brindley, Woodhall Spa.
E: Tim Bucknall, Congleton.
F: Martin Dale, Stockport.
G: John Eaton, Woking.
H: Ron Galliers, N.London.
I: Alec Griffiths, Inverness.
J: Gerry Haynes, Bushey Heath.
K: Simon Hockenhull, E.Bristol.
L: Sheila Hughes, Morden.
M: Rhoderick Illman, Oxted.
N: Ronald Kilgore, Co.Londonderry
O: Eddie McKeown, Newry.
P: Roy Merrall, Dunstable.
Q: George Millmore, Wootton IoW.
R: Sid Morris, Rowley Regis.
S: John O'Halloran, Harrogate.
T: Clare Pinder, Appleby.
U: Martin Price, Shrewsbury.
V: Harry Richards, Barton-on-Humber.
W: Tom Smyth, Co.Fermanagh
X: Phil Townsend, E.London.
Y: John Wells, East Grinstead.

Local Radio Chart

Freq (kHz)	Station	ILR BBC	e.m.r.p (kW)	Listener
558	Spectrum R	I	7.50	B,E,G,J*,K,N,D,P,R
585	R.Solway	B	2.00	M,P
603	Cheltenham(CD603)	I	?	E,G,H,L,N,O,P,R
603	Invicta SG (Coast)	I	0.10	B,G,J*,K*,M*,N,P,R
630	R.Bedfordshire(3CR)	B	0.20	B,E,G,H,I*,K,L,N,O,P,R
630	R.Cornwall	B	2.00	N,Q*
657	R.Clwyd	B	2.00	B,G,M*,O,P,R
666	DevonAir R	I	0.34	G,N
666	R.York	B	0.80	G
729	BBC Essex	B	0.20	B,C,G,K,N,P,R
738	Hereford/Worcester	B	0.037	G,O,P
756	R.Cumbria	B	1.00	G,M
756	R.Maldwyn	I	0.63	G,H,O,P,R
765	BBC Essex	B	0.50	B,C,G,K,M*,N,O,P,R
774	R.Kent	B	0.70	B,G,K,N,R
774	R.Leeds	B	0.50	C,G
774	Gloucester (3CSG)	I	0.14	H,L,O,P
792	Chiltern (S.Gold)	I	0.27	B,G,K*,O*,P,R
801	R.Devon	B	2.00	G,H,M*,N,P,R
828	Chiltern (S.Gold)	I	0.20	B,G,K,P*,R
828	R.WM	B	0.20	K*,O,P
828	2CR (Cl.Gold)	I	0.27	H,N,R
837	R.Cumbria/Furness	B	1.50	G,M*,P
837	R.Leicester	B	0.45	B,G,L*,N,O,P,R
855	R.Devon	B	1.00	G,N
855	R.Norfolk	B	1.50	B,C,G,R
855	Sunshine R	I	0.15	G,L,O,P,R
873	R.Norfolk	B	0.30	B,C,G,L,N,P,R
936	Brunel R (Cl.Gold)	I	0.18	G,N,O*P,R
945	R.Trent (Gem AM)	I	0.20	B,D,G,L*,M*,O,P,R
954	DevonAir (Cl.Gld)	I	0.32	G,N,R
954	R.Wyvern (WYVN)	I	0.16	G,O,P,R
990	WABC (Nice & Easy)	I	0.09	G,I,L*,O,P
990	R.Aberdeen	B	1.00	G,M*
990	R.Devon	B	1.00	G,N
990	Hallam R.(Gt.Yks)	I	0.25	G
999	R.Solent	B	1.00	B,G,N,R
999	R.Trent (Gem AM)	I	0.25	B,G,P,R
999	Red Rose (Gold)	I	0.80	M*,P
1017	Beacon R (WABC)	I	0.70	D,G,L,O,P,R
1026	Downtown R	I	1.70	Q
1026	R.Cambridgeshire	B	0.50	B,G,H,I,K,L,R
1026	R.Jersey	B	1.00	G,N,R
1035	NorthSound R	I	0.78	B*,G,M*
1035	R.Kent	B	0.50	B,G,K*,P,R
1035	R.Sheffield	B	1.00	C,G
1035	West Sound R	I	0.32	M*
1107	Moray Firth R	I	1.50	B*,G,M*
1116	R.Derby	B	1.20	B*,D,G,L,M*,O,P,R
1116	R.Guernsey	B	0.50	B*,G,N,R
1152	BRMB (Xtra-AM)	I	3.00	L,O,P
1152	LBC (L.Talkback R)	I	23.50	B,G,I*,K,N,R
1152	Piccadilly R(Gold)	I	1.50	D
1152	R.Broadland	I	0.83	B,M*,R
1161	Brunel R.(Cl.Gold)	I	0.16	G,P,R
1161	R.Bedfordshire(3CR)	B	0.10	B,G,K,P,R
1161	R.Sussex & Surrey	B	1.00	B,G,N,R
1161	R.Tay	I	1.40	B*,M*,P,Q*
1161	Humberside(Gt.Yks)	I	0.35	F*
1170	Hi Wycombe(1170AM)	I	?	G*,R
1170	Portsmouth (SCR)	I	0.12	G,N,R
1170	R.Orwell (SGR)	I	0.28	B,G
1170	Signal R.(S.Gold)	I	0.20	D,G,L*,O,P
1242	Invicta Snd(Coast)	I	0.32	B,G,R
1242	Isle of Wight R.	I	0.50	G,N
1251	Saxon R. (SGR)	I	0.76	B,G,K,P,R
1260	Brunel R (Cl.Gold)	I	1.60	M*
1260	Sunrise R	I	0.29	B,G,N,O,R
1260	Marcher Snd (Gold)	I	0.64	D,P,Q*
1278	Bradford (Gt.Yks)	I	0.43	G
1305	Barnsley (Gt.Yks)	I	0.15	D,G,P
1305	Red Dragon (Touch)	I	0.20	G,N,P,R
1323	R.Bristol (Som.Snd)	B	0.63	G,P,R
1323	Brighton (SCR)	I	0.50	B,G,I,N,R
1332	Hereward R.(WGMS)	I	0.60	B,G,K*,L*,P,R
1332	Wiltshire Sound	B	0.30	G,M*,N,P*,R
1359	Essex R.(BreezeAM)	I	0.28	G,K*,R
1359	Mercia Snd(Xtra-AM)	I	0.27	G*,L,O,P
1359	Red Dragon (Touch)	I	0.20	G
1359	R.Solent	B	0.85	M*,N
1368	R.Lincolnshire	B	2.00	G,R
1368	R.Sussex & Surrey	B	0.50	G,I,N,R
1368	Wiltshire Sound	B	0.10	G,N
1413	Sunrise R.	I	0.125	E,G,I*,N,R
1431	Essex R.(Breeze AM)	I	0.35	B,G,L*,K*,M*,N,P,Q*,R
1431	R 210 (Cl.Gold)	I	0.14	G,N,P,R
1449	R.Peterboro/Cambs	B	0.15	B,M*,P,R
1458	R.Devon	B	2.00	N,R
1458	R.Newcastle	B	2.00	M*
1458	Radio WM	B	5.00	O,P
1458	Sunrise R.	I	50.00	B,D*,G,K*,M*,R
1476	County Sound	I	0.50	F*,G,I*,M*,N,P,R
1485	R.Humberside	B	1.00	A,G*
1485	R.Merseyside	B	1.20	D,G,L,M*,O,P,Q*
1485	R.Sussex & Surrey	B	1.00	E,G,N,R
1503	R.Stoke-on-Trent	B	1.00	D,G,M*,N,O,P
1521	Reigate (Cty Snd)	I	0.64	G,I*,P,R
1530	Sheffield (Gt.Yks)	I	0.74	D,G,N
1530	R.Essex	B	0.15	E,G,N,P,R
1530	R.Wyvern (WYVN)	I	0.52	F*,G,I,M*,N,O,P
1548	Capital R (Cap G)	I	97.50	G*,K*,N,P,R
1548	R.Bristol	B	5.00	L,M*,N,Q*
1548	Liverpool (City G)	I	4.40	P
1548	R.Forth (Max AM)	I	2.20	L*,M*
1557	Chiltern R.(Gold)	I	0.76	M*,O*
1557	Southampton (SCR)	I	0.50	G,L,N,P,R
1557	R.Lancashire	B	0.25	F*
1557	Tendring (Mellow)	I	?	G*,J*,K,R
1584	Kettering (KCBC)	I	0.04	G,N,R
1584	R.Nottingham	B	1.00	D,F*,G,N,P
1584	R.Shropshire	B	0.50	G*,O,P
1584	R.Tay	I	0.21	G,P*,Q*
1602	R.Kent	B	0.25	F*,G,K,M*,N,P,R

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G: Gerry Haynes, Bushey Heath.
H: Simon Hockenhull, E.Bristol.
I: Sheila Hughes, Morden.
J: Rhoderick Illman, Oxted.
K: Ross Lockley, Broxbourne.
L: Ross Lockley, Cannock.
M: Eddie McKeown, Newry.
N: George Millmore, Wootton, IoW.
O: Sid Morris, Rowley Regis.
P: Martin Price, Shrewsbury.
Q: Tom Smyth, Co.Fermanagh.
R: John Wells, East Grinstead.

