

*The*  
**SHORT WAVE**  
*Magazine*  
**SWM**



**THE CLASSIC  
COLLINS 51S-1**

Discover what makes  
this receiver so good

**& Scanning Scene**

**FREE INSIDE!**

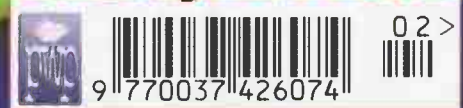


**How to  
Identify  
Stations**

**CHEAP &  
SIMPLE  
SCANNING  
ANTENNA**

**HRPT**  
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FOR YOU?**

February 2001 £3.25



# Satellit 800EU Millennium Receiver

The Grundig Satellit 800 EU Millennium gives you the ultimate in features, performance, convenience, and sound. It's incredibly powerful, technological-ly sophisticated, yet easy and intuitive to use. Whether you're an experienced Shortwave listener or a newcomer to the world of international broadcasting, this is the radio to get. Your ordinary Shortwave receiver doesn't have features like:

- Synchronous detection
- Excellent sensitivity and selectivity
- Three built-in bandwidths for shortwave
- You aren't limited to shortwave signals.
- Sure direct keypad digital tuning
- 70 user memory presets
- Two timer clocks keep track of time

#### EU version features

- 240V AC mains adaptor included
- Full UK warranty
- CE Approved



• Deluxe Headphones included FREE!

## GRUNDIG

Satellit 800EU Millennium Specifications

#### Frequency Range:

- 100-30,000kHz (0.1-30MHz) for AM Broadcast and Shortwave
- 87-108MHz for FM Broadcast
- 118-137MHz for Aircraft Band

#### Modes:

- AM, USB, LSB modes (0.1-30MHz)
- AM mode only for 118-137MHz
- WFM mode only for 87-108MHz

#### Tuning:

- Direct Input digital key pad combined with manual tuning

#### Indicators:

- Large Analog "S" Meter
- Multifunction LCD Display 6" x 3.5"
- DC Power Requirements - (6) internally mounted "D" cell (1.5V) batteries (not supplied) or 240V AC adaptor (supplied)

#### Weight:

- 14.5 lbs

#### Size:

- Width - 20.5", Height - 9", Depth - 8"

#### Complete with:

- 240V AC mains adptr & Deluxe Headphones

- **Synchronous detection** to improve the purity of shortwave and AM reception. This helps clarify fading signals and reduce interference from adjacent frequencies.
- **AGC- Automatic Gain Control.** The onboard microprocessor monitors signal strength, adjusting gain up or down to compensate for atmospheric and other conditions. It's like an onboard radio engineer. Choose either fast or slow AGC mode.
- **Excellent sensitivity and selectivity.** The Satellit 800EU Millennium receives stations most radios can't, including weak daytime shortwave signals.
- **Three built-in bandwidths** for shortwave, using electronically switched IF filters: 6.0, 4.0 and 2.5kHz.
- **You aren't limited to shortwave signals.** The Satellit 800EU Millennium is the ultimate portable AM/FM radio, too. Enjoy FM stereo with headphones. Listen to the VHF aircraft band from 118 to 137MHz. Many of the same advanced features which enhance shortwave broadcasts do the same for AM reception, too. Listen to distant AM stations at night without fading. Pick out those weak stations on adjacent frequencies.
- **Sure direct keypad digital tuning** is great and the Satellit 800EU

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the Grundig Satellit 800EU Millennium

- **With 70 user memory presets**, you may not want to scan every memory position. So the Grundig Satellit 800EU Millennium lets you scan 10 memory positions at a time. This feature allows you to group your favourite stations: your BBC frequencies, other shortwave favourites, local AM and FM stations.
- **Two timer clocks** keep track of time - local and alternate. The clocks turn the radio on or off as you wish. Yes, the Grundig Satellit 800 is a fabulous radio!



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- Shortwave: 1.711 - 26.1MHz
- FM Stereo: 87.5 - 108MHz
- MW/LW
- SSB reception (both USB/LSB) ( $\pm 1$ kHz fine tuning)
- 40 station preset
- Fine tuning
- Narrow/Wide bandwidth
- DX/Local sensitivity
- Auto Search
- Dual alarm clock
- Sleep timer/Snooze timer
- External antenna & stereo headphone, sockets
- Audio output: 600mW
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  - Shortwave Handbook • Carrying case
  - External Wire Antenna • Carry strap

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'Stick & Win' - yes, stick your free SWM sticker, get spotted and you could win a prize. See page 4 for more details.



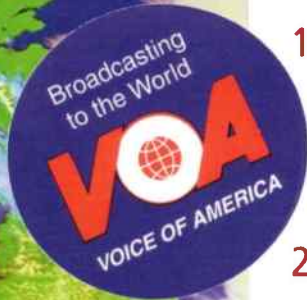
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## 15 DIVERSITY RECEPTION TECHNIQUES

Fading, phase and other distortion are characteristics that we all know are synonymous with short wave communication. Here, the late Joe Carr K4IPV examines methods of removing these effects.

## 18 COLLINS 51S-1

What makes this 'classic' receiver one of JW's all time favourites? Read on and see just what makes a 51S-1 the best receiver on the planet!

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### SWM Author Info To provide you with a ready reference here are the contact details of all our regular authors.

#### Airband

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

#### Amateur Bands

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

#### Attention 123!

Enigma, 17-21 Chapel Street, Bradford, West Yorkshire BD1 5DT. E-mail: enigma@pwpublishing.ltd.uk

#### Bandscan

Bandscan America  
Gerry Dexter, c/o SWM Editorial Offices. E-mail: gdexter@pwpublishing.ltd.uk

#### Bandscan Australia

Greg Baker, PO Box 3307, Manuka, ACT2603, Australia. E-mail: greg.baker@pwpublishing.ltd.uk

#### Bandscan Europe

Martin Peters, c/o SWM Editorial Offices. E-mail: martin.peters@pwpublishing.ltd.uk

#### Decode

Mike Richards G4WNC, PO Box 1863, Ringwood, Hampshire BH24 3XD. E-mail: decode@pwpublishing.ltd.uk

#### DXTV

Keith Hamer and Garry Smith, 17 Collingham Gardens, Derby DE2 4FS

#### Info In Orbit

Lawrence Harris, 5 Burnham Park Road, Peverell, Plymouth, Devon PL3 5QB. E-mail: info.orbit@pwpublishing.ltd.uk

#### LM&S and Maritime Beacons

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

#### MilAir

Peter Bond, c/o SWM Editorial Offices. E-mail: milair@pwpublishing.ltd.uk

#### Off The Record

Andy Cadier, 28 Romney Avenue, Folkstone, Kent CT20 3QJ E-mail: off.the.record@pwpublishing.ltd.uk

#### Propagation

Jacques d'Avignon VE3VIA E-mail: jacques@pwpublishing.ltd.uk

#### Satellite TV News

Roger Bunney, 35 Grayling Mead, Fishlake, Romsey, Hampshire SO51 7RU. E-mail: roger.bunney@pwpublishing.ltd.uk

#### Scanning

Dave Roberts, c/o SWM Editorial Offices. E-mail: scanning@pwpublishing.ltd.uk

#### ShackWare

Jerry Glenwright, 16 Copeman Street, Norwich, Norfolk NR2 1HH. E-mail: shackware@pwpublishing.ltd.uk

#### SSB Utilities

Graham Tanner, 64 Attlee Road, Hayes, Middlesex UB4 9JE. E-mail: ssb.utilis@pwpublishing.ltd.uk

### SWM Author Info



**Missed an issue from 1997 - why not order a back copy - see page 52 for more details.**

### 44 SIMPLE & CHEAP SCANNER ANTENNA WITH PRE-AMP

Buy or build? Paul Unwin shows his way of a conversion from a domestic set top TV antenna into a wide-band scanning antenna, with a minimum of workshop tools and facilities.

### 48 SOME THOUGHTS ON STATION IDENTIFICATION TECHNIQUES - PART 1

There are all sorts of ways to log and identify short wave stations. In Part 1 of this feature, Michael L. Ford touches on some points which should make the whole process of intercepting and identifying weak stations easier.

### COMING NEXT MONTH IN SWM MARCH

- Station Identification Techniques - conclusion.
- Rhode & Schwarz landmark receiver EK-07 With John Wilson.
- IPV On IP3 - Joe Carr looks at the all important receiver characteristic.
- Plus lots more.

\*contents subject to change



**EDITOR:**  
Kevin Nice, G7TZC, BR95787

**NEWS AND PRODUCTION EDITOR:**  
Zoë Shortland

**ART DIRECTOR:**  
Steve Hunt

**ART EDITOR:**  
John Kitching

**EDITORIAL ADDRESS:**  
Arrowsmith Court, Station Approach,  
Broadstone,  
Dorset BH18 8PW  
Telephone: (01202) 659910  
Facsimile: (01202) 659950

If you wish to send E-mail to anyone at SWM then our Internet domain name is: [pwwpublishing.ltd.uk](mailto:pwwpublishing.ltd.uk)  
Simply add the name of the person you wish to contact.  
For example:  
[kevin.nice@pwwpublishing.ltd.uk](mailto:kevin.nice@pwwpublishing.ltd.uk)

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**ADVERTISEMENT DEPARTMENT**  
(Broadstone)  
**ADVERTISING**  
Stedman MBIM

**ADVERTISEMENT TYPESETTING & PRODUCTION**  
Peter Eldrett  
Telephone: (01202) 659920  
Facsimile: (01202) 659950

**ADVERTISEMENT MANAGER**  
Roger Hall G4TNT  
PO Box 946, London SW6 2DS  
Telephone: 020-7721 6222  
Facsimile: 020-7304 1031  
Mobile: (07085) 801280

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## SWM Services

### Subscriptions

Subscriptions are available at £33 per annum to UK addresses, £40 to Europe and £44 (Airmail), £50 (Airmail) overseas. Subscription copies are dispatched 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 £55 (UK), £59 (Europe) and £74 (rest of world), £85 (Airmail).

### 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, **KANGA PRODUCTS** Sandford Works, Cobden Street, Long Eaton, Nottingham NG10 1BL. Tel: 0115 967 0918. Fax: 0870 056 8608.

### Photocopies & Back Issues

We have a subscription of back issues, covering the past three years of SWM. If you are looking for an article in review that you missed first time around, we can help. If we don't have the whole issue we can always supply a photocopy of the article. Back issues for SWM are £2.99 each and photocopies are £2.95 per article. Binders are also available (each binder takes one volume) for £9.99 plus £1 P&P for one binder, £2 P&P for two or more. UK or overseas. Prices include VAT where appropriate.

A complete review listing for SWM/PWA is also available from the Editorial Offices for £1 and P&P.

### Placing An Order

Orders for back numbers, binders and items from our Book Store 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 from overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard, AMEX or Visa) are also welcome by telephone to Broadstone (01202) 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: Broadstone (01202) 059950. The E-mail address is [bookstore@pwpublishing.ltd.uk](mailto:bookstore@pwpublishing.ltd.uk)

### Technical Help

We regret that due to Editorial time scales, replies to technical queries cannot be given over the telephone. Any technical queries by E-mail are very unlikely to receive immediate attention either. So, if you require help with problems relating to topics covered by SWM, then please write to the Editorial Offices, we will do our best to help and reply by mail.

# ed's comments

**F**irstly, a very Happy New Year to all of you. I'm looking forward to another exciting year of bringing you the latest news, views and all things radio within the pages of SWM.

I've received some extremely favourable compliments from many of you about our new logo and title bar, that is indeed pleasing.

## January CD Offer

We've had a fantastic response to our Scanning Scene/PROMA CD offer. So good, that we sold out in about two weeks. I would like to publicly thank Zoë for typing in all the addresses for the labels in record time, which has allowed us to ship out the CDs to you all.

I am really amazed at the demand for the disc, some people have been requesting as many as six CDs. I guess they're bulk buying for their friends or a radio club.

This level of popularity certainly confirms my thoughts that the CD would be a hit and it certainly tells me that a future repeat should definitely be considered.

Anyone reading this who ordered their CD before January 12th will have now received their order. After that date, there is very likely to be a delay due to having to reorder discs from our supplier. I hope this won't exceed the 28 days stated on the order form. If it does, then it won't be by much and I offer my apologies for the wait.

## WH Smiths

Talking of the January issue, I've had a few calls about the WH Smiths special issues. As I mentioned some time ago, in response to queries regarding supply difficulties, we were planning to work with WHS to increase the number of stores carrying SWM. The special issue, which was priced one pound higher than the non-WHS version, included the CD as a cover mounted



item. This is the first time that our publishers have attempted this kind of exercise, it remains to be seen how successful it will be. The upshot of the activity is good news for everyone though because WHS have committed to a significant increase in stores selling SWM. We should be easier to find in the shops now.

## A Hitch

I say should, sadly, the January issue of SWM suffered a setback due to one of the hauliers that delivers our magazine into the wholesalers, temporarily

'lost' a significant quantity of copies. As I write this piece, I've had news that the 'lost' copies have finally been delivered. Indeed our local WHS in Poole only received their order of SWM on the 9th - we should have been on sale 28 December last year!

This kind of problem can be devastating to our circulation.

Fortunately we had many calls from concerned readers, which alerted us to the problem.

Unfortunately, many people don't ask the newsagent why they don't have any on the shelves. Even those of you who do make enquiries are often 'fobbed off' with excuses such as, "oh they've stopped printing that", or "sorry we've not had that for months...". Please don't accept this kind of couldn't care less attitude and speak to a senior member of staff. If you have no joy then please make sure I know of your difficulties. Then I can pursue the problem and fix it.

## Stick & Win!

As you must have noticed, in this month's SWM, you've got a free 'car sticker'. Over the next few months, I'll be travelling far and wide throughout the UK and I will be looking carefully for SWM stickers. Any I see in car windows, I'll be recording and publishing the registration numbers. If you see your number in SWM, write in and claim your prize. We will be offering SWM Book Store vouchers and SWM subscriptions. For those of you without cars, don't despair, I'll be looking for stickers in house windows too. Okay then let's get sticking - Good luck.