Transatlantic DX Chart

Freq kHz	Station	Location	Time UTC	DXer
		USA		
770	WABC	New York, NY	*	E
850	WHDH	Boston, MA	*	E
1010	WINS	New York, NY	0151	A,D,E
1030	WBZ	Boston, MA	*	E
1050	WEVD	New York, NY	0154	A,D,E
1090	WBAL	Baltimore, MD	0158	D,E,F
1130	WBBR	New York	0234	A,D,E,F
1180	WHAM	Rochester, NY	*	E
1500	WTOP	Washington, DC	0100	E,F
1510	WSSH	Boston, MA	0240	A,B,D,E,F
1520	WWKB	Buffalo, NY	0210	D,E
1560	WQEW	New York	*	E
		Canada		
560	CHVO	Carbonear, NF	*	E
580	CJFX	Antigonish, NS	*	E
590	VOCM	St.John's, NF	0132	A,D,E
600	CBNA	St.Anthony, NF	*	E
620	CKCM	Grand Falls, NF	*	E
640	CBN	St.John's, NF	*	E
650	CKGA	Gander,NF	*	E
690	CBF	Montreal, PQ	0243	A
710	CKVO	Clarenville, NF	0140	D,E
720	CHTN	Charlottetown, PEI	*	E
740	CHCM	Marystown, NF	0145	D,E
750	CBGY	Bonavista Bay, NF	*	E
910	CHRL	Roberval, PQ	*	E
920	CJCH	Halifax, NS	*	E
930	CFBC	St.John, NB	0149	C,D,E
930	CJYQ	St.John's, NF	0136	A,B,D,E,F
940	CBM	Montreal, PQ	*	E
1050	CHUM	Toronto, ON	*	E
1060	CJRP	Quebec, PQ	*	E
1140	CBI	Sydney, NS	*	E
1375	RFO	St.Pierre/Miquelon	0206	D,E
1380	CFDA	Victoriaville, PQ	*	E
1380	CKPC	Brantford, ON	0236	A
1390	CHOO	Ajax, ON	*	E
1400	CBG	Gander,NF	*	E
1410	CIGO	Pt.Hawkesbury, NS	*	E
1480	CHRD	Drummondville, PQ	*	E
1510	CJRS	Sherbrooke, PQ	*	E
		C.America & Caribbean.		
800	TWR	Bonaire,Ned.Antilles.*		E
1610	Caribbean Beacon	The Valley,Anguilla	*	E
		South America		
780	YVMN R.Coro	Coro, Venezuela	*	E
1470	R.Vibracion	Carupano, Venezuela	*	E
1500	R.Dos Mil (2000)	Cumana, Venezuela	*	E

* Heard between 2300 and 0200UTC

DXers:
A110: Ted Bardy, N.London.
B131: Ron Damp, Worthing.
C140: Ron Galliers, Islington.
D152: Gerry Haynes, Bushey Heath.
E173: Paul Logan, Lisnaskea.
F177: Roy Merrall, Dunstable.

Philippines 15.410 (Chin to China 1100-1700) SIO322 at 1130 by **Philip Rambaut** in Macclesfield.

After mid-day, R.Austria Int via Moosbrunn 15.450 (Ger, Eng, Fr to Far East 1200-1500) was 33433 at 1230 in Ross-on-Wye; Israel R, Jerusalem 15.640 (Eng to Eu, USA 1400-1425) 55555 at 1408 in Norwich; AIR via ? 15.120 (Eng to SE.Asia 1330-1500) 43333 at 1409 in E.Worthing; RCI via Sines 15.325 (Eng to Eu, M.East, Africa 1430-1500) 33433 at 1430 in Chester; Voice of Greece, Athens 15.630 (Gr, Eng to M.East, E.Africa 1400-1450) 55444 at 1437 in Woodhall Spa; R.Moscow Int 15.345 (Eng WS 0830-1600) 44444 at 1430 in Morden; KTWR Agana, Guam 15.610 (Eng to S.Asia, India 1500-1700) 24222 at 1549 in Newry; R.Veritas Asia, Philippines 15.140 (Pil + Eng ident 1502-1530, also 1530-1600 Sat/Sun/Mon) 33344 at 1559 in Gibraltar; China R.Int via Mali 15.130 (Eng to E/S.Africa 1600-1657) 53333 at 1607 in Bushey Heath; Africa No.1 via Moyabi 15.475 (Fr to W.Africa 1600-1900) 35443 at 1620 in Woking.

Later, WRNO, New Orleans 15.420 (Eng to E.USA, Eu 1600-2300) was 34433 at 1722 in Oxted; BBC via Ascension Is 15.400 (Eng to Africa 1500-2315) SIO334 at 1745 in E.London and via Skelton 15.070 (Eng to E.Eu, M.East 0600-2315) 25322 at 2305 by **Simon Hockenhull** in E.Bristol; Channel Africa, Johannesburg 15.240 (Eng to W.Africa 1600-1755) 34232 at 1748 in Middlesbrough; WWCR, Nashville 15.685 Eng to Eu 1100-0000) 33333 at 1820 in Stalbridge; RNB Brasilia, Brazil 15.265 (Eng, Ger to Eu 1800-2020) SIO343 at 1855 in Edinburgh; RAI Rome 15.340 (Ar to Nr East 1910-1930) 44333 at 1909 in Islington; RAE, Buenos Aires 15.345 (Eng, It, Fr, Ger to Eu, Africa 1800-2300) 34322 at 2015 in Bridgwater; VOA via Greenville 15.245 (Ar to N.Africa 1800-2200) 22231 at 2050 by **Peter Pollard** in Rugby; R.Havana Cuba 15.165 (Eng to Eu 2100-2200) 24432 at 2110 in Stirling.

Good reception from many areas was also noted in the **13MHz (22m)** band. R.Australia was logged on 13.605 from Darwin (Eng, Chin to Asia 0900-1400) as 35533 at 0924 in Wallsend and SIO444 at 1150 in Rowley Regis; also on 13.755 from Carnarvon (Kh, Eng to S.Asia 1230-1430) was 54344 at 1422 in Norwich.

Also heard here were Monitor R.Int via KHBI 13.615 (Eng to Oceania 0800-1000), 33222 at 0800 in Mordeh and via WCSN 13.770 (Eng [Fr Sun] to Africa 2000-2057) SIO444 at 2015 in Edinburgh; SRI via Sottens? 13.635 (Eng, Fr, Ger to F.East 1100-1230) 52433 at 1112 in Co.Londonderry; R.Bulgaria, Sofia 13.645 (Eng to USA, Aust 1130-1300) 32323 at 1256 by **Leo Barr** in Sunderland; WWCR, Nashville 13.845 (Eng to USA 1200-0100) 23333 at 1456 in E.Worthing; R.Nederlands via Flevo 13.700 (Eng to S.Asia 1330-1625) 33333 at 1600 in Rugby; WEWN, Birmingham 13.615 (Eng to USA 1600-1755) 44333 at 1743 in Bushey Heath; R.Austria Int via Moosbrunn 13.730 (Ger, Eng, Sp, Fr to S.Africa 1800-2200) 42222 at 1930 in Newry; DW via Sines 13.610 (Ger to Africa 1800-2000) 32222 at 1945 in Stalbridge; VOA via Selebi-Phikwe 13.710 (Eng to Africa 1600-2200) 45444 at 1946 in Woking; China R.Int via Fr.Guiana 13.685 (Sp to S.Am 0200-0255) 33333 at 0235 in Kilkeel.

Some broadcasts to Europe in this band come from R.Austria Int via Moosbrunn 13.730 (Ger, Eng, Fr, Sp 0400-1700) 45544 at 1230 in Ross-on-Wye; Croatian R, Zargreb 13.830 (Cr [Eng ???] 24hrs) 55555 at 1700 in Lisnaskea; UAE R.Dubai 13.675 (Eng 1600-1640) 54444 at 1635 in Barton-on-Humber; WHRI, South Bend, 13.760 (Eng

1700-0000) 33223 at 1730 in Islington; R.Kuwait via Kbad 13.620 (Eng 1800-2100) 45444 at 1900 in Bridgwater; RCI via Sackville 13.650 (Fr, Eng 2030-2230, also to M.East, Africa) 25332 at 2130 in Chester.

Quite a number of the **11MHz (25m)** signals are meant for Europe. They include R.Bulgaria Int, Sofia 11.720 (Eng 0500-0630 also to USA) 43443 at 0615 in Kilkeel; BBC via Limassol 11.780 (Eng 0600-0730) 44333 at 0640 by **Robin Harvey** in Bourne also via Skelton 12.095 (Eng 0400-2315) 44444 at 1102 in Co.Londonderry and 55555 at 1605 in Gibraltar; R.Moscow Int 12.020 (Eng WS 0800-1300) heard at 1028 by **Tim Bucknall** in Congleton;R.Prague, Czech Rep 11.990 (Eng 1130-1157) 54444 at 1130 in Morden; RCI via Sines 11.915 (Eng 1430-1500, also to M.East, Africa) 45444 at 1440 in Chester and via Sackville 11.945 (Eng, Fr 2130-2300, also to M.East, Africa) SIO333 at 2224 by **Julian Wood** in Elgin; Israel R, Jerusalem 11.587 (Eng 1800-1815, also to W.USA, W.Asia) SIO444 in E.London, 11.585 (Eng 2000-2030, also to USA) 44444 at 2020 in E.Worthing and 11.675 (Eng 2230-2300, also to USA) SIO443 at 2240 in Rowley Regis; AIR via Bangalore 11.620 (Eng, Hi 1745-2230) 44333 at 1840 in Middlesbrough; R.Damascus, Syria 12.085 (Eng 2008-2108) 34332 at 2049 in Oxted; R.Japan via Moyabi 11.925 (Eng 2100-2155) 55355 at 2111 in Newry; VOFC Taiwan via Okeechobee 11.915 (Eng 2200-2300) 44344 at 2200 in Appleby.

While beaming to other areas KTWR, Agana 11.805 (Eng to S.Pacific 0855-1000) was logged as 23332 at 0930 in Stirling; R.Tunisia Int via Sfax 11.550 (Ar to N.Africa? 0430-2300) SIO333 at 0941 in Rotherham; HCJB Quito 11.925 (Eng to Caribbean 1130-1600) SIO344 at 1235 in Edinburgh; R.Australia via Carnarvon 11.660 (Eng to S.Asia 1430-1800) 43433 at 1445 in Islington and 11.695 (Eng to Pacific 1430-2055) 32232 at 1704 in Norwich; R.Pakistan, Islamabad 11.570 (Eng to M.East 1600-1630) 35333 at 1607 in Barton-on-Humber; Voice of Mediterranean, Malta 11.925 (Eng, Ar to N.Africa 1400-1600) SIO333 at 1400 in Co.Fermanagh; BBC via Lesotho 11.940 (Eng to S.Africa 0700-1830) 34323 at 1729 in Woodhall Spa and via Ascension Is 11.750 (Eng to S.America 2200-0330) 24322 at 2350 in E.Bristol; R.New Zealand Int 11.735 (Eng to Pacific areas 1850-2137) 24222 at 1900 in Bushey Heath; Israel R, Jerusalem 11.675 (Eng to Russia, W.Asia 2000-2030) SIO322 at 2000 by **Francis Hearne** in N.Bristol; R.Nac da Amazonia, Brazil 11.780 (Port 0900-0200) 33333 at 2040 in Lisnaskea; R.Anhanguera, Brazil 11.830 (Port 0800-0300) 24212 ar 2340 in Bridgwater; RAE Buenos Aires 11.710 (Eng to USA 0200-0300) 43433 at 0210 in Ross-on-Wye.

R.New Zealand's **9MHz (31m)** broadcast to Pacific areas on 9.700 (Eng 0659-1206 [includes relay of BBC WS *News Desk* 1100-1130]) was 22322 at 0855 in Sunderland, SIO233 at 1030 in Edinburgh, SIO111 at 1120 in Macclesfield and 25552 at 1203 in Wallsend. Later, the signal on 9.655 (Eng to Pacific 1650-1850) was SIO222 at 1655 in Rotherham. In contrast, R.Australia via Carnarvon on 9.510 (Eng, Chin to Asia 0900-1200) was logged as 44434 at 1145 by **George Tebbitts** in Penmaenmawr; also 9.770 (Eng to Asia 1430-1600) as 44444 at 1436 in E.Worthing.

Also logged here were HCJB Quito 9.745 (Eng to S.Pacific 0715-1125) 43333 at 1049 in Co.Londonderry; Yemen R, Sana'a 9.780 (Ar to M.East 1000-2145 [Eng 2100-2135]) 44333 at 2107 by **P.Gordon Smith** in Kingston; RFI via Moyabi, 9.790 (Fr to Africa 2000-2300) 34444 at 2134 by **Fred Pallant** in Storrington; UAE R, Abu Dhabi 9.605 (Eng to NW.USA 2200-0000) 'very good' at 2215 by **G.Rowland** in Buckley; Voice of Turkey, Ankara 9.445 (Eng to USA 2300-0000) 55555 at 2300 in Appleby; R.Novas de Paz, Brazil 9.515 (Port 0900-0300), heard at 0100 in Lisnaskea.

Broadcasts to Europe come from R.Vlaanderan Int, Belgium 9.925 (Eng [Fr Sun] 1000-1030) 44333 at 1000 in Morden; BBC via Limassol 9.660 (Eng 0700-1515) 23222 at 1021 in Barton-on-Humber; R.Jordan via Al Karanah 9.560 (Eng 1500-1730) 44444 at 1601 in Woodhall Spa; SNBC Ondurman 9.165 (Eng 1800-1900) 43443 at 1800 in Stirling; R.Portugal via Sines? 9.780 (Eng 1900-1930) 55434 at 1900 in Ross-on-Wye; Monitor R.Int via WSHB 9.355 (Eng 1900-2200) 44333 at 1930 in Oxted; VOA via Gloria, 9.700 (Eng 1700-2100) SIO444 at 2000 in N.Bristol; BSKSA Riyadh 9.870 (Ar 1800-2300) 33333 at 2035 in Rugby; R.Moscow Int 9.550 (Eng WS 1630-2300) heard at 2100 in Congleton; R.Ukraine Int 9.860 (Eng 2200-2300) 34343 at 2200 in Middlesbrough; R.Cairo via Abis 9.900 (Eng 2115-2245) 43343 at 2204 in Bourne; AIR via Delhi? 9.950 (Eng 2045-2230) 33332 at 2215 in Stalbridge.