*M 73 Kevin*



**Dear Sir**

I have an upgraded ERA Microreader which unfortunately fell onto the floor off a table and the consequences are now I cannot get it to work. I tried ringing ERA in Warrington, but was unable to get a telephone number which makes me think they could have gone out of business. Do you know of anywhere who services Microreaders and where I could reach them?

**J. Cooper  
Hull**

**Dear Sir**

In the June 22 issue of dotcom.telegraph (supplement to *Daily Telegraph*), Hugh Scully (page 6E) notes that he is able to pull in classical radio stations from France, Germany, Austria, etc, by means of his satellite radio system. Can you give any information re: satellite sources of hi-fi audio? For example, are these free to hear or encoded and available only by subscription? Might this aspect of broadcasting be a suitable topic for an article in *SWM*?

**B.W. Smithers  
Middlesex**

*It is likely that the article you refer to is discussing the WorldSpace digital satellite system. We published a feature on WorldSpace in the October 2000 issue of SWM. In the December issue there was a chance to win a satellite receiver. Many of the dealers in this issue have suitable receivers for sale. - Ed.*

**Dear Sir**

Yesterday I received my copy of the October issue of *SWM*. I particularly wish to thank you for the information provided re: the NATS Flightpath demo program. By last night it was 'up and running' - a very comprehensive and ambitious project that I found extremely interesting. No aviation enthusiast should be without it! Please keep us up-to-date with the development and issue of the final product.

**A.J. Budd  
Southport**

*See page 26 for more details. - Ed.*

**Dear Sir**

I am putting finger to keyboard to ask if there is a frequency book that I could buy that would be easy to read, as I have an old valve Yaesu Musen FRdx400 which I have just had serviced and found it has 2m and 6m crystals in it, but the readout is a bit daunting to say the least and I would like to get into it a bit more. Also, is there a manual that I could get hold of as I have no

books on it at all.

At the moment I am running a Realistic DX-394 to receive SSTV with *JVCOMM* and I find it very good with digital readout and easy to tune. Also, I would like to thank you for getting me started in h.f. FAX and RTTY via the programs in *SWM* - it was made easy to read and follow and it got me my first weatherfax.

I have thought of buying a PCR1000, but I don't know much about it and I don't think I would be able to run my normal programs with it as I would need two computers to run them. Also, all I have is a Scan Stick 0-1300MHz antenna on top of my bungalow and wonder if it was good enough if I did buy a PCR1000. Once again, thank you for all your and *SWM*'s help.

**George Hawkes  
Cornwall**

*George, I'm sure that someone reading this will have a manual for the FRdx400 that they will be prepared to share with you. Since the FRdx400 is an amateur band receiver, I'm not too sure what kind of frequency guide you require. The SWM Book Store stocks many guides, both broadcast and utility stations. Regarding the PCR1000 control, if you have a pentium based PC, then you should be able to run the receiver and later, sound-card type decoders on one PC. - Ed.*

**Dear Sir**

After reading 'ShackWare' (November *SWM*) I am wondering what Jerry is going to turn to when he finds a load of kids using PMR446? Why be so negative about CB Radio? It is what you make it.

If I find 'lunatics, kids and the plain foul-mouthed tainting the band' - Jerry's words not mine - just turn to another channel or the other band. The only way to keep CB Radio alive is for it to be used by decent breakers, just ignore the others.

Do not go back to them on the air as it

only feeds them. Here on the Isle of Wight our local DX group, the India Whiskys stick together. The more decent breakers use CB and ignore the lunatics, the better the channels.

Be positive - the India Whisky DX Group have just raised £553 (553 UKP) by holding a sponsored modulation for the Headway Group. As a sw.I. I do not think the amateurs have it all their own way. But it is easy to jump on the bandwagon and pick an easy target.

**Barry Cant  
Isle of Wight**

**Dear Sir**

Does anyone have any experience of using a Sherwood SE-3 synchronous detector? It is highly regarded in various reports in *Passport To World Band Radio 2000* to enhance the sound from top end h.f. equipment. I would welcome any reports or tips on using this device from readers or staff direct to my E-mail address: [paean@netcomuk.co.uk](mailto:paean@netcomuk.co.uk)

**John Porter**

**Letters Received Via E-Mail**

**A great deal of letters are now arriving by E-mail, and although there's no problem in general, many correspondents are forgetting to provide their postal address. Although we do not publish a full postal address, unless we are asked to, we do require this**

**information, especially if your letter wins TOP QSL and we need to send you your voucher! Also, please mark your letters intended for QSL 'For Publication'. Many thanks.**

Is there something you want to get off your chest? Do you have a problem fellow readers can solve? If so then drop a line to the Editor at QSL, Short Wave Magazine, Arrowsmith Court, Station Approach, Broadstone, Dorset BH18 8PW.

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You can also submit your letters by E-mail to: [qsl@pwpublishing.ltd.uk](mailto:qsl@pwpublishing.ltd.uk)

**Dear Sir**

John Wilson's article on loop antennas (Nov 2000 *SWM*) was interesting reading. I have lived at my present address for over 20 years and until about 1990 I could merrily tune the lower h.f. bands on my trusty R-1000 and hear weak signals against a quiet background. What bliss!

Since that time, the signals have been progressively drowned under a sea of hash, burbles and mysterious unstable carriers that I assume to be the products of evil devices such as satellite receivers,

computers and TV sets. My random wire antennas, with or without baluns, were no longer suitable. So the bench was cleared of unfinished products and a 600mm diameter loop took shape. As it was broadband (i.e. untuned), its output was fed to a balanced amplifier and from there to a length of coax feeding the receiver. The difference was miraculous! The hash was down from S7 to S1 and most of the burbles could be nulled right down to nothing and signals were once again standing out from a quiet backdrop. Its a shame

that we have to resort to messing around like this, but in the age of noisy digital devices, we seem to have no choice.

On a completely different subject, I hope that JW will continue to write about the older receivers. More and more modern radios seem to be computers-with-knobs and they don't have that special 'magic' anymore. Keep it up John!

**Andrew Howlett  
Cheshire**

**TOP  
QSL**

# Communiqué

## Open Day

Back at the beginning of December 2000, Nevada held their first ever open day and had just under 500 people turn up, some having travelled a considerable distance. Nevada have been in their new 1100m<sup>2</sup> warehouse for just over a year, which is the ideal setting for such an event. A hamburger van was installed outside to provide free tea and coffee to all who visited.

Representatives from Icom, Kenwood, Yaesu and AOR all supported the evening, providing demonstrations of their latest models and also answering customer queries. Nevada are pleased this event was such a success and they now intend to run this show on an annual basis.



The early risers at Nevada's first ever open day!

## Special Event Station GB2SLS

Scarborough Lifeboat Station will celebrate 200 years of lifesaving in March 2001, and the RNLI have announced that they will honour this outstanding achievement by the award of a special bicentenary vellum. Scarborough lifeboat station was one of the original three lifeboat stations first established in the United Kingdom between the years 1800-1801.

Until this time local fishermen risked their lives in their own cobbles to save the lives of shipwrecked colleagues. Lifeboats stationed at Scarborough have been launched 1096 times and saved 563 lives, with seventeen medals for bravery awarded to crew members.

The Scarborough Special Events Group will be active as GB2SLS from the presentation day on 3rd March and a full colour souvenir QSL card of Scarborough Lifeboat will be issued to commemorate the occasion. Activity will be mainly in the 40m band using s.s.b. and c.w. Short wave listener reports are very welcome and QSL cards can be sent via the Bureau or direct to the club call G0000.



## Transmission 2001

Icelandic amateur radio operators from the Radio Club of Reykanes joined UK clubs and operators for a sponsored fundraising event held over the weekend of 16/17th September 2000 in support of the **British Wireless for the Blind Fund**. Together they raised over £5800 to help provide UK registered blind people with audio equipment that has been specially designed to meet their needs.

Chief Executive Margaret Grainger said that she was delighted with the response from the radio operators for this year's event. "I know that many of them had problems getting to



their stations because of the fuel shortage and appalling weather conditions over that weekend, and that makes their support all the more special to us. In spite of all of the difficulties that they faced, the total raised has beaten previous years. I am so grateful to everyone who took part in Transmission".

Prizes for the most money raised were awarded to Port Talbot ARS, with runner up Stevenage & District ARS, and in the individual category, the first prize went to Mr J. Scully of Bognor Regis with Mr R. Walker from West Bromwich in second place.

Transmission 2001 will be held over the weekend of **15/16th September** and information about this event can be obtained from the British Wireless for the Blind Fund on **(01634) 832501** or write to: **Gabriel House, 34 New Road, Chatham, Kent ME4 4QR** or visit **www.blind.org.uk**

## New Web Portal

Budding innovators can learn how to make the most of their ideas and protect themselves from counterfeiters thanks to a new Intellectual Property (IP) web site launched today by the Minister for Consumer and Corporate Affairs, Dr Kim Howells.

The site provides a comprehensive resource for businesses and inventors, with information on copyrights, trade marks, patents and designs. Users will be able to find answers to frequently asked questions, view the latest news and link to other IP-related sites. Special sections deal with IP as it relates to business, education and entertainment and there is information on how to profit from IP.

The site will also help people with concerns about using the property of others, for example by signposting them to the correct place to obtain a licence. There is information for both people with little knowledge of IP and more experienced users.

Launching the site at the DTI's conference recently to raise awareness of IP and IP crime

issues, Dr Howells said, "Invention and creativity have a vital role to play in ensuring the continuing competitiveness of British Industry. The Government is keen to help innovation by providing the appropriate tools for businesses to understand and make the most of their intellectual property rights. I hope that creators and users alike will find the new IP portal a useful source of information".

The idea for the portal came from a report by the Intellectual Property Group of the Government's Creative Industries Taskforce, a body set up to make recommendations on ways of improving respect for and understanding of intellectual property. The Group's recommendations were published in March 2000. The web site address for the Intellectual Portal is **www.intellectual-property.gov.uk**

## Vesermirna Radioset

World Radio Network has launched a new station this month in St. Petersburg, Russia's second largest city, that will be a pilot for a Russian language network due on-air next week. The new radio station, known as Vesermirna Radioset (a direct translation of World Radio Network in Russian) broadcasts on 684kHz a.m. and offers St. Petersburg's 4.75 million citizens a mix of news and information programming in Russian from international broadcasters including YLE Radio Finland, Radio Canada International, Radio Prague, Radio Slovakia International and China Radio International.



The second stage in the network roll-out will be an a.m. transmitter in Moscow, followed by f.m. stations in a further eight cities to be established over the next twelve months. WRN will also shortly open a representative office in Moscow to co-ordinate its radio activities across Russia, including sourcing locally produced programming to create a truly unique, informative and entertaining radio network for Russian listeners. Technically, Vesermirna Radioset will be put together in WRN's London studios and sent by satellite to Russia for local transmission.

Inaugurating the new station WRN Managing Director Karl Miosga, said "Many of the programme providers we work with have expressed strong interest in reaching Russia and the CIS through local broadcasts and we plan to develop extensive coverage. This is just the start of what is an exciting project and we aim to attract varied and popular programming into the station which will enliven the Russia radio market".

Check out WRN's web site at **www.wrn.org** for more information.



## Icom's Latest

The introduction of the IC-910H v.h.f./u.h.f. all-mode amateur transceiver from **Icom (UK) Ltd.**, available in March, is designed for all-mode multi-band operation and provides a compact, fully featured transceiver, which is ideally suited to meet the demands of the serious DXer or satellite enthusiast.

Whilst keeping the essential qualities of its well respected predecessor, the IC-821H, Icom have added important features to the IC-910H, such as a large, clear l.c.d. display, a useful increase in transmit power output and d.s.p. facilities. Also Icom have installed the optional UX-910 1200MHz band unit, enabling the IC 910H to become a tri-band all-mode transceiver, capable of working on 2m, 70 and 23cm. These and many other options make the IC-910H a premier v.h.f./u.h.f./s.h.f. transceiver.

Newly designed power amplifier circuits provide 100W of stable output power on 2m, 75W on 70cm and 10W on 23cm. Couple this with dual, high sensitivity d.s.p. compatible receiver, weak signal DX and satellite communications are second to none. Also, the aluminium diecast chassis and effective cooling fan ensures stable output for continuous operation.

Measuring just 240 x 90 x 240mm the weighing in at just 4.5kg, the IC-910H is ideal for field day or contest operations that require a top-notch, all-mode v.h.f./u.h.f. transceiver. The large easy to read l.c.d. display and 10 key entry pad ensure direct frequency or memory channel control has never been easier.

Add to this a multitude of features, such as speech compressor, VOX, electronic keyer, CTCSS encoder, variable power output, frequency tracking for satellite up/down, 99 memory channels, then you have a versatile set which is perfect for anyone interested in any aspect of v.h.f./u.h.f./s.h.f. operation.

More details from Icom themselves at **Sea Street, Herne Bay, Kent CT6 8LD, Tel: (01227) 741741, FAX: (01227) 741742** or visit their website at [www.icomuk.co.uk](http://www.icomuk.co.uk)



## Radio Listener's Guide - 2001 Edition

Now available from the **SWM Book Store**, priced at just **£5.25**, is the 2001 edition of the *Radio Listener's Guide*. The guide shows the frequencies and locations of all the radio stations in the UK and Ireland. Information covers BBC and commercial radio stations as well as new Digital Radio (DAB Services). You will find information about the BBC World Service, overseas stations broadcasting to the UK, as well as about satellite and Internet radio. A useful little book. Order your copy now! **Tel: (01202) 659930.**



## Nevada's Newest



**Nevada** have recently released the new Grundig Satellit 800 EU Millennium Receiver. This new receiver gives you the ultimate in features, performance, convenience and sound. It's incredibly powerful, technologically sophisticated, yet easy and intuitive to use. Whether you are an experienced short wave listener or a newcomer to the world of international broadcasting, this is definitely the radio to get.

Nevada will be distributing the radio exclusively in the UK, both direct and through their existing dealer network. The EU version has a rec. retail price of £599, but will be offered for an introductory period to **SWM** readers for £549. More information from Nevada at **Unit 1, Fitzherbert Spur, Farlington, Portsmouth, Hampshire PO6 1TT**, or visit their web site at [www.nevada.co.uk](http://www.nevada.co.uk)

## rallies

**January 28:** The Horncastle Amateur Radio, Electronics & Computer Fair is to be held at the Horncastle Youth Centre, The Old School, Cagthorpe, Horncastle, Lincs. (nr Horncastle Police Station) Admission just 50p. There will be Morse code tests and refreshments available. Information and bookings taken on (01526) 860320 or (07778) 274535.