In the **7MHz (41m)** band WYFR via Okeechobee 7.355 (Eng to Eu 0600-0800) 34343 at 0723 in Bourne; WJCR, Upton 7.490 (Eng to E.USA 2100-1000) 24322 at 0951 in Sunderland; WHRI, South Bend 7.315 (Eng to E.USA 2000-1300) SIO433 at 0959 in Macclesfield; R.Australia via Carnarvon 7.260 (Eng to S.Asia 1430-2100) 33433 at 1900 in E.Bristol; R.Moscow Int 7.205 (Eng WS 1900-2030) SIO444 at 1915 in N.Bristol; Voice of Israel, Jerusalem 7.465 (Eng to W.Eu, USA 2000-2030) 55555 at 2000 in Appleby; Monitor R.Int via WSHB 7.510 (Eng to Eu, E.USA 2100-2255) 44444 at 2145 in Rugby; Voice of Nigeria, Ikorodu 7.255 (Ha to W.Africa 2200-2300) 22342 at 2200 in Storrington; AIR via Aligarh? 7.412 (Hi, Eng to Eu 1745-2230) 44434 at 2210 in Penmaenmawr; R.Ukraine Int, Kiev 7.240 (Eng to Eu 2200-2300) SIO554 at 2220 in Rowley Regis; R.Prague, Czech Rep 7.345 (Eng to USA 0000-0030) SIO333 at 0000 in Co.Fermanagh.

The **6MHz (49m)** logs included RTL via Junglinster 6.090 (Fr to Europe 24hrs) 44444 at 1020 in Rugby; R.Nederlands via Flevo 5.955 (Eng to Eu 1130-1325) 45544 at 1230 in Inverness; R.Australia via Carnarvon (Eng to S.Asia 1630-2100) 23332 at 1845 in E.Bristol; BBC via Antigua 5.975 (Eng to C.Am 2000-0430) 22332 at 2240 in Woking; WEWN, Birmingham 5.825 (Ger to Eu 2300-0000) 34323 at 2335 in Sunderland; R.Prague, Czech Rep 6.055 (Eng to USA 0000-0030) 55444 at 0015 in Penmaenmawr.