**February 4:** The 16th South Essex ARS Radio Rally will be held at the Paddocks (situated at the end of the A130), Long Rd, Canvey Island, Essex. Doors open at 1030 and featured will be Amateur Radio, Computer and Electronic Component exhibitors. Home-made refreshments, free car parking with space outside main doors for disabled visitors. Details from **Brian Bellamy G7IIO** on (01268) 756331 or E-mail: [briang7iio@yahoo.com](mailto:briang7iio@yahoo.com)

**February 11:** The 10th Northern Cross Radio Rally takes place today at Thornes Park Athletics Stadium, Wakefield, West Yorkshire, just out of town on the Horbury road. Easy access from M1 J39 & J40 well signposted and with talk-in on 144 and 430MHz. Doors open 1100 (1030 for disabled and Bring & Buy). Usual attractions plus Morse tests on demand. **John G7JTH (01924) 251822** or E-mail: [rally@sandalmagna.demon.co.uk](mailto:rally@sandalmagna.demon.co.uk) Web site: <http://www.sandalmagna.demon.co.uk/rally/>

**February 11:** The Cambridge & District ARC Annual Radio, Computer Rally & Car Boot Sale takes place today at a new venue - Lordsbridge Arena, Wimpole Road, Barton, Nr Cambridge, opposite Mullards Radio Observatory on the A603 off J12 on the M11. Doors open 1000 for disabled visitors, 1030 general public. Admission is £1.50, £1 QAP/disabled and under 14s free. Talk-in on S22. **Bob G6GVZ** on (01223) 413401 or E-mail: [bob.grimes@btinternet.com](mailto:bob.grimes@btinternet.com)

**February 11:** Harwell ARS Radio and Computer Rally - Didcot Leisure Centre, Merleand Road, Didcot, signposted from A34. Talk-in on S22, car park, admission £1, doors open 1015 (disabled)/1030, trade stands, Bring & Buy, special interest groups, licensed bar, light refreshments and disabled facilities. Details from **Ann G8NVI** on (01235) 816379 or E-mail: [annstevens@compuserve.com](mailto:annstevens@compuserve.com)

**February 17:** The Reddish Rally will be held in St Mary's Parish Hall, St Mary's Onve, Reddish, Stockport. Signposted from M60 Junction 27. Doors open 1000. Talk-in on S22. All tables to be paid for in advance (£8 each), please ring for a booking form. **John McKee G4ILA** on 0161-477 6702

**February 25:** The Swansea ARS will be holding their 20th Amateur Radio & Computer Show in the Swansea Leisure Centre. Doors open 1030. There will be traders, a Bring & Buy, operational h.f./v.h.f. station and local groups, etc. Admission is £1.50 for adults, 50p for children. Further details from **Roger GW4HSH**, Show Secretary, on (01792) 404422

## CLUB CORNER

Members of the **Wakefield & District Radio Society** meet on Tuesdays at 2000. Just a few up and coming events are: Feb 6th: Final rally preparation, 11th - Northern Cross Radio Rally, 13th - Rally debrief, 20th - Talk by Derek Allen G3WYP from the RSGB, 24th - Annual dinner, 27th - On the air/natter night. Further details from **John G7JTH** on (01924) 251822 or check out the Society's web page at [www.sandalmagna.demon.co.uk/wdrs/](http://www.sandalmagna.demon.co.uk/wdrs/)

The **Cockenzie & Port Seton Amateur Radio Club** are holding their 8th Annual Radio Junk Night on **Friday 10th August 2001** at 1830 to 2130 at the Cockenzie & Port Seton Community Centre, South Seton Park, Port Seton, East Lothian. Why not take along your own 'junk' and sell it yourself. Further information re: times/cost. etc. from **Bob Glasgow GM4UYZ** on (01875) 811723 or E-mail Bob at [bob.gm4uvz@btinternet.com](mailto:bob.gm4uvz@btinternet.com) or [bob.glasgow@icl.com](mailto:bob.glasgow@icl.com)

The **Bangor & District Amateur Radio Society** meet on the first Wednesday of every month at The Stables, Groomsport, County Down, at 2000. Please note that this is a new venue - meetings are no longer held at the Clandeboye Lodge. On Wednesday 7th February at 2000 the Society are hosting a talk on packet by Ken Crossan G10YEW (sysop of GB7HMI). This should be an interesting evening, and as always, visitors and new members are all most welcome. More information from **Mike G14XF** on 0208-4277 2383 or visit the club's web site at <http://welcome.to/bdars>

■ **Gerry L. Dexter, c/o SWM EDITORIAL OFFICES, ARROWSMITH COURT, STATION APPROACH, BROADSTONE, DORSET BH18 8PW.**

■ **E-MAIL: gldexter@pwpublishing.ltd.uk**

# Bandscan America

There will soon be even more commercial religion and politics coming at you from short wave transmitters in the United States. WGTG - which hasn't even been on the air all that long - has been sold and its call letters changed to WWFV (World Wide Freedoms Voice). The new owners are adding five new 100kW transmitters and eight new antennas to their installation at McCaysville, Georgia.

Broadcast time on the new facility is available to anyone who has the money and the ability to put programmes on tape. Frequencies to be used by the new transmitters aren't known yet. An easily heard current frequency is 6.890 upper sideband, which is on the air from 0000 to 0700.

And, WBCQ in Maine is adding a second transmitter which will very likely also carry commercial religion most, if not all of the time. If it hasn't done so already, it should show up on 17.495 at any time.

Radio Miami International (WRMI) has added 15.725 to its 9.955 and 7.385 bag of frequencies, and is using it between 1300 and 2300.

Radio Villa, one of the few active stations in the Dominican Republic, has reactivated on 4.960 and is heard with all Spanish language programming during our North American evenings, up to 0600. The station relays a local f.m. outlet in Santo Domingo. Radio Barahona, on nominal 4.930 continues to be active, though it has been more recently heard on variable 4.900.

United Nations Radio is currently broadcasting from its New York studios to various areas of Africa, according to the following schedule: in French from 1700 - 1715 via Meyerton, South Africa on 6.125 and Skelton, UK on 17.595. 1700-1720 in French and Portuguese from Meyerton on 21.490. 1725 to 1745 in Portuguese and English on 6.125 and 15.495 (Skelton) and 17.735 via Ascension Island. Also in Arabic from 1830 to 1845 on 7.260 and 13.770, both via Skelton.

CHNX, Halifax, Nova Scotia, has returned to the air on 6.130, relaying CHNS medium wave. Although the transmitter has been fixed, the power is extremely low and the antenna isn't exactly modelled after something you'd find at Rampisham either. So you may find this one to be a very difficult catch.

## Coming & Going

Since its first appearance a couple of years ago Mexico's Radio XERTA (4.800) has had a history of coming and going, as though the owners couldn't make up their minds on whether to stick with the medium, or the engineers were having trouble keeping a transmitter healthy. At any rate, at this writing they are active again. They're listed for 24-hour operation, but that may or may not actually be so. At any rate, check them early in the morning, UTC.

Radio Mexico International has begun using 11.770, in addition to its regular spot on 9.705. The exact schedule isn't known, but it should be in operation at least part of the time - 9.705 is also active.

Probably the hardest-to-log short wave station in Mexico is Radio Huayacocotla, La Voz de los Campesinos, on 2.390. Besides the difficulty of hearing much of anything on 120m (and there's not much there to begin with!) the station isn't on the air very far into North American evenings when 120 is 'open' - if it's going to be open at all. The schedule is more helpful for UK DXers, since it covers UK evenings - from 2100 to 0100. But you'll also have to contend with the fact that the station is running only 500W.

Venezuelan Radio Tachira in San Cristobal has resumed to the air on 4.830, as has Radio Amazonas on 4.939 variable, from Puerto Ayacucho. Meantime, we seem to have lost Ecos del Torbes, also from San Cristobal, at least in the evenings when I do most of my listening. It has been a long time regular on 4.980 and sometimes puts 9.660 into play as well. The latter frequency has been in operations during periods when 4.980 was silent.

KHBN on Palau Island, part of the California-based High Adventure Ministries operation, is undergoing some changes in program content. The majority of the station's

airtime is now programmed by the Chinese Church of Hong Kong. The station is currently scheduled from 0900-1100 on 17.520 and 21.460 and 1030-1500 on 9.965.

Current stations in Bolivia being heard include the following (frequencies may vary slightly):

- 3.310 Radio Mosoj Chaski, Cochabamba
- 4.410 Radio Eco, Reyes
- 4.453 Radiodifusora Tropic, Trinidad
- 4.472 Radio Movima, Santa Ana
- 4.649 Radio Santa Ana, Santa Ana
- 4.681 Radio Palititi, Guayaramerin
- 4.717 Radio Yura, Yura
- 4.732 Radio La Palabra, Santa Ana de Yacuma
- 4.767 Radio Constalacion, Guanay
- 4.877 Radio La Cruz del Sur, La Paz
- 5.580 Radio San Jose, San Jose de Chiquitos
- 6.025 Radio Illimani, La Paz
- 6.054 Radio Juan XXIII, San Ignacio Velasco
- 6.135 Radio Santa Cruz, Santa Cruz

Brazilian short wave stations showing up in recent weeks include:

- 3.205 Radio Ribeirao Preto, Ribeirao Preto
- 3.365 Radio Cultura, Araraquara
- 4.755 Radio Educacao Rural, Campo Grande
- 4.805 Radiodifusora de Manaus, Manaus
- 4.865 Radio Verde Floresta, Cruzeiro do Sul
- 4.885 Radio Clube do Para, Belem
- 4.985 Radio Brazil Central, Goiania
- 5.965 Radio Nova Visao/Radio Trans Mundial, Santa Maria
- 5.970 Radio Itatiaia, Belo Horizonte
- 6.000 Radio Guiaba, Porto Alegre
- 6.040 Radio Clube Paranaense, Curitiba
- 9.505 Radio Record, Sao Paulo
- 9.530 Radio Nova Visao/Radio Trans Mundial, Santa Maria
- 9.685 Radio Gazeta, Sao Paulo
- 9.695 Radio Rio Mar, Manaus
- 11.735 Radio Nova Visao/Radio Trans Mundial, Santa Maria
- 11.925 Radio Bandeirantes, Sao Paulo

If you want to send reception reports on any of the US Armed Forces Radio single sideband broadcasts, they should go to this address: **Michael Foutch, Chief Broadcast Operations Specialist, Naval Media Center, 2713 Mitscher Road S.W., Washington, D.C. 20373.**

## New Station

Watch for a new station to come on the air from Uruguay. Radio Universo in Castillos is due to open on 6.055. It won't use a whole lot of power, however - probably somewhere in the multi-hundred watts range. Once they are on, much of the programming will be a relay of their medium wave sister station on 1480kHz. They plan to operate from 1600 to 0500. Their mailing address is **c/o Ferrer 1265, Castillos, Departamento de Rocha, Uruguay.** Further into the future the same ownership plans to put a second station - Radio Sarandi del Yi - on the air on 6.155.

The US based United Methodist Church tested on short wave in early December, via DTK transmitters in Julich, Germany. Based in the United States. Transmitted from Germany. Produced in Hong Kong! Apparently there are plans for regular broadcasts, beginning sometime this year. Test frequencies were 17.775, 13.685, 13.810 and 15.485. If you hear them, the address is **485 Riverside Drive, New York, NY 10115.** The test broadcasts were beamed to Africa.

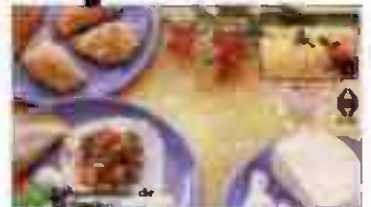
## Stronger Signals

Watch for slightly stronger signals from Radio Miskut (5.770) in Nicaragua. They are supposed to be up to three kilowatts now! Their normal schedule is from 1200 to 0000, including a relay of VOA News Now programming from 1200-1230, 1700 to 1730 and 2300-0000. Watch for an extended schedule well into the evenings (mornings UTC) on holidays.

That wraps things up for this time. Good listening!



Years ago, Radio Canada International was simply the international service of the Canadian Broadcasting Corporation. This card was issued in 1952!



A few years ago HCJB issued a series of QSLs featuring the foods of Latin America. This one features the 'Empanada'.

■ BRIAN ODDY G3FEX, THREE CORNERS, MERRYFIELD WAY, STORRINGTON, WEST SUSSEX RH20 4NS

# LM&S

Some of the higher frequency short wave bands are very crowded just now and listeners may have difficulty in receiving a wanted broadcast due to the 'splatter' from a station on an adjacent channel.

The owners of receivers that are capable of single sideband (s.s.b.) reception may be able to achieve some improvement by selecting either the upper or lower sideband of the wanted transmission. However, many receivers cater only for the detection of amplitude modulated (a.m.) transmissions, so tuning to a parallel transmission in another band may be the best solution.

## Long Wave Reports

Note: l.w. & m.w. frequencies in kHz; s.w. in MHz; Time in UTC (=GMT). Unless otherwise stated, all logs were compiled during November.

Over in Co.Down **Eddie McKeown** (Newry) searched the band during the evening and late at night. At 0040UTC he picked up a broadcast from Ríkisutvarpid (RUV) in Reykjavik via their 300kW outlet at Gufuskalar, W.Iceland on **189kHz**. He logged the transmission as SINPO 24212.

On the 24th at 2150UTC, **Sheila Hughes** (Morden) heard on **171kHz** a faint ballad type song, followed by a woman and a man talking, then the news in Russian, which she presumed came from Bolshakovo, Russia. The transmission rated 22212.

A lift in the propagation conditions was observed during the evening of the 30th by **Fred Pallant** in Storrington. It resulted in co-channel interference to DLF via Donebach, Germany from Bechar, Algeria which share **153kHz**; also to DLF via Munich, Germany from Azilal, Morocco which share **207kHz**.

## Medium Wave Reports

Listeners who searched the band at night for broadcasts from m.w. stations in E.Canada and E.USA found the propagation conditions unfavourable - any that were heard were too weak to be identified. However, the sky waves from quite a few stations in the Middle East, N.Africa, Europe and Scandinavia were picked up after dark - see chart.

During some evenings **Simon Hockenull** (E.Bristol) noticed that reception from Kalundborg, Denmark on **1062kHz**; Solvesborg, Sweden **1179**; Kvitsoy, Norway **1314** and some other northern European stations was very poor and noisy, with rapid fading and echos. He presumes it was caused by solar disturbances.

A new VOA service to central Europe from Munich on **1197kHz** attracted the attention of **Harry Richards** (Barton-upon-Humber) at 1500UTC on the 5th. He says "It sounded as good as BBC R-4 on long wave! Of course it can be heard in the North but not in the South because Virgin are on **1197kHz**".

Searching the band during daylight for the ground waves from distant local radio stations proved to be worthwhile for some listeners - see chart. On the 27th **Brian Keyte** (Gt.Bookham) was surprised to hear the Gunthorpe transmitter on **1449kHz** relaying the BBC Asian network instead of the usual BBC R.Cambridge/Peterborough, as on **1026kHz**. He says "Their announcements, and information that I got later from the BBC, confirmed that **1449** has joined the Asian network (now on **828, 837, 1449** and **1458kHz**) - in fact the changeover took place at 0800 on the 27th, the same morning that I heard it."

## Short Wave Reports

No doubt many listeners in the UK will recall the truly excellent reception that could be obtained in the **25MHz (11m)** band from many areas during the peak period of sunspot cycle 22 (1989-1990). Almost every day the broadcasts from Radio RSA in Johannesburg, S.Africa were received here as clearly as those from a local station!

It is therefore surprising that almost all of the international broadcasters have chosen to ignore the peak period of the present sunspot cycle (No.23) - so far only Deutsche Welle (DW) and R.France International (RFI) are exploiting the propagation conditions prevailing in the 11m band. The 'Propagation Forecasts', which are prepared for SWM by **Jacques D'Avignon VE3VIA**, indicate that the Maximum Usable Frequency (m.u.f.) to N & C.America, the Middle East and India is as high as 40MHz at certain times during the day. Furthermore, the Optimum Working

Frequency' (OWF), with a 90% probability of success to those areas plus South Africa, Australia and the Pacific is around 26MHz or higher.

The daily broadcasts from DW on **25.740** are intended for listeners in S/SE.Asia (Ger 08007-1600?). Those from RFI are beamed to E/C.Africa on **25.820** (Fr 0900-1300). How well they are being received in those areas is still not known here - reports from listeners living there would be very welcome here.

The reception of both transmissions in the UK is unreliable because back scatter and other modes are involved. The SINPO ratings noted in the reports for DW on **25.740** were 35233 at 0817 in Newry; 45444 at 0920 by **Bernard Curtis** in Stalbridge; 45523 [with echo] at 1021 by **Vic Prier** in Colyton; 35233 at 1030 by **Peter Pollard** in Rugby; 35543 at 1045 by **David Edwardson** in Wallsend; 34422 [with echo] at 1139 by **Rhoderick Illman** in Oxted; 25522 at 1140 in E.Bristol; 34443 at 1255 by **Robert Connolly** in Kilkeel.

Those for RFI on **25.820** were 45534 at 0920 in Stalbridge; 35343 at 1000 in Newry; 45544 [with echo] at 1011 in Colyton; 35233 at 1025 in Rugby; 35543 at 1045 in Wallsend; 24222 at 1140 in Oxted; 35433 at 1233 by **Fred Wilmshurst** in Northampton; 25522 at 1150 in E.Bristol; 44444 at 1250 in Kilkeel.

In contrast there is a high level of activity in the **21MHz (13m)** band. During the morning R.Finland via Pori **21.670** (Eng to Australia, Asia, W.Eur 0730-0800) was rated 55555 at 0735 by **Stan Evans** in Herstmonceux; R.Australia via Shepparton on **21.725** (Eng to Pacific areas 0200-0900) 42433 at 0845 in Colyton; R.Prague, Czech Rep **21.745** (Eng to E.Africa, Asia 1000-1030) 54444 at 1000 in Morden; R.Pakistan **21.465** (Ur, Eng to Eur) 33333 at 1015 by **Tom Winzor** in Plymouth; R.Ext.Espana via Noblejas **21.570** (Sp to S.America 10007-1700) 44444 at 1030 by **Thomas Williams** in Truro; UAER, Dubai **21.605** (Eng to Eur 1030-1055) 35553 at 1030 in Wallsend; Swiss R.Int via Sottens **21.770** (Eng, Ger, Fr, It to Asia 1100-1330) 45544 at 1145 by **Robert Hughes** in Liverpool.

After mid-day VOIRI Tehran **21.470** (Eng to Australia 1100-1230) was 44243 at 1217 in Newry; R.Australia via Shepparton **21.820** (Eng to Asia 0900-1400) 33233 at 1302 by **Martin Venner** in St.Austell; UAER, Dubai **21.605** (Eng to Eur 1330-1350) SIO 544 at 1330 by **Tom Smyth** in Co.Fermanagh; Vatican R.Italy **21.620** (Various to Asia, Pacific [Eng 1345-1405]) was 45544 at 1347 in Northampton; RAI Rome **21.520** (It sport) to E.Africa 1345-1700 Sun) 45544 at 1359 in E.Bristol; Channel Africa, Johannesburg **21.725** (Eng to Africa, Eur? 13007-1455) 35333 at 1405 in Rugby; BBC via Cyprus **21.470** (Eng to Africa 1300-1700) 44444 at 1410 in Kilkeel; BBC via Ascension Is **21.660** (Eng to Africa 1400-1700) 43333 at 1420 by **David Hall** in Morpeth; Voz Christiana, Chile **21.500** (Sp) 34433 at 1658 in Oxted; WYFR Okeechobee, USA **21.455** (Eng, Fr, Ger to Eur 1600-2100?) 44434 at 1925 in Stalbridge.

The occupants of the narrow **18MHz (15m)** band include R.Denmark via R.Norway **18.950** (Da to N.America 1230-1300) rated 45433 at 1242 in Northampton; R.Sweden **18.960** (Eng to N.America 1230-1300) 55555 at 1255 in Herstmonceux; WYFR Okeechobee, USA **18.980** (Eng to Africa, Eur 1600-2200?) 34232 at 1808 in Newry & 54444 at 1846 in Plymouth; Christian Science BC via WSHB Cypress Creek **18.910** (Fr, Eng to E/C.Africa 1700?-2000) 54445 at 1910 in Stalbridge.

The most distant broadcaster to reach the UK in the **17MHz (16m)** band is R.New Zealand. Their 100kW transmission to Pacific areas on **17.675** (Eng 1850-0705) was rated 45522 at 0455 in E.Bristol & 32223 at 0700 in Stalbridge. R.Australia's broadcasts have also been reaching the UK. Their transmission from Shepparton on **17.750** (Eng to Asia 0000-0500,



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

Listeners:  
(A) Simon Hockenull, E.Bristol  
(B) David Hall, Morpeth  
(C) Eddie McKeown, Newry  
(D) Sheila Hughes, Morden  
(E) Fred Wilmshurst, Northampton  
(F) Robert Connolly, E.Bristol  
(G) David Edwardson, Wallsend  
(H) Fred Wilmshurst, Northampton

## Long Wave Chart

Freq (kHz)	Station	Country	Power (kW)	Listener
153	Bechar	Algeria	1000	G*
153	Donbach DLF	Germany	500	A*B*C*DE*FG
153	Bid	Poland	1200	G*
162	Bechar	France	2000	B*C*DE*F
171	Ascension Is	Morocco	2000	F*
171	Ascension Is	Russia	1200	B*C*G*
171	Ascension Is	Germany	1000	G*
177	Ascension Is	Germany	500	A*B*C*DE*FGI*
183	Ascension Is	Germany	2000	C*DE*FGI
183	Ascension Is	Wales	150	C*G*
183	Ascension Is	France	500	B*C*D*G
207	Ascension Is	Germany	500	A*B*C*DE*G
207	Ascension Is	Morocco	400	A*F*G*
216	Ascension Is	France	1400	C*D*E*G
216	Ascension Is	France	7	A*B*DE*G
216	Ascension Is	Germany	2000	C*DE*FG
216	Ascension Is	Germany	300	A*B*DE*G
216	Ascension Is	France	150	C*D*E*G
216	Ascension Is	Germany	5	A*B*DE*G
216	Ascension Is	Canada	1500	A*B*DE*G
216	Ascension Is	Belgium	500	B*C*DE*G

£99.95

**LOG PERIODIC MLP32**

Freq. Range 100-1300MHz  
Length 1420mm Wide Band 16 Element directional beam which gives a maximum of 11-13Db Gain Forward and 15Db Gain Front to Back Ratio. Complete with mounting hardware. (The Ultimate Receiving Antenna - a must for the Dedicated Listener.)



**ROTATOR AR-300XL**

- Rotation Torque-22Kg
- Vertical Load-45Kg
- Mast Size - 28-44mm
- Control Box-230v AC
- Cable-3 core
- Direct Compass Bearings (Ideal for Light to Medium Beams, i.e. LOG PERIODIC above.)

£49.95



**6" STAND OFF BRACKET**

Complete with 'U' Bolts

£6.00

**MD37 SKY WIRE (LONG WIRE BALUN KIT)**  
25 METRES OF ENAMELLED WIRE & INSULATOR

FOR USE ON WITH RECEIVER 0 - 40 Mhz. ALL MODE NO ATU REQUIRED 2 "S" POINTS GREATER SIGNAL THAT OTHER BALUNS. MATCHES ANY LONG WIRE TO 50 OHMS



£9.00

**9" STAND OFF BRACKET**

Complete with 'U' Bolts

£9.00

**T&K BRACKETS**

Complete with 'U' Bolts



£29.95

**5' SWAGED POLES**

- Heavy Duty Ali (1.2mm wall)
- SINGLE 1 1/4"..... £6.00
- SET OF FOUR 1 1/4". £19.95
- SINGLE 1 1/2"..... £9.00
- SET OF FOUR 1 1/2". £29.95

**CONNECTORS**

- PL259/9..... 0.75 each
- PL259/6..... 0.75 each
- PL259/7 for mini 8 1.00 each
- BNC (Screw Type) 8 1.00 each
- BNC (Solder Type) 8 1.00 each
- N TYPE for N58 .....2.50 each
- N TYPE for RF213 ..2.50 each
- SO239 to BNC .....1.50 each
- PL259 to BNC .....2.00 each
- N TYPE to SO239 ..3.00 each

**CABLE**

- RG213 MILITARY 0.85 per mtr.
- MINI RF8 ..... 0.85 per mtr.
- RG58 STANDARD 0.35 per mtr.
- RG58 MILITARY 0.60 per mtr.



**TURNSTILE 137**

Freq. 137.5 Mhz  
Length 1000mm

This Antenna is designed for external use to receive weather satellite signals

Complete with mounting hardware

£39.95

(Simple and easy to install a must for the enthusiast who has it all)

**MRW-40 (Rubber Duck)**  
Dedicated for Civil & Military Airband VHF/UHF RX & TX Capabilities Length 215mm. PP £2.00

£19.95

**UK SCANNING DIRECTORY**  
7th edition

£19.50

£29.95

**SUPER SCAN STICK**

Freq. Range 0-2000MHz  
Length 1000mm  
It will receive all frequencies at all levels unlike a mono band antenna. It has 4 capacitor loaded coils inside the vertical element to give maximum sensitivity to even the weakest of signals. (Ideal for the New Beginner and the Experienced Listener alike.)

£49.95

**SUPER SCANAIR BASE (Airband)**

(Stainless Steel)  
Freq. Range Receive 117-140MHz  
Transmit 117-140MHz  
Length 825mm  
Connector-N TYPE

This is a transmitting & receiving antenna designed for the aircraft frequency range. (For the control tower & aircraft listener)

£39.95

**SUPER SCAN STICK II**

Freq. Range 0-2000 MHz.  
Length 1500mm.  
This is designed for external use. It will receive all frequencies, at all levels unlike a mono band antenna. It has 8 capacitor loaded coils inside the vertical element to give maximum sensitivity to even the weakest of signals plus there is an extra 3db gain over the standard super scan stick. (For the expert who wants that extra sensitivity)

**MULTI SCAN STICK II**

Freq. Range Receive (0-2000MHz) Transmit (144-146 MHz)  
Gain 4.00dbd (420-430 MHz) Gain 6.00dbd Length 1500mm  
Same as Super Scan Stick but with extra gain, makes it an even better antenna for the amateur and expert alike. (Ideal for the Ham Radio user)

£39.95

**MULTISCAN STICK**

Freq. Range Receive - 0-2000 MHz.  
Transmit 144 - 146 MHz gain 2.5 DBd  
420 - 430 MHz gain 4.5 DBd  
Length 1000 mm.  
Although marginally compromising sensitivity the multi scan stick has within its transmitting capabilities plus gain makes it an excellent antenna for the amateur and expert alike.  
Comes complete with mounting hardware and brackets (Ideal for the amateurs ham radio - user).

£89.95

**IVX 2000**

Freq. Range Receive - 0-2000 MHz.  
Transmit 50 - 52 MHz gain 2.00DBd  
144 - 146 MHz gain 4.00 DBh  
420 - 430 MHz gain 6.00 DBd  
Length 2.5 m.  
For external use, but at a pinch can be used in the loft. It has been finely tuned to make this Antenna the best there is. It has stainless steel radials and hardware (THE BEST)

**FULL RANGE OF SCANNERS AVAILABLE. PLEASE PHONE FOR PRICE.**

£29.95

**SWP 2000 FREQ. 25 - 2000**

Mhz. Length 515mm. (Multiband good sensitivity for its small size. Fitted with two suction cups for ease of fitting to any smooth surface (i.e. inside of car window) comes with 5 metres of mini coax and BNC connector. (Good for the car user who doesn't want an external antenna.)

£39.95

**SWP HF30**

Freq. Range 0.05-30MHz Length 770mm  
Although small, surprisingly sensitive for the H.F. user. Fitted with two suction cups for ease of fitting to any smooth surface (i.e. inside of car window) comes with 5 metres of mini coax and BNC connector. (Good for the car user who doesn't want an external antenna.)