Tropical Bands Chart

Freq MHz	Station	Country	UTC	DXer
2.310	ABC Alice Springs	Australia	1952	H,I,J,K,M,Q,U
2.325	ABC Tennant Creek	Australia	1952	H,I,J,K,M,Q,U
2.485	ABC Katherine	Australia	1900	K,Q,U
2.850	KCBS Pyongyang	N.Korea	2020	H,I
3.200	TWR Ndebele	Swaziland	2130	H,M
3.205	R.Ribeirao	Brazil	0023	D,H
3.220	CPBS 1, Beijing	China	2200	H,S?
3.220	R.HCJB Quito	Ecuador	0150	D,H
3.220	R.Togo, Lome	Togo	2003	D,H,K,M,Q,U,V
3.223	AIR Shimla	India	1632	M
3.230	SABC Oranje Meyerton	S.Africa	1904	I,M,S
3.235	AIR Guwahati	India	1559	M
3.240	TWR Shona	Swaziland	1845	H,I,K,M
3.245	AIR Lucknow	India	0110	D,K,M,Q
3.250	R.Pyongyang	N.Korea	1950	H
3.255	BBC via Maseru	Lesotho	2020	C,I,K,M,Q,U
3.268	AIR Kohima	India	1633	M
3.270	R.Ecos del Oriente	Ecuador	0214	M
3.270	SWABC 1, Namibia	S.W.Africa	1945	K,M,U,X
3.276	R.S.Highlands, Mendi	N. Guinea	1908	M
3.277	AIR Srinagar	India	1557	K,M,Q
3.300	R.Cultural	Guatemala	0150	D,H,J,M,Q
3.315	AIR Bhopal	India	0050	D,G,K,Q
3.316	SLBS Goderich	Sierra Leone	2211	C,D,H,J,M,U,X
3.325	FRCN Lagos	Nigeria	2045	C,D,M,R
3.335	TWR	Swaziland	0256	I,S
3.345	RRI Ternate	Indonesia	2034	S
3.350	R.Cumanda, Coca	Ecuador	0155	D
3.355	AIR Kurseong	India	1630	K,M,Q
3.356	R.Botswana	Gabarone	2000	M,Q,U
3.359	RTV Malagasy	Madagascar	1742	I,K
3.365	R.Rebelde, La Julia	Cuba	0130	D,R
3.365	AIR Delhi	India	1531	K
3.365	GBC R-2	Ghana	2130	C,D,M,P,Q,R,U,V,W
3.380	R.Chortis	Guatemala	0200	D
3.380	R.Malawi	Malawi	1831	M
3.385	RFO Cayenne	Guiana	0533	R
3.395	RRI Tanjungkarang	Indonesia	2345	H
3.870	Voz de la Esperanza	Peru	0155	D
3.900	Hulunbei'er, Hailar	China	2355	H
3.915	BBC Kranji	Singapore	2130	B,K,L,M,Q,Q,V
3.925	NSB Tokyo	Japan	1640	H,M
3.930	KBS Seoul	Korea	2335	H
3.940	PBS Hubei Wuhan	China	1515	H
3.945	AIR Gorakhpur	India	1542	I,K
3.945	Vatican Radio	Italy	2050	B,E,J,O,R,V,Z
3.950	Qinghai PBS, Xining	China	2100	H,Q
3.955	BBC via Skelton	England	2200	D,L,N,O,R,Y,Z
3.955	R.Budapest	Hungary	1605	S
3.955	Novosibirsk rly A.Ata.	Kazakhstan	2100	Q,R
3.960	Xinjiang PBS, Urumqi	China	2050	D,M,Q
3.960	RFE/RL Munich	W.Germany	1825	D
3.965	RFI Paris	France	2359	A,D,R,Z
3.975	BBC Skelton	England	2202	R
3.980	VOA Munich	Germany	2203	A,D,O,R,Y,Z
3.985	China R.Int via SRI	Switzerland	2205	L,N,O,R
3.985	SRI Beromunster	Switzerland	1840	D,R,Z
3.990	Xinjiang BS, Urumqi	China	2050	H,Q
3.990	BBC via Limassol	Cyprus	1636	M
3.995	DW via Julich	Germany	2225	D,N,R,Z
4.005	RRI Padang	Indonesia	1544	H,I,M
4.035	Xizang PBS, Lhasa	Tibet	2334	D,Q,R
4.081	Ulan Bator 1	Mongolia	1610	M
4.220	Xinjiang PBS, Urumqi	China	0110	D
4.500	Xinjiang BS, Urumqi	China	2335	C,D,I,M,Q,R
4.735	Xinjiang, Urumqi	China	2300	C,D,K,M,Q,R
4.740	R.Afghanistan, Kabul	Afghanistan	1917	U
4.755	R.Educ CP Grande	Brazil	0005	D,H
4.755	RRI Ujungpadang	Indonesia	1510	H,K
4.760	Yunnan PBS,Kunming	China	2323	H,K,M,Q
4.760	AIR Port Blair	India	1651	K,M
4.760	ELWA Monrovia	Liberia	2131	C,J,K,M,Q,R
4.760	TWR	Swaziland	2141	H,M,U
4.765	Brazzaville	P.Rep.Congo	2146	C,M
4.770	FRCN Kaduna	Nigeria	2117	C,F,J,M,Q,R,U,Z
4.770	R.Mundial, Bolivar	Venezuela	0219	M
4.777	R.Gabon, Libreville	Gabon	2121	K,M,U
4.780	RTD	Djibouti	2001	U
4.783	RTM Bamako	Mali	2200	C,J,K,M,Q,R,U,X
4.785	Caiari Porto Velho	Brazil	0200	D
4.785	Zhejiang PBS,Hangzhou	China	0220	M
4.785	R.Tanzania	Tanzania	1854	M
4.790	AIR Shillong	India	1605	M
4.790	Azad Kashmir R.	Pakistan	0110	D,K,R
4.790	R.Atlantida	Peru	0220	M
4.790	TWR Manzini	Swaziland	1844	M,K
4.795	La Voz de los Caras	Ecuador	0721	M
4.800	R.Nac Amazonas	Brazil	0940	H
4.800	CPBS 2 Beijing	China	1328	K
4.800	R.Popular Cuenca	Ecuador	0215	D,M
4.800	AIR Hyderabad	India	1640	K,M
4.805	R.Nac.Amazonas	Brazil	2345	C,D,M
4.810	R.San Martin Tara	Peru	0110	D,R
4.810	SABC Meyerton	S.Africa	1946	K,M
4.815	R.Difusora, Londrina	Brazil	0200	D,M
4.815	R.Nac.Tabatinga	Brazil	0223	M
4.815	China R.Int, Beijing	China	1327	K
4.815	R.diff TV Burkina	Ouagadougou	2207	C,D,M,Q,U
4.820	E.Prov.Huila	Angola	2152	M
4.820	La Voz Evangelica	Honduras	0000	C,M
4.820	AIR Calcutta	India	1639	H,K,M
4.825	R.Cancao Nova	Brazil	2356	C,M
4.830	R.Botswana, Gaborone	Botswana	2105	C,D,R,T
4.830	R.Bangkok	Thailand	1520	H,K
4.830	R.Tachira	Venezuela	2330	C,D,H,I,M,Q
4.835	R.Tezulutlan, Coban	Guatemala	0110	D
4.835	RTM Bamako	Mali	2115	B,C,J,M,O,Q,R,T,U,V,X,Z
4.840	Heilongjiang, Harbin	China	2215	H
4.840	AIR Bombay	India	1638	M
4.840	R.Valera, Trujillo	Venezuela	0125	D
4.845	R.Nacional Manus	Brazil	0720	M
4.845	RTM Kuala Lumpur	Malaysia	1455	B,H,K
4.845	ORTM Nouakchott	Mauritania	2207	C,D,J,M,R,T,U
4.850	R.Yaounde	Cameroon	2055	C,M,R
4.850	R.Luz y Vida, Loja	Ecuador	0120	D
4.865	PBS Lanzhou	China	2300	C,H,K,Q,R,U
4.865	Caracol	Colombia	0030	C,R
4.865	L.V. del Cinaruco	Colombia	0300	D,H,I,Q,R
4.870	R.Cotonou	Benin	2213	C,D,M,Q,R,U
4.875	R.Roraima, Boa Vista	Brazil	0300	M,Q
4.875	V. of Jinling	China	1530	H
4.879	R.Bangladesh	Bangladesh	1520	H,K
4.880	R.Nac.Espejo, Quito	Ecuador	0220	D
4.885	R.Clube do Para	Brazil	0155	C,D,H,I,M,Q
4.885	R.Difusora Acreana	Brazil	0225	M
4.885	China R.Int, Beijing	China	1555	K
4.885	KBC Nairobi	Kenya	1850	M,U
4.890	RFI Paris	via Gabon	0400	D,R
4.895	R.Bare, Manaus	Brazil	0226	M
4.895	Voz del Rio Arauca	Colombia	0139	C,D,H,M,R
4.895	AIR Kurseong	India	0200	Q
4.895	Hanoi 1	Vietnam	1605	H
4.896	Pakistan BC	Pakistan	1515	K
4.900	SLBC Colombo	Sri Lanka	1629	K,M
4.905	R.Nat.N'djamena	Chad	2020	B,C,I,M,Q,R,T,U,Z
4.910	AIR Jaipur	India	1540	C,K,M,U,V
4.910	R.Zambia, Lusaka	Zambia	2033	H,K,M,U
4.915	R.Anhanguera	Brazil	0735	H
4.915	PBS Guangxi, Nanning	China	2220	B,H
4.915	GBC-1, Accra	Ghana	2230	A,C,D,G,J,L,M,Q,R,T,V
4.915	Voice of Kenya	Kenya	1858	D,M
4.920	R.Quito	Ecuador	0255	D
4.920	AIR Madras	India	1636	H,K,M,Q
4.925	R.Difusora, Taubate	Brazil	0227	M
4.925	R.Nacional, Bata	Eq.Guinea	1823	M
4.927	RRI Jambi	Indonesia	1505	H
4.935	R.Difusora, Jatai	Brazil	0240	D
4.935	Voice of Kenya	Kenya	1925	C
4.940	AIR Guwahati	India	1434	K
4.950	R.Madre de Dios	Peru	2235	H
4.955	R.Cultura, Campos	Brazil	0215	D
4.955	R.Marajoara, Belem	Brazil	0030	H,I,Q
4.960	AIR Delhi	India	0100	M,Q
4.970	PBS Xinjiang	China	1613	K,M
4.970	AIR Itanagar	India	1410	K
4.970	R.Rumbos, Caracas	Venezuela	0210	D,M
4.975	R.Tupi, Sao Paulo	Brazil	0231	M
4.975	PBS Fuzhou	China	1850	M
4.975	R.Uganda, Kampala	Uganda	2005	C,M,Q,R,U
4.980	PBS Xinjiang, Urumqi	China	1550	C,H,K
4.980	Ecos del Torbes	Venezuela	0100	C,D,H,I,M,Q,R,V
4.985	R.Brazil Central	Brazil	2250	D,H
4.990	Hunan 1, Changsha	China	1430	H
4.990	AIR Ext.Service	India	0000	Q,R,V
4.990	FRCN Lagos	Nigeria	2100	C,D,J,M,D,Q,R,T,U
4.990	R.Ancash, Huaraz	Peru	0220	D
5.005	R.Nacional, Bata	Eq.Guinea	2055	J,K,U
5.005	R.Nepal, Kathmandu	Nepal	1602	H,K,M
5.010	R.Garoua	Cameroon	1840	M
5.010	Guangxi 2, Nanning	China	2345	H,K
5.020	PBS-Jiangxi Nanchang	China	2350	D,I,Q
5.020	La Voix du Sahel	Niger	1855	K,M,D
5.025	ABC Katherine	Australia	2355	D
5.025	R.Parakou	Benin	1958	B,C,D,H,M,D,Q,U
5.025	R.Rebelde, Habana	Cuba	0230	D,M
5.025	R.Uganda, Kampala	Uganda	1942	R
5.030	BBS Thimpu	Bhutan	1354	K
5.035	R.Aparecida	Brazil	0724	M
5.035	R.Bangui	C.Africa	2200	C,D,J,M,Q,R,U
5.045	R.Cultura do Para	Brazil	0234	D,M,Q
5.047	R.Togo, Lome	Togo	2200	C,D,I,M,Q,R,U,X
5.050	Em Jesus Gran Poder	Ecuador	0235	M
5.050	AIR Aizawl	India	0120	D,M
5.050	R.Tanzania	Tanzania	1930	M,P,Q,T
5.052	SBC R-1	Singapore	2200	D,H,I,K,M,Q,R,U
5.055	RFO Cayenne(Matoury)	Fr.Guiana	0015	C,D,H,Q
5.060	Sist de Em Progreso.	Ecuador	0225	D
5.065	R.Candip, Bunia	Zaire	1835	H
5.075	Caracol Bogata	Colombia	0040	B,C,D,G,H,I,J,M,R,T,V
5.125	Taiwan 1 Sce	China	2350	H
5.131	R.Vis 2000 Bambamarca	Peru	2320	D,H
5.163	CPBS 2, Beijing	China	2345	V
5.256	RRI Sibolga, Sumatra	Indonesia	2355	H,O

DXers:

A: Tim Allison, Middlesborough.
B: Leo Barr, Sunderland.
C: Darren Beasley, Bridgwater.
D: Robert Connolly, Kilkeel.
E: Bernard Curtis, Stalbridge.
F: Ron Damp, Worthing.
G: John Eaton, Woking.
H: Jim Rdwards, Wigan.
I: David Edwardson, Wallsend.
J: Ron Galliers, N.London.
K: P. Gordon Smith, Kingston, Moray.
L: Robin Harvey, Bourne.
M: Gerry Haynes, Bushey Heath.
N: Simon Hockenhull, E.Bristol.
O: Sheila Hughes, Morden.
P: Ross Lockley, Stirling.
Q: Paul Logan, Lisnaskea.
R: Eddie McKeown, Newry.
S: Roy Merrall, Dunstable.
T: Sid Morris, Rowley Regis.
U: Fred Pallant, Storrington.
V: Roy Patrick, Derby.
W: Peter Pollard, Rugby.
X: Eric Shaw, Chester.
Y: Tom Smyth, Co.Fermanagh.
Z: Phil Townsend, E.London.