£49.95

**HF DISCONE**

Freq. Range 0.05-2000MHz  
Length 1840mm  
Internal or External use (A Tri-Plane Antenna). Same as the Super Discone but with enhanced HF capabilities, comes complete with mounting hardware and brackets. (Ideal for the Short Wave H.F. Listener.)

£49.95

**ROYAL DISCONE 2000 (Stainless Steel)**

Freq. Range Receive 25-2000MHz  
Transmit 50-52MHz  
144-146MHz 430-440MHz 900-986MHz  
1240-1325MHz  
Length 1540mm  
Connector-N TYPE The Ultimate Discone Design. 4.5DB GAIN OVER STANDARD DISCONE! Highly sensitive, with an amazing range of transmitting frequencies, comes complete with mounting hardware & brackets (The Best There is).

£39.95

**SUPER DISCONE**

Freq. Range 25-2000MHz  
Length 1380mm  
Internal or External use (A Tri-Plane Antenna). The angle of the ground planes are specially designed to give maximum receiving performance within the discone design. The Super Discone gives up to 3Db Gain over a standard conventional discone. Comes complete with mounting hardware and brackets. (Ideal for the Experienced Enthusiast.)

£19.95

**MRW-100**

(Super Gainer) (Rubber Duck) Wideband extra sensitive Dedicated VHF/UHF all mode Length 400mm. PP £2.00

**MRP-2000 (Preamplifier)**

Freq Range 25-2000 Mhz 9-15v input (Battery not included) 14 db Gain. Complete with lead and BNC connectors.

£49.95

**MRP-125 (Preamplifier)**

Freq Range 118-137 Mhz 9-15v input (Battery not included) 14 db Gain Complete with lead and BNC connectors.

£44.95

**G. SCAN II**

Freq. Range 25-2000 MHz.Length 620 mm.  
Magnetic mount Mobile Scanner Antenna. 2 vertical loaded coils for good sensitivity complete with magnetic mount and 4mts of coax, terminated with BNC plug. (Good for when you are driving about)

£19.95

**CIVIL AND MILITARY RECEIVING ANTENNAS**  
R220 (Length 1800mm GAIN 2.5 & 4.5) Price £39.95  
R225 (Length 1700mm GAIN 1.0 & 4.5) Price £24.95

ADD £6 P&P PER ORDER

### Tropical Bands Chart

Freq (MHz)	Station	Country	UTC	DXer
4.835	KBCG, Sao Paulo	Brazil	2000	D,H
4.845	A1 Gurwah	India	1545	H
4.940	SLB, TE, Colombo	Sri Lanka	0025	B
4.950	R Namibia, Windhoek	Angola	1702	D
4.960	AIR S, New Delhi	India	1547	H
4.950	VOA, Sao Tome	Sao Tome	2108	H,I
4.955	R Namibia, Windhoek	Angola	0015	B
4.960	VDA, Sao Tome	Sao Tome	2010	J
4.965	R Namibia, Windhoek	Angola	0010	B
4.965	R Namibia, Windhoek	Angola	1705	H
4.975	R Namibia, Windhoek	Angola	1935	A,C,H,J,K
4.980	Torres, Caracas	Venezuela	2141	B,H
4.985	R Namibia, Windhoek	Angola	2132	H
4.985	R Namibia, Windhoek	Angola	2127	H
5.005	R Namibia, Windhoek	Angola	2008	H,K
5.005	R Namibia, Windhoek	Angola	1716	B,H
5.009	R Namibia, Windhoek	Angola	1706	H
5.010	AIR, London	India	0035	B,K
5.020	R Namibia, Windhoek	Angola	1935	H,K
5.025	R Namibia, Windhoek	Angola	2113	H
5.025	R Namibia, Windhoek	Angola	0040	B
5.025	R Namibia, Windhoek	Angola	2052	H,K
5.030	AWA, London	Cuba	0658	B,F
5.040	FR, London	Indonesia	0015	B
5.047	R Namibia, Windhoek	Angola	2116	H,K
5.050	Haw, London	China	1713	H
5.050	R Namibia, Windhoek	Angola	1704	H,K
5.060	PS, London	China	0035	B,K
5.080	Sist, London	Ecuador	0145	D
5.100	R Namibia, Windhoek	Angola	0030	B

DXers	Station	Country	UTC	DXer
(A)	Moche, Chilly, NE Manchester	UK		
(B)	Herbert, County, Kilmuckin	UK		
(C)	Bilston, W London	UK		
(D)	Dunstable, Bedfordshire	UK		
(E)	Simon, Wiltshire, E Bristol	UK		
(F)	Rhodes, Wiltshire, E Bristol	UK		
(G)	Luca, Wiltshire, E Bristol	UK		
(H)	Fred, Wiltshire, E Bristol	UK		
(I)	Clare, Wiltshire, E Bristol	UK		
(J)	Paul, Wiltshire, E Bristol	UK		
(K)	Mike, Wiltshire, E Bristol	UK		
(L)	Tom, Wiltshire, E Bristol	UK		
(M)	Tom, Wiltshire, E Bristol	UK		

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

- Listeners -
- (A) Robert Conroy, Kilmuckin
  - (B) Simon Lockenill, E Bristol
  - (C) Sheila Hughes, Morden
  - (D) Brian Keyte, Gt Bookham
  - (E) Eddie McKee, Newry
  - (F) George Milmore, Winton, Is/W
  - (G) Tom Smyth, Co Fermanagh
  - (H) Ernie Strain, Ramsey, Cambs
  - (I) Bruce Watt, W London
  - (J) Fred Wilmshurst, Northampton
  - (K) Tom Wozor, Plymouth

0600-1100) was rated 33333 at 0854 in Plymouth.

Also received in the UK were the BBC via Ascension Is **17.830** (Eng to Africa 0800-2100), rated 32233 at 0846 in St Austell; DW via Kigali, Rwanda **17.800** (Eng to Africa 0900-0945) 23222 at 0915 in Colyton; R.Bulgaria, Sofia **17.500** (Eng to Eur 1200-1300) 44444 at 1230 by **Tony Hall** in Freshwater Bay, IoW; Africa No.1, Gabon **17.630** (Fr to W.Africa 0700-1600) 34433 at 1305 in Killeel & 44444 at 1400 by **Bill Griffith** in W.London; Voice of Turkey **17.815** (Eng to Eur? 1330?-1425?) SIO 544 at 1330 in Co.Fermanagh; R.Finland via Pori **17.660** (Eng to W.Eur, N.America 1330-1400) 54444 at 1340 in Herstoncoeur; Vatican R, Italy **17.515** (Eng to Asia? 1345-1405) 54444 at 1355 in Morpeth; RAI Rome **17.780** (It (sport) to N.America 1345?-1700?) 44444 at 1430 by **Gerald Guest** in Dudley; R.Sweden **17.505** (Eng to Australia 1430-1500) 44444 at 1450 in Rugby; Israel R, Jerusalem **17.705** (Heb [Home Svce relay] to Eur, N.America 1500-?) 54454 at 1510 in Liverpool; R.France Int via ? **17.850** (Eng to Africa? 1600-1700) 44344 at 1615 by **Vera Brindley** in Woodhall Spa; Channel Africa via Meyerton **17.870** (Eng to W.Africa 1800-1830?) 33333 at 1809 in Newry; R.Netherlands via Bonaire, Ned.Antilles **17.605** (Eng to Africa 1830-2025) 55544 at 1945 in Northampton; VOA via Greenville, USA? **17.640** (Fr to Africa 2000-2030, 2100-2130) 25333 at 2002 in Storrington; HCJB Quito, Ecuador **17.660** (Eng to Eur 1900-2200) 44333 at 2030 in Morden; WHRI via Maine, USA **17.650** (Eng to Eur, M.East, Africa 1600?-2200) 22222 at 2100 in Truro.

Broadcasts from far away places have also been reaching the UK in the **15MHz (19m)** band. R.New Zealand on **15.175** (Eng to Pacific areas 0705-1000) was rated 44444 at 0800 by **Clare Pinder** in Appleby & 35553 at 0909 in Walsend. A programme for troops in E.Timor then follows (Eng 1000-1200), which was rated 22222 at 1030 in Truro. R.Australia via Shepparton on **15.240** (Eng to Pacific areas 0000-0900) was rated 44333 at 0815 in Herstoncoeur.

Others include the Voice of Armenia, Yerevan **15.270** (Various to Eur, M.East [Eng 0910-1000] Sun) rated 44333 at 0945 in Morden; WEWN via Vandiver, USA **15.745** (Eng to Eur 1100-2100) 45444 at 1123 in Freshwater Bay, IoW; R.Ukraine Int **15.520** (Eng to Eur?, N.America?) 43443 at 1212 in Newry; VOIRI

### Local Radio Chart

Freq (kHz)	Station	ILR BBC	e.m.p (kW)	Listener
1152	CG Birmingham	I	3.00	B,J
1161	R Bolton (3CR)	B	0.10	D,G,H,J
1161	Brunel CE Swindon	I	1.00	D
1161	Magical FM Gwent	I	0.35	A
1161	Severn Trent 6	B	1.00	D,F
1170	Magical FM Swindon	I	0.32	H
1170	Crystal FM North	I	0.50	A,D,E
1170	Crystal FM South	I	0.25	D,J
1242	Crystal FM Stone	I	0.32	D,F
1251	Crystal FM Sted	I	0.16	A,D,H
1260	Crystal FM Litch	I	1.50	F
1260	Magical FM Wexham	I	0.64	A
1260	Southampton	I	0.29	D,H,J
1278	C Gold WY	I	0.43	H
1295	Rediffusion Birmingham	I	5.00	B,C,D,F,G,H,J
1305	Magical FM Barnsley	I	0.15	A
1307	Crystal FM	I	0.50	D,F,H,J
1310	Crystal FM Walsley	I	0.20	F
1323	Crystal FM Wark	I	0.50	C,D,F,J
1327	Shropshire Bristol	B	0.63	A,H
1331	Crystal FM	I	1.00	D,F
1331	Crystal FM Peto	I	0.60	A,D,H,J
1332	Wiltshire FM	I	0.30	D
1359	Bristol FM	I	0.28	D
1359	Crystal FM	I	0.27	D,H,J
1359	Rugby	B	0.65	F
1368	Rugby	B	2.00	H,J
1379	Southampton	B	0.50	C,D,F
1398	Wiltshire FM	I	0.10	F
1411	Crystal FM	I	0.50	D,F,H
1413	Crystal FM	I	0.10	A,H
1431	Bristol FM	I	0.35	D,F,H
1431	Crystal FM Reading	I	0.14	D,F,J
1449	R Bolton (3CR)	B	0.15	A,D,F,H,J
1454	R Bolton (3CR)	B	0.50	A
1458	R Bolton (3CR)	B	2.00	A
1458	Southampton	B	50.00	F,H,J
1458	Crystal FM Lutley	B	5.00	D,H
1465	Crystal FM	B	1.00	B,C,J
1465	R Bolton (3CR)	B	1.20	A,E*
1465	Southampton	B	1.00	D,F
1503	Crystal FM	B	1.00	D,E*,F,G,H,J
1521	Bristol FM	I	0.64	D,E*,F,H,J
1531	R Bolton (3CR)	B	0.15	D,H
1531	Crystal FM	I	0.74	A,E*,H
1530	Crystal FM	I	0.22	D*,J
1541	Bristol FM	B	5.00	E*,F,G
1549	Crystal FM London	I	97.50	A,D,F,H
1548	Crystal FM Edinburgh	I	2.20	E*
1557	R Bolton (3CR)	B	0.25	A,E*
1557	Crystal FM North	I	0.76	D,H,J
1557	Crystal FM South	I	0.50	D,F
1581	Crystal FM Guildford	I	0.50	C,D,F
1584	Crystal FM Turkish	I	0.20	D,F,H
1584	R Bolton (3CR)	B	1.00	D*,J
1584	R Bolton (3CR)	B	0.50	A,C
1584	Tay, Perth	I	0.21	D*,E*
602	R Kent	B	0.25	D,F

Tehran, Iran **15.084** (Home Sce relay) 44344 at 1214 in Oxted; BBC via Cyprus? **15.565** (Eng to Asia? 0900-1500) 34433 at 1300 in Kilkeel; R.Finland via Pori **15.400** (Eng to Eur, N.America 1330-1400) 54444 at 1342 in Morpeth; VOA via Philippines **15.425** (Eng 1100-1500?) 32223 at 1420 in Stalbridge; Swiss R.Int via Sottens **15.185** (Eng, Ger, Fr to Asia 1400-1600) 44444 at 1434 in St.Austell; WWCR Nashville, USA **15.685** (Eng to N.America, Eur 1100?-2100?) 33233 at 1540 in Liverpool; VOA via Woofferton, UK? **15.205** (Eng to E.Eur 1500?-1700) 34443 at 1542 in Plymouth; R.France Int via ? **15.210** (Eng to E.Africa 1600-1730) SID 433 at 1600 in Co.Fermanagh; KTWR Guam **15.330** (Eng to Asia 1600-1630) 34333 at 1620 in Woodhall Spa; Israel R, Jerusalem **15.640** (Fr, Eng to Eur, N.America 1630-1700) 33333 at 1645 in Rugby; RAI Rome **15.330** (It to E.Africa?, M-East?) 34333 at 1659 in E.Bristol; VOA via Philippines **15.255** (Eng to Asia 1700-1800) 34443 at 1718 in Manchester; BBC via Meyerton, S.Africa **15.420** (Eng to Africa 1700-1900) 35444 at 1732 by **Michael Casey** in Manchester; Israel R, Jerusalem **15.760** (Heb (Rly of Home Servical) to Eur, N.America) 44434 at 1808 in Colyton; R.Pilipinas, Philippines **15.190** (Filip 1900?-1930?) 44444 at 1925 in W.London; VOA via Greenville, USA **15.580** (Eng to Africa 1800-2200) 45544 at 2120 in Northampton.

R.Australia has also been reaching the UK in the **13MHz (22m)** band but their transmission from Shepparton on **13.605** (Eng to Pacific 0800-1200) was

rated only 22222 at 0902 in Stalbridge.

Also received in this band were R.Austria Int via Moosbrunn **13.730** (Various to Eur, Africa), rated 33333 at 1025 in Truro. 54444 at 1242 in Plymouth & SID 433 at 1430 in Co.Fermanagh; Croatian R, Zargreb **13.830** (Eng, Cr to Eur, N.America) 35333 at 1415 in E.Bristol; WWCR Nashville, USA **13.845** (Eng to Africa 1400-0100) 32332 at 1420 in Kilkeel; U.A.E.R, Dubai **13.675** (Eng to Eur 1600-1640) 45544 at 1601 in Northampton; Vatican R, Italy **13.765** (Eng to Africa? 1600-1630) 44344 at 1605 in Liverpool; VOA via Sao Tome **13.600** (Special Eng to Africa 1600-1700) 34333 at 1622 in Woodhall Spa; AIR via Bangalore **13.620** (Ar to M.East, Africa 1730-1945) 34433 at 1833 in Colyton; VOA via Selebi Phikwe, Botswana **13.710** (Eng to Africa 1800-2230) 34343 at 2033 in Rugby; VOA via Morocco **13.640** (Eng to Eur 1900-2000) 33322 at 1900 in Dudley; VOA via Lampertheim? **13.725** (Eng to M.East? 1900-2000) 33323 at 1919 in St.Austell; R.Nederlands via Flevo **13.700** (Eng to Africa 1830-2025) 45344 at 2012 in Freshwater Bay, IoW; Swiss R.Int via Fr.Guiana **13.790** (Eng, Ger, Fr to Nr.East, Africa 2000-2130) 24232 at 2021 in Newry; R.Canada Int via Sackville? **13.650** (Fr, Eng to Eur, Africa 2000-2200) 44333 at 2100 in Morden; R.Havana Cuba **13.750** (Eng to Eur 2030-2130) 33233 at 2100 in Appleby.

In the **11MHz (25m)** band R.Prague, Czech Rep **11.640** (Eng to N.Eur 1130-1157) 44444 at 1145 in Freshwater Bay, IoW; R.Jordan via Al Karanah **11.690**

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

Listeners:

- (SA) Simon Hockenhill, E Bristol
- (B) Sheila Hughes, Morden
- (C) Brian Kaye, Gt Bockham
- (D) Eddie McKagyn, Newry
- (E) George Milmore, Wynton, IoW
- (F) Gary Pinder, while in Appleby
- (G) Harry Nicholas, Barton-on-Humber
- (H) Tom Smyth, Co.Fermanagh
- (I) Ernie String, Rimsney, Camas
- (J) Bruce Wat, W.London
- (K) Thomas Williams, Morden
- (L) Fred Wilmshurst, Northampton
- (M) Tom Winzor, Plymouth

Medium Wave Chart

Freq (kHz)	Station	Country	Power (kW)	Listener	Freq (kHz)	Station	Country	Power (kW)	Listener
732	Uncont(NCF)	Germany	5	D*,E*	1170	FinEbus?	Spain	?	?
734	Sevilla(SER)	Spain	20	D*,E*	1174	Zdrav(Croatian R)	Croatia	600/1200	A*,D*,E*,H*,J*,L*,M*
792	Londonderry(BBC)	UK	1	?	1174	COPE via?	Spain	2	D*,E*,J*
801	München (smaring)	Germany	300	D*,E*,H*	1179	SEI via?	Spain	?	D*,E*,H*,J*,L*,M*
801	RNE1 via?	Spain	?	D*,E*,H*	1179	SEI via?	Spain	?	D*,E*,H*,J*,L*,M*
810	Vogograd	Russia	150	E*	1183	Kuime	Belgium	5	D*,E*
810	Mindros(SER)	Spain	20	D*,E*,H*	1183	Feichterbach(MDR)	Germany	5	D*,E*
810	Wilmington(BBCS)	UK	100	A*,C*,D*,E*,H*,J*,L*,M*	1183	Szolnok	Hungary	135	E*
819	Batra	Egypt	450	A*	1183	Sar Remo	Italy	6	?
819	S.Sebasten(EI)	Spain	5	D*,E*,H*	1183	Munich(WDR)	Germany	300	D*,G*,J*
828	Mannover(WDR)	Germany	100/5	D*	1197	Virgin via?	UK	?	D*,E*,H*,J*,L*,M*
829	Rotterdam	Holland	20	D*	1205	Bordeaux	France	100	A*,D*,E*,H*,J*,L*,M*
837	Nancy	France	200	D*,E*,H*	1215	Virgin via?	UK	?	D*,E*,H*,J*,L*,M*
837	Orléans via?	Spain	?	D*,E*,H*	1224	Widin	Bulgaria	500	A*
845	Rome	Italy	1200	A*,D*,E*,H*,J*,L*,M*	1224	Lefystaw	Holland	50	D*,E*,H*
855	RNE1 via?	Spain	?	D*,E*,H*	1233	Nitra	Slovakia	40	D*
864	Santah	Egypt	500	D*	1233	Virgin via?	UK	?	D*,E*,H*,J*,L*,M*
864	Paris	France	300	D*,E*,H*	1242	Marseille	France	150	A*
873	Frankfurt(AFV)	Germany	150	D*,E*,H*	1242	Virgin via?	UK	?	D*,E*,H*,J*,L*,M*
873	Zaragoza(SER)	Spain	20	D*,E*,H*	1251	Munkacs	Hungary	500	D*
873	Symonville(R.II)	UK	?	D*,H*	1251	Hummel	Netherlands	10	D*,E*
867	3EP	Spain	?	D*,H*	1250	SFR via?	Spain	?	D*,E*
882	Walthamstow(MDR)	UK	100	B,C,D*,E*,H*,J*,L*,M*	1259	Saarbrücken(DLF)	Germany	600	A*,J*,E*,H*,J*,L*,M*
881	Algiers	Algeria	600/300	A*,F*,H*	1278	Strasbourg	France	300	?
881	Madrid	Netherlands	20	D*	1278	Paris (via RTE2)	Eura	10	C,D*,E*,H*,J*,L*,M*
900	Bonn(Ar?)	Czech Rep	25	D*,E*	1267	Prague	Czech Rep	?	D*,E*
900	Athina	Italy	600	A*,D*,E*,H*,J*,L*,M*	1287	Lende(SER)	Spain	10	D*,E*,H*
909	Bratislava(BBCS)	N Ireland	10	H	1296	Wilmshurst(DFE)	Spain	10	E*,H*
909	Bratislava(BBCS)	UK	100	E*,H*,J*,L*,M*	1296	Orfordless(BBC)	UK	500	B*,C*,D*,E*,H*,J*,L*,M*
918	Dumava	Slovenia	600/100	D*,E*,H*	1305	Constantine	Algeria	20	?
918	Madrid	Spain	20	?	1305	RNE5 via?	Spain	?	D*,E*,H*
936	Worms	Germany	100	D*,E*,H*	1314	Kronsvy	Norway	1200	A*,D*,E*,H*,J*,L*,M*
936	Vincennes	Italy	20	D*,E*	1321	W Brunn (V.Russia)	Germany	1000/150	A*,D*,E*,H*,J*,L*,M*
936	RNE5 via?	Spain	?	?	1332	Radiotele	Italy	300	D*,E*,H*
945	Toulon	France	300	D*,E*,H*,J*,L*,M*	1341	Bratislava(BBC)	N Ireland	100	A*,C*,E*,H*,J*,L*,M*
954	Bmo,CRC21	Czech Rep	200	D*,E*	1341	Troms(SFR)	Spain	2	E*,H*
954	Madrid(D)	Spain	20	E*,H*	1350	Osaka	Latvia	50	D*,E*
950	Helsinki	Finland	600	A*,D*,E*	1358	Avalon(R.II) FS	Spain	600	D*,E*,H*
960	Tir Cherrail	Lebanon	10	H*	1358	Faouzi(Mar) RI	Is of Man	20	C*,E*,H*,J*,L*,M*
972	Hamburg(NDR)	Germany	300	D*,E*	1377	Lille	France	300	D*,E*,H*,J*,L*,M*
972	RNE1 via?	Spain	?	D*,E*,H*	1396	Banikovo	Bulgaria	2500	A*,B*,D*,E*,H*,J*,L*,M*
981	Algier	Algeria	600/300	D*,E*,H*	1396	TWR via Fluke	Albania	500	D*
980	Berlin	Germany	300	B*,D*,E*,H*,J*,L*,M*	1404	Bratis	Netherlands	120/40	A*,E*,H*,J*,L*,M*
990	Rabat(SER)	Spain	10	B*,E*,H*	1413	Brest	France	20	D*,E*,H*,J*,L*,M*
990	Ilyy(BBC)	UK	1	C,D*	1413	RNE5 via?	Spain	?	D*,E*,H*
999	Schwahn (RAS)	Germany	20	D*	1427	Neuss via(DLF)	Germany	1200/600	A*,D*,E*,H*,J*,L*,M*
999	Mildred(CRRC)	Spain	50	B*,D*,E*	1440	Mannheim(R.I)	Luxembourg	1200	D*,E*,H*,J*,L*,M*
1008	SER via?	Canaries/Spain	?	?	1449	Recomost(BBC)	UK	2	A*,C*,D*,E*,H*,J*,L*,M*
1008	Hershey	Holland	400	D*,E*,H*,J*,L*,M*	1458	Rilike	Albania	500	D*,E*
1017	Rheinstetten(SWF)	Germany	600	D*,E*	1467	Monte Carlo(TWR)	Monaco	1000/400	D*,E*,H*
1017	RNE5 via?	Spain	?	D*,E*,H*	1476	Wien Bismarck	Austria	600	B*,D*,E*,H*,J*,L*,M*
1026	SER via?	Spain	?	E*	1485	SER via?	Spain	?	?
1035	Nizza	Italy	50	?	1494	Clermont-Ferrand	France	20	D*,E*,H*,J*,L*,M*
1035	Lisbon (Pro 3)	Portugal	120	D*	1494	St Petersburg	Russia	1200	A*,B*,D*,E*,H*,J*,L*,M*
1044	Düsseldorf (DR)	Germany	20	D*,E*,H*	1512	Worms	Belgium	300	B*,D*,E*,H*,J*,L*,M*
1044	Santander	Spain	10	D*,E*,H*	1521	Kosice(Euratel)	Slovakia	600	E*,H*
1063	Troms	UK	?	D*,E*,H*,J*,L*,M*	1521	Osaka	Saudi Arabia	2000	D*
1062	Kullerbyn	Denmark	250	D*,E*	1521	Castellon (SER)	Spain	?	?
1062	H.Uto via?	Italy	?	?	1530	Varese R	Italy	150/450	A*,C*,D*,E*,H*,J*,L*,M*
1071	Riga	Bulgaria	50	E*	1539	Milfringe(ERF)	Germany	350/1000	D*,E*,H*,J*,L*,M*
1071	Rilike(FI)	Spain	5	D*,E*,H*	1557	Nice	France	300	A*
1071	Tek Sport via?	UK	?	D*,E*,H*	1575	Bonovo	Italy	50	A*,D*,E*,H*,J*,L*,M*
1080	SER via?	Spain	?	D*,E*,H*	1575	SER via?	Spain	5	D*,E*,H*,J*,L*,M*
1089	Tek Sport via?	UK	?	D*,E*,H*,J*,L*,M*	1583	Worms via(VOA)	Germany	150	D*,E*,H*,J*,L*,M*
1089	Nizhny Novgorod	Slovakia	1500	A*,D*,E*	1602	SUF via?	Spain	?	E*
1089	RNE5 via?	Spain	?	D*,E*,H*	1602	Vitoria(E)	Spain	10	D*,E*,H*,J*,L*,M*
1107	AFN via?	Germany	10	D*	1611	Vatican R	Italy	15	C
1107	Tek Sport via?	UK	?	D*,E*,H*					
1116	Bre	Italy	150	D*,E*					
1125	La Louviere	Belgium	20	D*,E*					
1125	Dearovec	Croatia	100	A*					

(Eng to W.Eur, E.USA 1100-1400) 44444 at 1225 in Herstmonceux & 44444 at 1315 in Morden; R.Romania Int, Bucharest 11.940 (Eng to Eur 1300-1356) 55555 at 1300 in Appleby; VOA via Philippines 11.705 (Eng to E.Asia 1100-1500) 43334 at 1350 in Stalbridge; R.Japan via Sri Lanka 11.880 (Eng to M.East 1400-1500) 42343 at 1400 in W.London; Swiss R.Int via Singapore 12.010 (Eng, Ger, Fr to Asia 1400-1600) 24322 at 1403 in Newry; WYFR via Taiwan 11.550 Eng to S.Asia 1300-1500) 32232 at 1445 in Liverpool; R.Australia via Shepparton 11.660 (Eng to Asia 1330?-1700) 43333 at 1500 in Morpeth & 35543 at 1610 in Wallsend; R.Nederlands via Tashkent 12.070 (Eng to S.Asia 1430-1625) 35433 at 1520 in E.Bristol & SIO 433 at 1600 in Co.Fermanagh; R.Pakistan, Islamabad 11.570 (Eng to M.East 1600-1615) 35343 at 1610 in Northampton; R.Romania Int 11.940 (Eng to W.Eur 1700-1800?) 33233 at 1705 in Rugby.

Later, R.Canada Int via Skelton? 11.720 (Eng to Eur 1800-1900) was 34434 at 1800 in Oudley; R.Kuwait via Kabd 11.990 (Eng to Eur, N.America 1800-2100) 54444 at 1843 in Plymouth & 44444 at 1937 in Woodhall Spa; AIR via Bangalore 11.620 (Eng to Eur 1745-1945) 45434 at 1855 in Colyton; WWCR Nashville, USA 12.160 (Eng to N.America, Eur 1400-2200) 24343 at 1933 in Storrington; VOA via Thailand 12.015 (Eng 1900-2000) 44444 at 1941 in St.Austell; Israel R, Jerusalem 11.605 (Eng to Eur, N.America 2000-2030) 22222 at 2010 in Truro; VOA via Greenville, USA 11.695 (Eng to Caribbean 0000-0100) 35343 at 0015 in Barton-upon-Humber.