Andy Cadier, 28 Romney Avenue, Folkestone, Kent CT20 3QJ

Off The Record

The studio of Shepway Sound

Hello, this quarter we are taking a look at Restricted Service Broadcasting Licences, known as RSLs. These are available from the Radiocommunications Agency for periods of up to 28 days, usually to cover special occasions or events. The maximum e.r.p. is 25W on v.h.f. f.m. or 1W on medium wave. The licence, copyright and phonographic performance fees can amount to almost £4000. Also transmission facilities, station premises and studio equipment will need to be obtained. There are a number of recognised companies that can hire you virtually everything you need, which of course can add substantially to the overheads. Having got the gear, you need at least one qualified and capable person to install the equipment and to keep it running.

Whatever kind of programming you choose, programme presentation has to be as good as, and hopefully different to, competing stations. Advertisers will only be attracted to a station that has a confident and reliable sound and a professional business attitude. A programme manager and a band of proficient presenters, together with a news and public relations team will probably be required. Plus a commercial production department to organise the making of advertisements to clients specifications. Last, but not least, a business manager to organise initial funding, to establish an advertising sales team and to be responsible for insurance, safety and security. Using voluntary staff many RSL stations are able to cover their costs and show a reasonable profit.

Shepway Sound

Last December saw me reviving my DJ talents as a presenter with a local RSL Shepway Sound, who broadcast from a studio in Folkestone's town centre. This was a part of the local Christmas Festival to promote shopping and entertainment facilities during the run-up to Christmas. The station played a carefully planned wide range of pop music from the 50s to the present charts. The satellite-delivered Network News was provided on the hour followed by a local weather bulletin. Local traffic and travel, including reports from our own harbour were provided at quarter past and quarter to each hour. At the half hour, local news provided by both the *Folkestone Herald* newspaper and the radio station's own staff was a splendid example of successful co-operation in this field. Then followed an inshore waters forecast for the benefit of ferry passengers and our local fishing fleet.

The audio output from the studio was fed to the transmitter site by a u.h.f. radio link. The receiver for this, together with the rented 25W transmitter and diesel generator, was located in an old WWII gun emplacement high above the town on the South Downs. An omnidirectional vertically-mounted antenna at this vantage point produced a first class signal in the target area plus reasonable reception in most of south-east Kent. The reaction from both listeners and local business people has been most positive, many asking, "When are you coming back?" Alas there are no provisions for any kind of extension to a Restricted Service Licence.

Offshore Radio

Mystery and intrigue appear to surround two American radio ships the MV *Sarah* and the MV *Fury*, the former was used by the pirate station RNI (Radio Newyork International). Broadcasts started on 23 July 1987 but within days the Federal Communications Commission had issued a Warning Citation and after this was ignored, raided the ship on July 28. Further transmissions were made on 14 October 1988, after the ships registration details had been changed.

Just three days later programmes finally stopped following a visit from the US Coast Guard in possession of an FCC Restraining Order. At this point it had been intended to register the ship with the Principality of Sealand, this self-made state is really an old wartime sea fort off Harwich in England, known as Roughs Tower. It is not recognised as a country and from 1 October 1987 became within the new extended territorial jurisdiction of the UK and therefore was not in a position to register international shipping.

The key figure behind Radio Newyork International was Allan Weiner who has been involved in the construction an offshore short wave station for an American religious organisation. He and Brother R. Stair of Overcomer Ministries at Walterboro, South Carolina, were equipping a former trawler the MV *Fury* with four short wave broadcasting transmitters. All the radio equipment that had been aboard the *Sarah* was transferred to the *Fury*, except for the top section of the radio mast, which was damaged while being moved.

The *Sarah*, whose registered name is *Lichfield 1* was then sold to MGM Pictures for $20 000 for a spectacular role in a film with the working title *Blown Away*, that reflected the planned fate of the vessel. The superstructure was to have been reconstructed in timber with the big bang taking place on 21 August 1993. The scorched remains of the vessel were bought for $15 000 by a salvage company.

On 19 January 1994 US federal agents raided the MV *Fury* while anchored in the Wando River, near Charleston, South Carolina. This followed an investigation by two field operations officials from the enforcement division of the FCC who claimed they had detected radio signals coming from the ship. A warrant was issued by a district judge for the seizure of all radio equipment aboard.

Using a hired barge with a crane the US Marshal's Service, the FCC and the Coast Guard took almost two days to remove the transmitters, reportedly valued at $500 000. The owners of the equipment have a month to file a claim or it will be forfeited to the US Government. The Assistant US Attorney handling the case said ,"It was the governments intention to seize the property and not pursue legal charges against anyone".

The MV *Peace* that broadcast the programmes *The Voice of Peace* to Israel, ceased broadcasting on the 1 October 1993. The station's owner Abie Nathan was unable to find sufficient financial backing for his shipboard peace museum. The former Dutch coaster, originally named *Rolf* and launched in 1940, was scuttled on 29 November 1993 some 15km off the coast of Israel. Previously Abie had referred to the possibility of him sinking or setting fire to the vessel as some sort of symbolic gesture. He had spent many years attempting to bridge the gap between the Israeli Government and the PLO, and was once imprisoned for allegedly talking to the 'enemy'.

Radio Caroline

Radio Caroline hopes to be on air over Easter to celebrate their 30th anniversary. They intend to use a medium wave RSL, however, with the usual 1W allocation they may have difficulty reaching any centre of population owing to the ships remote anchorage. The Department of Transport will not allow the vessel to move until it is completely seaworthy. At present the rudder will not operate! In exceptional circumstances, the Radiocommunications Agency are able to issue licences for higher power, or for the use of a larger antenna than normally specified.

Collectors Corner

Kevin Reeks is a collector of old broadcasting equipment, particularly from the 1960s and 70s, if you have something suitable Kevin can be contacted at 67 Lancaster Drive, Lydney, Gloucestershire GL15 5SJ.

Talking about the 60s, **John** and **Jenny Knight** of Horizon Sales are looking for early Radio Caroline recordings. Of particular interest are broadcasts from the MV *Frederica* or the *Mi Amigo* from 1964 to 1968. Their address is 121 Monkton Street, Monkton, Ramsgate, Kent CT12 4JQ.

Bookworms will be pleased to know that *Pop Went the Pirates* by Keith Skues is available from the publishers. **Black Bear Press, King Hedges Road, Cambridge CB4 2PQ.** There are 594 pages of text, 230 illustrations and biographies of some 200 pirate radio personalities, including a priceless picture of myself! The soft-back version is £14.99 plus postage, in case-bound hardback it's £24.99.

Sunday Morning Pirates

Rab O'Fokel using his Sony ICF SW-7600 in Sunderland has logged a large number of stations including Radio Barones, Weekend Music, Pamela, Orang Utan, FRS London, Chaos, Ozone, Emerald, Jolly Roger and Marabu. Free Radio Monitoring based at Halesowen West Midlands include in their report. Radio Piranha, Waves, Belgian Relay, Optimod, Diamond, East Coast Commercial, Lightning, Toekomst Music, Titanic, Safari and Kaleidoscope.

Darren Taplin of Brenchley in Kent using his Yaesu FRT-7700 tells us he has received many of the above plus Pandora, Amsterdam, Citadel, Lowland, and Xenon Transmitting Company. **Bob Marsh** of Bexleyheath, also in Kent, uses a JRC NRD-525 to log lots of stations including Live Wire, Caroline, Waves, Merlin, Stella, FRS Holland and Radio Galaxy.

Finally **David Williams** of Southampton adds Reflex, Britain, Overflow and Transatlantic. I am happy to supply a complete list of pirate station activity based on our contributors' logs. My address is at the head of this page, please include two 1st class stamps to cover materials and return postage.

TRADING POST

Fill in the order form in the March issue in BLOCK CAPITALS - up to a maximum of 30 words plus 12 words for your address - and send it, together with your payment of £3.00, to Trading Post, Short Wave Magazine, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW. If you do not wish to cut your copy of SWM, or do not wish to use the order form provided, you must still send the cornerflash from the foot of this page, or your subscription number, as proof of purchase of the magazine. Advertisements from traders, or for equipment which it is illegal to possess, use or which cannot be licensed in the UK will not be accepted.