Good reception from some areas has been noted in the 9MHz (31m) band. Before noon the occupants include HCJB Quito, Ecuador 9.780 (Eng to Eur 0700-0900), rated 44444 at 0700 in Dudley; TWR Monte Carlo, Monaco 9.870 (Eng to Eur 0755-0920) 55444 at 0805 in Northampton; R.Vinius, Lithuania 9.710 (Eng to Eur 0930-1000) 54554 at 1000 in W.London; R.Nederlands via Bonaire, Ned.Antilles 9.790 (Eng to Asia, Far East 0930-1125) 43443 at 1005 in Plymouth; Swiss R.Int via Julich, Germany 9.535 (Eng, Ger, Fr, It to SW.Eur 1100-1330) SIO 433 at 1100 in Co.Fermanagh. Also mentioned in the reports was the American Forces Network (AFN) via Sicily on 10.940 (Eng [u.s.b.] 24hrs?), logged as 33333 at 0555 in Morpeth.

During the afternoon they include R.Nederlands via Wertachtal, Germany 9.855 (Eng to Eur 1130-1325), rated 55555 at 1225 in Herstmonceux; R.Norway Int 9.590 (Nor to Eur 1300-1330) 45554 at 1308 in Wallsend; BBC via Kranji, Singapore 9.740 (Eng to Australia? 1130-1630) 44444 at 1335 in Kilkeel; R.Australia via Shepparton 9.475 (Eng to Asia 1400?-1858) 32223 at 1405 in Stalbridge; BBC via Skelton, UK 9.410 (Eng to Eur, N/C.Africa 1500-2100) 44444 at 1631 in Woodhall Spa.

Later, R.Pyongyang, N.Korea 9.335 (Eng to M.East, Africa 1900-2000) was 32433 at 1900 in Colyton; Voice of Greece, Athens 9.420 (Gr to Eur 1900-2100) 54454 at 1950 in Liverpool; R.Thailand via Udorn Thani 9.535 (Eng to Eur 1900-2000) 32222 at 1950 in Truro; R.Australia via Shepparton 9.500 (Eng to Asia? 1900-2130?) 35333 at 1953 in Storrington & 44434 at 2010 in E.Bristol; VOIRI Tehran, Iran 9.022 (Eng to W.Eur 1930-2030) 44434 at 2006 in Freshwater

Bay, IoW; V of Armenia via Kamo 9.965 (Eng to Eur 2040-2100) 43343 at 2040 in Newry; VOA via Kavala? 9.760 (Eng to M.East 1700-2100 [via Woofferton?], UK 2100-2200) 34333 at 2100 in Barton-upon-Humber; China R.Int via ? 9.840 (Eng to Eur 2000-2200) 44444 at 2112 in St.Austell; R.Cairo, Egypt 9.990 (Eng to Eur 2115-2245) 34333 at 2135 in Morden; R.Taipei Int via WYFR Okeechobee, USA 9.355 (Eng to Eur 2200-2300) 33233 at 2200 in Appleby.

There are a number of broadcasts to listeners in Europe in the 7MHz (41m) band. Those noted came from Sudwestfunk via Rohrdorf 7.265 (Ger 24hrs), rated 45544 at 0844 in Northampton; Christian Science BC via WSHB Cypress Creek, USA 7.535 (Eng 0400?-1000?) 54444 at 0917 in Plymouth; WWCR Nashville, USA 7.435 (Eng) 22222 at 1030 in Truro; R.Slovakia via Velke Kostolany 7.345 (Eng 1730-1755) SIO 555 at 1730 in Co.Fermanagh; Voice of Vietnam via Russia? 7.440 (Eng to Eur 1800-1830) 44434 at 1810 in Colyton; R.Prague, Czech Rep. 7.315 (Eng 1800-1827) 43433 at 1817 in Newry; AIR via Bangalore 7.410 (Eng 1745-1945) 42333 at 1905 in Liverpool; Voice of Turkey 7.125 (Eng 1930-2030) 55333 at 1930 in Appleby; Voice of Russia 7.340 (Eng) 43333 at 1930 in Morden; Voice of the Mediterranean, Malta via Russia 7.440 (Eng 2000-2100) 44444 at 2000 in Dudley; R.Bulgaria, Sofia 7.500 (Eng 2000-2100) 55343 at 2005 in E.Bristol; R.Tirana, Albania 7.130 (Eng 2230-2300) 33333 at 2234 in St.Austell.

Although intended for other areas the Voice of Nigeria, Ikorodu 7.255 (Fr, Eng to W.Africa 1800-2000?) rated 34333 at 1958 in Storrington; World Harvest Radio (WHRI) via Maine, USA 7.580 (Eng to N.America) 54444 at 0020 in Morpeth; WJCR Upton, USA 7.490 (Eng to E.USA 24hrs) 32223 at 0710 in Stalbridge.

There are many more broadcasts to Europe in the 6MHz (49m) band. Some of them originate from R.Vlaanderen Int, Belgium 5.985 (Eng 0800-0830), rated 55555 at 0805 in Rugby; Deutsch Welle (DW) via Julich? 6.140 (Eng Service) 54444 at 0910 in Stalbridge; Sudwestrundfunk, Germany 6.030 (Ger) 35433 at 0950 in Northampton; R.Nederlands via Julich, Germany 6.045 (Eng 1130-1325) 55555 at 1215 in Herstmonceux; R.Vlaanderen Int, Brussels 5.910 (Eng 1830-1856) 54444 at 1830 in Plymouth; Bayerischer Rundfunk, Germany 6.085 (Ger 24hrs) 35433 at 1845 in Colyton; Voice of Russia 5.950 (Eng) 43233 at 1922 in St.Austell; Swiss R.Int via Vatican State, Italy 6.165 (Ger, It, Fr, Eng 1830-2030) 54454 at 1945 in Liverpool; Vatican R, Rome 5.880 (Eng) 22222 at 2100 in Truro; R.Canada Int via Skelton, UK 5.995 (Eng 2100-2130? Sun) 55444 at 2100 in Appleby; R.Budapest, Hungary 6.025 (Eng 2200-2230) 33233 at 2200 in Dudley; R.Taipei via Skelton? 5.810 (Eng 2200-2300) 44444 at 2215 in Morden; R.Sweden 6.065 (Sw, Eng 2200-2300) SIO 444 at 2230 in Co.Fermanagh.

While broadcasting to other areas R.Exterior, Espana 6.055 (Eng to N.America 0000-0200) was 55455 at 0000 in Newry; BBC via Antigua, W.Indies 5.975 (Eng to C/N.America 2100-0800?) 44444 at 0025 in Kilkeel; VOA via Greenville, USA 5.995 (Eng to C.America 0000-0200) 32332 at 0135 in Barton-upon-Humber; American Forces Network (AFN) via Puerto Rico 6.458 (Eng [u.s.b.]) 34333 at 0613 in Morpeth.



The SINPO code is used for broadcast station reports, here is an explanation of the code.

Signal Strength	
5	excellent
4	good
3	fair
2	poor
1	barely audible
Interference	
5	nil
4	slight
3	moderate
2	severe
1	extreme
Noise	
5	nil
4	slight
3	moderate
2	severe
1	extreme
Propagation Disturbance	
5	nil
4	slight
3	moderate
2	severe
1	extreme
Overall Merit	
5	excellent
4	good
3	fair
2	poor
1	unusable

**LIST OF EQUIPMENT USED - LM&S for \$November, #December 2000, \*January 2001.**

- # \* Vera Brindley, Woodhall Spa: Roberts R-867 or Sangean ATS-803A + r.w.
- # \* Robert Connolly, Kilkeel: JRC NRD-525 + Timewave DSP9+ filter + Datong AD-370 or Sangean ATS-803A.
- # \* Bernard Curtis, Stalbridge: Realistic DX-400 - rod or r.w. in loft.
- # Bernard Curtis, while near Newquay, Cornwall: Vega Selena B215 portable + loop.
- # \* David Edwardson, Wallsend: Trio R-400 + 2.5m x 2.5m fixed loop or 22m long trap dipole.
- # \* Stan Evans, Herstmonceux: Kenwood R-2000 + Balun + 11m wire in loft.
- \* Jochen Groh, Plauen, Germany: Not stated.
- # \* Bill Griffith, W.London: JRC NRD-535 + 25m wire.
- # Bill Griffith, while in Finhault, Switzerland: ICF-SW55 - AN-71 & 7m wire.
- # \* Gerald Guest, Dudley: Roberts RC-818 + r.w.
- # \* David Hall, Morpeth: AOR AR7030 + Global AT-2000 + 13m wire.
- # \* Tony Hall, Freshwater Bay, IoW: Yaesu FRG-7 + 13m wire or RF84E.
- # \* Francis Hearne, N.Bristol: Sharp WQT370 + r.w.
- # \* Simon Hockenhill, E.Bristol: Roberts R617, R617, R676, ITT Coil.
- \* Simon Hockenhill, while in Torquay: Roberts R617.
- # Robert Hughes, Liverpool: AOR AR7030 + 15m indoor wire or Drake R8E + RF Systems MTA on roof.
- # \* Sheila Hughes, Morden: Sony ICF-7600DS or Panasonic DR48 + 15m inverted L.
- \* Sheila Hughes, while in Winchelsea: Sony ICF-750L.
- # \* Rhoderick Ilman, Osted: Kenwood R-5000 + c.w. or AN-1, Sony ICF-7600DS.
- # \* Brian Keyte, Gt.Bookham: AOR AR7030 + loop or a.t.u. + r.w.

- # Brian Keyte, while near Inverness: AOR AR7030 + a.t.u. + top strand of roadside fence.
- # \* Eddie McKeown, Newry: Grundig Yacht Boy 400 or Sangean ATS-818.
- # \* George Millmore, Wootton, IoW: Racal RA17L + v.l.f. converter + loop or Sangean ATS-818-ACS.
- # \* Fred Pallant, Storrington: Trio R-2000 + Howes CTU8 a.t.u. + r.w.
- # \* Clair Pinder, while in Appleby: JRC NRD 525 + a.t.u. + r.w.
- # \* Clare Pinder, while in Glasgow: Sony ICF-SW55 or Sony 2001
- # \* Peter Pollard, Rugby: Sony ICF-2001D + r.w.
- # \* Vic Prier, Colyton: Redifon R551N + a.t.u. + r.w. or loop in loft.
- # \* Harry Richards, Barton-upon-Humber: Grundig Satellit 700 + AD-270 or r.w. or Grundig Yacht Boy 400 or Matsui MR4099.
- # Harry Richards, while in Worthing: Not stated.
- \* Alan Roberts, Quebec, Canada: Lowe HF-225 + 49m or 31m dipole or 11m vertical dipole.
- # Colin Smith, Armagh, N.Ireland: Roberts R676 - Roberts s.w. antenna.
- # \* Tom Smyth, Co.Fermanagh: Morphy Richards R191 or Sangean ATS-803A
- # \* Tom Smyth, while in Co.Armagh: Morphy Richards R191 or Sangean ATS-803A.
- \* Michael Stonebridge, St.Isidore, Alberta, Canada: Drake R-7 + 50m EWE antenna.
- # Phil Townsend, London: Lowe HF-225 + preselector + r.w. or loop.
- # \* Martin Venner, St.Austell: Yaesu FRG-7700 + FRT-7700 + 30m wire or Sangean ATS-818 + Global AT-1000 + 30m wire.
- # Bruce Watt, W.London: Roberts R757.
- # \* Thomas Williams, Truro: Grundig Yacht Boy 206 or Sharp 5454 + r.w.
- # \* Fred Wilmshurst, Northampton: Icom IC-R70 + Global AT-1000 + r.w. in loft
- # \* Tom Wintor, Plymouth: Kenwood R-2000 or Yaesu FRG-7 + Datong active antenna.

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# Diversity Reception Techniques

Fading, phase and other distortion are characteristics that we all know are synonymous with short wave communication. Here, the late Joe Carr K4IPV examines methods of removing these effects.

I onospheric fading affects short wave propagation more than the other bands. Because of the vagaries of ionospheric propagation, high frequency short wave signals cannot be depended on for highly critical applications. But in amateur radio, international broadcasting and a host of other services, the high frequency short wave bands remain popular as ever.

Perhaps the main mechanism for ionospheric distortion of the signal on short wave radio is fading. Unfortunately, on amplitude modulation (a.m.) stations, the two sidebands fade out of phase with each other, and also with the r.f. carrier, producing a hollow, rolling fade. Added to ordinary amplitude fading, this produces a difficult to receive situation.

So how do the big

international broadcasters and other users of spectrum space deal with fading? Well, truthfully, most of them today use satellite reception. It is much more reliable. But in their heyday, short wave broadcasters and local relaying signal from a short wave source used diversity reception techniques. Even today, commercial users of the short wave spectrum will use diversity reception as a matter of course.

## Diversity Reception

The best method for ridding ourselves of fading in the short wave is diversity reception. There are three versions of diversity reception: frequency diversity reception, spatial diversity reception, and polarisation diversity reception. Let's take a look at all three methods.

## Frequency Diversity

Frequency diversity reception is based on the fact that the different short wave frequencies fade differentially. That is seen in the fact that the sidebands and carrier fade out of phase with each other. By its nature, a.m. separates the lower sideband, carrier and upper sideband in frequency equal to the audio spread of the input signal to the transmitter's modulator. The signals don't all fade the same amount and the same time. By using different frequencies, and then voting on the output received, they can often get the reception that they desire.

A frequency diversity scheme can be seen in Fig. 1. Three receivers are used in this scheme, although two, four and five may be used in practice. Each receiver is tuned to a different frequency, or perhaps a different band. The antenna inputs of the receivers are tied together in a single multi-frequency antenna that covers all of the bands.