For Sale

AOR1500EX wide-range receiver a.m., f.m.(n), f.m.(w), and s.s.b., s.s. wire, NiCad, mains adapter, aerial, ear phone, cigar lighter, plug and manual, v.g.c., £200 o.n.o. Craig, London. Tel: 071-702 4569 evenings.

Audio filter ERA BP34 s.s.b. a.m., c.w., RTTY, excellent performance, boxed with manual and lead, mint condition, £60. Send registered or collect. Tel: London 071-700 1540 anytime.

Black Jaguar 200 MkIII hand-held scanner, v/u.h.f., 26-30, 60-88, 115-178, 210-260, 410-520, 16 memories, delay, look-out, priority, charger with instructions and boxed, less than three years old, £80. Tel: Somerset (0935) 72888.

Black Jaguar M-3, frequencies 26-29.995, 60-88, 115-178, 210-260, 410-520 boxed with all accessories with three antennas, excellent condition, £95. Tel: Essex 081-502 2340.

D-100 (De-luxe version) DXTV converter, £50. Labgear v.h.f. to u.h.f. up-converter, £30. P&P extra. 2 Craven Grove, Irvine KA11 1RY. Tel: (0294) 221842.

Datong AD370 active antenna, outdoor model, complete, new, £50. Global AT-1000 a.t.u., new and boxed with manual, £55. Tel: Warwicks (0926) 54556.

Eddystone EC10 MkII with mains and battery power packs, mint condition. Tel: Gwynedd (0286) 674042.

ERA Micro-reader MkII 4.1, £90. LCD ERA display, £90. FAX1 decodes RTTY, FAX, Navtex to printer, £100. FAXII decode computer system, RTTY, Navtex, FAX. Everything works, £50, all with operating instructions. A. Bell, Kent. Tel: (0959) 575113.

Icom IC-R7000 scanner, boxed with manual 25-2000MHz, v.g.c. buyer collects, £590. Tel: Lincs (0476) 72304.

Icom IC-R7100, mint condition, boxed, antenna and coax available, cost, £1400, for sale at, £800. Tel: Nr. Coventry (0676) 533274.

Icom R71E receiver with pre-amp and passband tuning, excellent condition, complete with box and instructions, £550. Tel: Cambridge (0223) 565613 after 6pm.

ICS FAX1 weather map and decoder with all cables and manual, excellent condition, £185. Universal M400 decoder as new with manual, £310. G3KZU, Oxford. Tel: (0865) 63000.

JRC h.f. receiver NRD-535D, £950, mint, boxed with manuals etc., Built-in CLF-243 BWC, CMF 78 ECSS and CFL 232 i.f. filter. JRC ST3 headphones, £30. JRC speaker NVA 319, £100. AEA decoder PK232 MBX and PC program, £225. Doreen, Kent. Tel: 071-987 1240.

JRC NRD-525G extra filters fitted, one year old, very little used, boxed and as new, £550, carriage extra. Mr M. Wynn, 28 Court Place Gardens, Iffley, Oxford OX4 4EW. Tel: (0865) 770398.

JRC-NRD-535 h.f. communications receiver, in excellent condition, boxed with full instructions and manual. NVA-319 external matching speaker with filters, also JRC communication headphones, open to offers. Steve, Northumberland (0670) 510695 after 6pm.

Kenwood R-1000 in new condition with manual and f.m. board (not fitted), £240. Codemaster CWR-610E RTTY/c.w. decoder, good condition, £60. BBC-B computer in v.g.c., plus cassette, games, £80. Tel: Hawick (0450) 370937.

Lowe HF-225 receiver, long wire, balun active antenna, power supply and keypad, £375 o.n.o. Tel: Warwick (0926) 401399.

Realistic PRO-2021 scanner, 200 channels/programmable a.m. & f.m., v.h.f. 66-88, 108-136, 138-174MHz, u.h.f. 380-512MHz, £110. Tel: Somerset (0460) 240837.

Saisho twin speaker radio cassette, good condition, £10. Sanyo Walkman-type tape recorder with earphones, not boxed, good condition, £20, carriage extra. Mr. Wynn, 28 Court Place Gardens, Iffley, Oxford. Tel: (0865) 770398.

Save £1000! NRD-535 with pbs and ecss worth, £1600; plus 486PC, v.g.a. etc., NRD software; CODE3; and DX1 antenna. Ultimate computerised shortwave utility station, offers around, £1700 excellent condition. Tel: Essex (0702) 347590 after 8pm.

Scanmaster 2 scanner controller with connectors for AR3000, £125 or **consider P/X with large IDE hard drive for PC**. G4WJX, QTHR. Tel: (0782) 330613.

Silent Key Sale: Receivers: Lowe 0 -30MHz, £150, Roberts Radio, £45, a.t.u., £15, BRT 400 RX, HRO, Drake, Watkin & Johnson, Rycom (v.l.f.) APR-4Y. Cased Speakers For Eddystone, AR88, Realistic. Decoders (various) Microreader, Microwave Modules. Marconi B28/CR100, 17 Set, Various Spy transmitter receivers and books. Tel: Lancs (0942) 55948.

Sony 2001D in perfect condition with all accessories including mains supply, boxed, batteries included, £130, carriage extra. Mr M. Wynn, 28 Court Place Gardens, Iffley, Oxford OX4 4EW. Tel: (0865) 770398.

Sony ICF PRO80 plus frequency converter, manual and soft case, £150. **Wanted Signal R535 airband RX.** Martin, Devon Tel: (0837) 87438 evenings.

Sony ICF-SW77 short wave and f.m. stereo portable receiver, as new, mint condition, boxed, £225 o.n.o. Bearcat BC-2000 XLT hand-held scanner, excellent condition, £100. Tel: Herts (0582) 792543.

Sony SW77 superb, as new, used approx six hours only. Boxed with all accessories, bargain at, £275. John, Romford. Tel: (0708) 742662.

Sony SW77 worldband receiver with f.m. stereo, mint condition, as new, £225. Uniden Bearcat 200XLT scanner, excellent condition, £100. Tel: Herts (0582) 792543.

Trio R2000 digital communications receiver, 150kHz to 30MHz all-mode. VC10 v.h.f. board fitted, 118-174MHz, excellent condition with manual but no box, £425 o.n.o. Tel: Plymouth (0752) 351063.

Yaesu FRG7700 receiver, v.g.c., boxed and FRA-7700 pre-amp, £275 o.n.o. Discone aerial, £20. 15m heavy coaxial cable, £8. VHF/UHF 26MHz to 12GHz, frequency scanning guide, £5 (new, published 1993). Mike, Gwent. Tel: (0633) 856933.

Yaesu FT-101 h.f. rig, Icom IC2SE v.h.f., Yaesu FT-221 all-mode v.h.f. rig, various test gear for silent key. D. J. Plant, 15 Heathcombe Road, Bridgwater, Somerset. Tel: (0278) 423288.

Yupiteru MVT-7100, boxed, as new and includes case, manual and all accessories, virtually unused, in excellent condition, bargain at, £275. Tel: Sheffield (0742) 659405.

Yupiteru MVT-7100, purchased Feb '94, boxed with guarantee and all extras, including soft case, plus Skyscan mag mount mobile aerial, both mint, £350. Jim, South Yorks. Tel: (0709) 836224.

Yupiteru VT225 airband scanner, NiCads 12V power supply, not boxed, very little used, as new, £180, carriage extra. Mr M. Wynn, 28 Court Place Gardens, Iffley, Oxford OX4 4EW. Tel: (0865) 770398.

Exchange

I have new from Leicester Show an AR3000A, complete in original box etc., I am looking for equally new Lowe HF-225 'Europa' model. Check the current prices, it's a bargain offer. Peter, Norfolk. Tel: (0760) 720294.

Icom IC735 general coverage TX/RX SP7 speaker, SM8 desk mic, HM12 hand mic, all v.g.c., £600. Swap all above for NRD 525-535 or best receiver offered. Tel: Derby (0332) 372696.

MVT-7100 scanner for suitable lap-top computer, scanner complete with usual accessories. John, Essex. Tel: (0279) 731382 evenings.

Yaesu FT-ONE with Yaesu FTV 107R 2m transverter, **want Yaesu FT-726** or similar 2m/70cms multi-mode base station. Tel: Burnham on Crouch (0621) 772418.

Yupiteru MVT6000 for PRO2005 or 2006, in mint condition. Tel: Sheffield (0742) 351005 anytime.

Wanted

Buy/copy of handbook for Panasonic RB48 com rec, all costs refunded. Tel: West Glamorgan (0792) 896902.

Eddystone receivers models EB35, EB36, EB37, EC10, EC10 MkII, 960, 358, 358X, EY11, 881, 889, pillow speaker etc, £10. Each offered for scrap sets, please telephone anytime! Peter Lepino, Surrey. Tel: (0374) 128170, FAX: (0372) 454381.

Good condition, second-hand radio scanners, any make and I will arrange carriage. Tel: Isle of Man (0624) 625039 answerphone.

Lowe HF-150 with or without associated equipment, must be in good condition, also Amstrad laptop 386/486 with colour screen. Tel: Plymouth (0752) 872174 most times.

SSB unit for Grundig Satellit 6000. Tel: Merseyside 051-648 3031.

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

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SWM APRIL 94 TP

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DIAL SEARCH 1992/94
George Wilcox
The listener's check list and guide to European radio broadcasting. Covers m.w., l.w., v.h.f. & s.w., including two special fold-out maps. Also includes a full list of British stations, a select list of European stations, broadcasts in English and 'Making the Most of Your Portable'. *46 pages.* **£4.25**

FLIGHT ROUTINGS 1993
Compiled by T.T. & S.J. Williams
This guide was produced with the sole aim of assisting airband listeners to quickly find details of a flight, once they have identified an aircraft's callsign. Identifies the flights of airlines, schedule, charter, cargo and mail, to and from the UK and Eire and overflights between Europe and America.
122 pages. **O/P**

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Spirally bound, this easy-to-use reference book covers 1.6 - 28MHz in great depth, all modes and utility services, with new reverse frequency listing showing every known frequency against each callsign, who's using what frequency and mode, what's that callsign? These are some of the answers this book will help you find.
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HF aircraft channels by frequency and band, main ground radio stations, European R/T networks and North Atlantic control frequencies.
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BP255
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Julian Baldwin G3UHK & Kris Partridge G8AUU
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Langley Pierce
A guide to movitoring the Yugoslav radio transmissions of the UN, aircraft and shipping engaged in the civil war in the former Yugoslavia.
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POCKET GUIDE TO RTTY AND FAX STATIONS
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A handy reference book listing RTTY and FAX stations, together with modes and other essential information. The listing is in ascending frequency order, from 1.6 to 26.8MHz.
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RADIO LISTENERS GUIDE 1994
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This is the third edition of this radio listener's guide. Simple-to-use maps and charts show the frequencies for radio stations in the UK. Organised so that the various station types are listed separately, the maps are useful for the travelling listener. Articles included in the guide discuss v.h.f aerials, RDS, the Radio Authority and developments from Blaupunkt.
68 pages. **£3.45**

SHORT WAVE INTERNATIONAL FREQUENCY HANDBOOK
Formerly the Confidential Frequency List and re-published in April 93, this book covers 500kHz-30MHz. It contains duplex and channel lists, callsigns, times and modes, broadcast listing and times.
192 pages. **£9.95**

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WORLD RADIO TV HANDBOOK 1994
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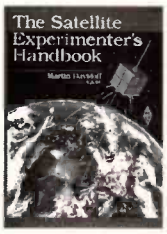
SATELLITES

NEWNES GUIDE TO SATELLITE TV
Derek Stephenson
This book, the 2nd edition, is a hard bound volume, printed on high quality paper. The author is a satellite repair and installation engineer and the book covers all information needed by the installation engineer, the hobbyist and the service engineer to understand the theoretical and practical aspects of satellite reception with dish installation and how to trouble-shoot when picture quality is not up to anticipated reception. Mathematics has been kept to a minimum.
284 pages. **O/P**

SATELLITE BOOK - A Complete Guide to Satellite TV Theory and Practice
John Breeds
This book deals almost exclusively with television broadcast satellites and is a comprehensive collection of chapters on topics, each written by a expert in that field. It appears to be aimed at the professional satellite system installer, for whom it is invaluable, but it will be appreciated by a much wider audience - anyone interested in satellite technology.
280 pages. **£30.00**



SATELLITE EXPERIMENTER'S HANDBOOK 2nd Edition
Martin Davidoff K2UBC
The book is divided into four main sections - History, Getting Started, Technical Topics and Appendices. It provides information on spacecraft built by, and for, radio amateurs. In addition, it discusses weather, TV-broadcast and other satellites of interest to amateurs.
313 pages. **£14.50**

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ARRL OPERATING MANUAL
Another very useful ARRL book. Although written for the American amateur, this book will also be of use and interest to the UK amateur. Topics covered range from short wave listening through operating awards to repeaters, operating and satellites.
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ARRL SATELLITE ANTHOLOGY
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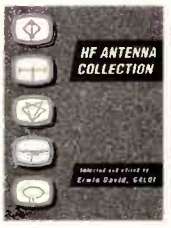

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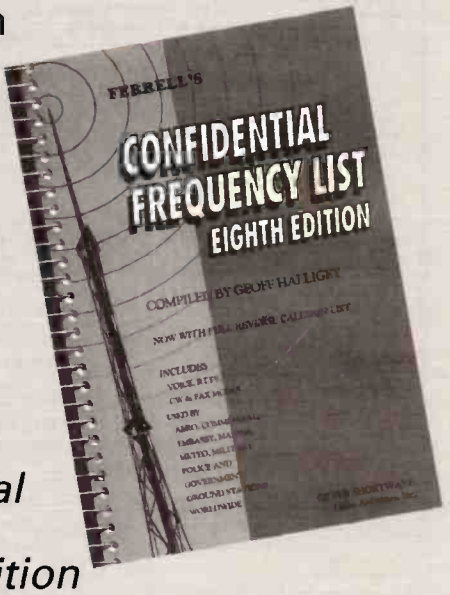

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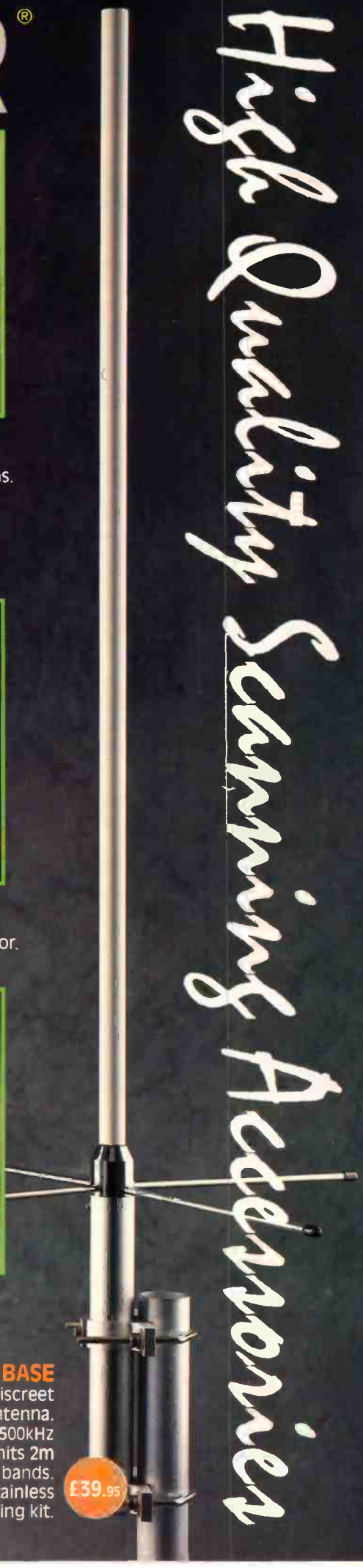

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