Note the outputs of the receivers. They go to some sort of combiner that votes on which has the best signal. This circuit may be either at i.f. or at audio. In the

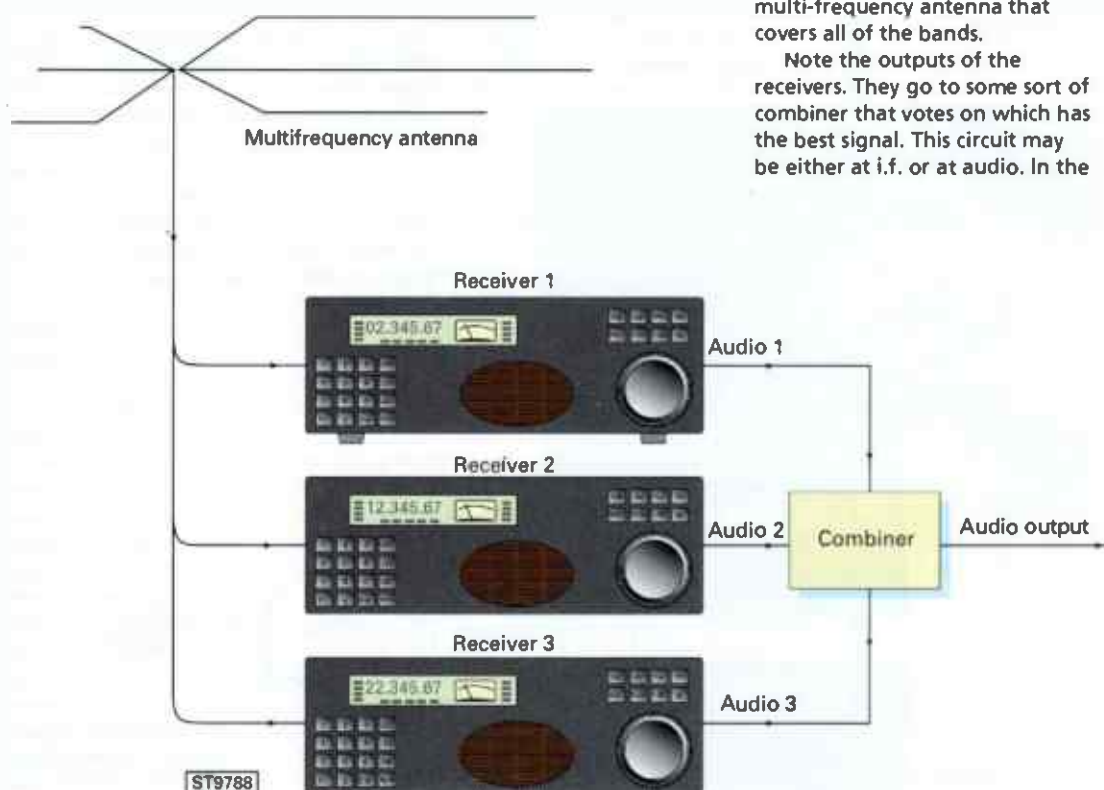


Fig. 1: Frequency diversity reception.

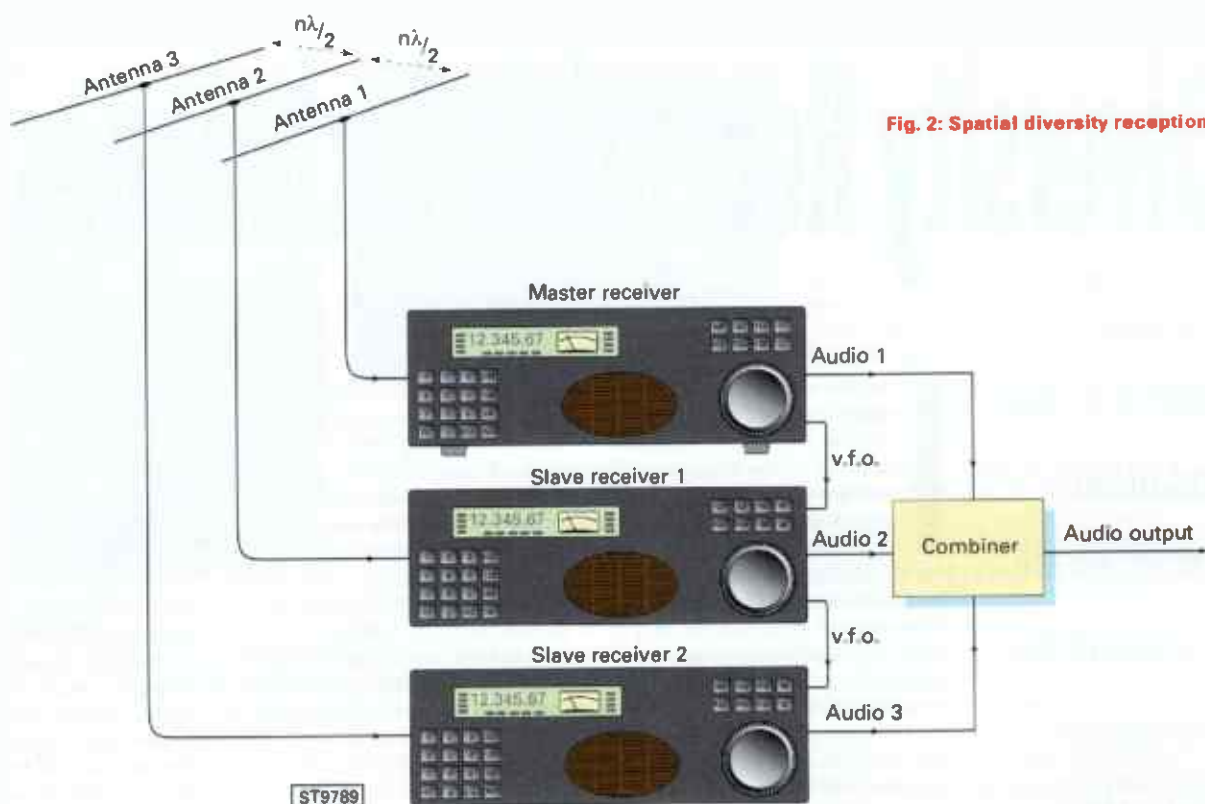


Fig. 2: Spatial diversity reception.

case of i.f. based systems, the combiner also includes the demodulator circuitry so that audio comes out of the combiner.

### Spatial Diversity

Spatial diversity reception depends on the fact that the wave moves from place to place as it fades. This is due largely to the ionosphere being unstable height wise, and thereby having the signal walk about a bit. The spatial diversity reception system is shown in Fig. 2.

The key to spatial diversity reception is the antenna field. Although three antennas and receivers are shown here, real systems may have two to five antenna-receiver combinations.

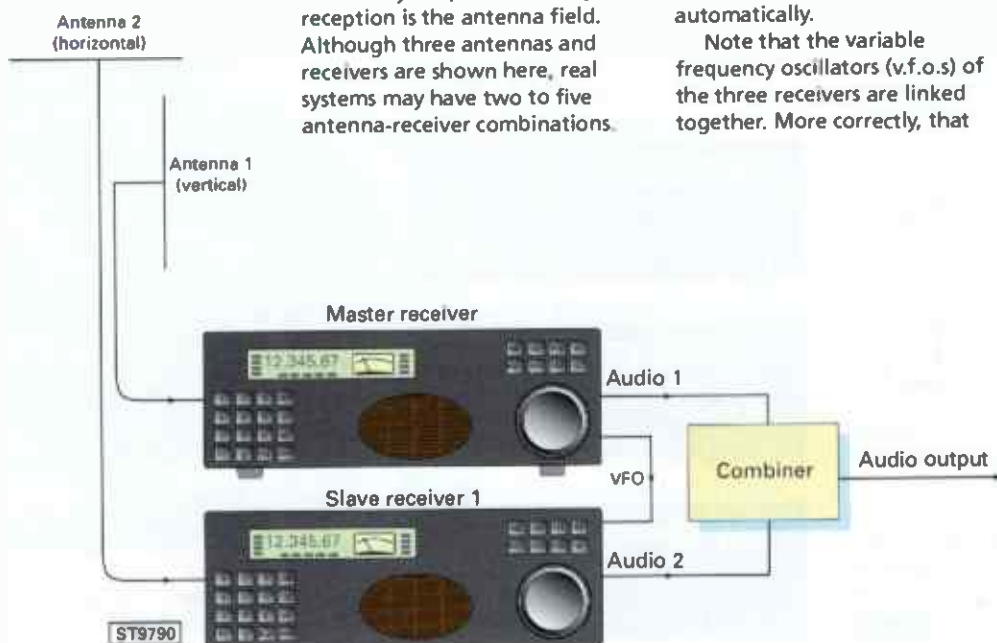
The key to the antenna field's performance is the fact that they are spaced  $n\lambda/2$  apart, where  $n$  is an integer (including 1). This spacing is dictated by the physics of the situation. Any closer spacing would nullify the operation considerably.

Three receivers are shown in the spatial diversity reception scheme of Fig. 2. Notice that the same audio or i.f. combiner circuitry is used as was used in the frequency diversity reception method (why mess up a good thing!). The i.f./audio combiner will output the highest signal automatically.

Note that the variable frequency oscillators (v.f.o.s) of the three receivers are linked together. More correctly, that

there is a designated 'Master Receiver' that drives a v.f.o. input on the other two 'Slave' Receivers. This configuration permits the user to adjust just one receiver, while controlling all three. One sure sign that a receiver is designed for the diversity reception is the 'existence of 'VFO IN/OUT' connectors on the rear panel.

Fig. 3: Polarisation diversity reception.



### Polarisation Diversity Reception

The polarity of the transcendental electromagnetic wave that forms the short wave signal is, to say the least, messed up. Although there is as much as 30dB difference between the vertical and horizontal polarisation (i.e., if you cross-polarise your receiver antenna you will suffer up to 30dB loss!), it rarely matters on short wave whether or not the polarity of the receiver antenna matches that of the transmitter antenna (normally good engineering practice). The reason is that the polarity of the incoming signal keeps shifting and rotating.

The solution to the problem is shown at Fig. 3. Polarisation diversity reception uses two or more receivers tuned to the same frequency, but fed with co-located vertically and horizontally polarised antennas. The antennas are located at the same site, but are of opposite polarisation. That way, when the

polarity shifts from more vertical to more horizontal, the proper receiver takes over.

The same i.f./audio combiner that was present in the previous two methods is used again in polarisation diversity reception. Similarly to Fig. 2, the v.f.o. of the 'Master Receiver' is driving the 'VFO IN' terminal on the 'Slave Receiver'. Again, that allows a co-channel receiver to be operated by the 'Master Receiver'.

## The Combiner

The i.f./audio combiner might be a simple voting logic signal selector on the audio signal. It will select whichever of the two to five receivers is putting out the strongest signal, or if two or more are putting out equally strong signals it will select according to a protocol.

There is another type of combiner that operates at the i.f. frequency of the receivers.

This type of combiner takes the signal and suppresses the carrier and one sideband, and then reinserts a strong local carrier from an oscillator circuit. The recreated single-sideband signal is more free of fading than any of the input signals, so is used to create the audio output on top of the advantages provided by diversity reception.

This solution, at least, eliminates the problem of the sidebands fading out of phase

with each other and the carrier. This method was called the Farnsworth method by some authorities, and the Crosley method by others.

Still another method for the combiner is synchronous a.m. reception. This is an updated version of the Farnsworth or Crosley methods as nearly as I can tell because it requires the carrier to be nulled out through phasing, and then uses an oscillator to reconstitute the carrier.

## Conclusion

Diversity reception in all its forms may be practised at international short wave facilities. In fact, it is likely that all three will be used at any given facility. It is a historically interesting topic, as well as being of current interest.

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## Commercially Speaking

# The Collins 51S-1

What makes this 'classic' receiver one of JW's all time favourites? Read on and see...

I suppose that because I have mentioned the 51S-1 in almost every article I have written for *Short Wave Magazine*, it was inevitable that the editor would insist on my writing a fuller account of what made this receiver one of my all time favourites. As it happens, the early story of the Racal RA17 serves as a lead-in, because as you now know, the RA17 came out of an aborted contract between Collins and Racal which would have allowed Racal to build the 51J receiver under licence.

The 51J series which Collins made from 1949 (51J-1) to 1962 (51J-4) was already coming to the end of its life when Racal were negotiating, and Collins had announced a new line of equipment for the amateur radio market in 1958, to be known as the S Line. This new design marked a departure from the 19in rack and panel style used up to then in the 51J and 75A series, replacing it by a lightweight perforated wrap-around cabinet which most of you will have seen in the 75S receivers.

The weight saving was considerable; the 51J-2 weighed in at 25kg, whilst the 75S came in at 9kg, the same weight as the empty cabinet for the 51J. In retrospect, Racal probably got off lightly by not building the 51J because Collins would have then bounced into the market with their new S-line receivers in direct competition.

### Designed For Amateur Radio Use

The 75S series was designed for amateur radio use like the preceding 75A series. The 51J general coverage receiver was replaced by the all new 51S-1, and apart from a few variants such as 24V d.c. power or slightly different connectors for military use, there were no successors to the 51S-1.

According to Raymond Moore, the total build for the 51S-1 was only 8500 units over

the period from 1959 to 1972, which is why you don't see many around. Another reason for not seeing many around is that, as always, Collins equipment was not cheap because they built up to a specification and not down to a price.

You will recall my review of the Hallicrafters SX-117? The selling price for that was \$379 compared to \$620 for the Collins 75S-3. At the same period the 51S-1 had a tag of between \$1800 to \$2500 which places it into some kind of context. This was a receiver made for military and professional use, not for the average listening enthusiast, but if you are lucky enough to own one now, you can be sure that you have something very special in design and build quality. My own sample has a serial

number in the 6000 series so probably represents the middle of production and is representative of the breed.

### Simplicity In Itself

The first thing you notice when you look at the 51S-1 is the relative simplicity of the front-panel control layout, dominated by the centrally mounted main tuning knob. Typically Collins in shape and feel, the knob has a man sized finger hole at its periphery, and it is used fairly often because true to American practice at the time the knob has no flywheel and needs to be positively driven across its tuning range.

However, the receiver is incredibly easy to tune, accompanied by the unique 51S-1 clack-clack at each 10kHz dial increment. Tuning range

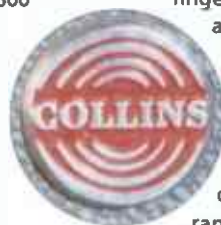
of the kHz dial is 1MHz and uses 34 turns of the tuning knob to accomplish, i.e. about 30kHz per turn. This may sound a bit coarse by today's synthesised receiver tuning rates, but you have to remember that the 51S-1 knob is driving a real v.f.o. and thus has infinite resolution, no need for automatic speed up; you do that by spinning the knob a bit faster, and its much easier to use than any of the multi-speed-up digital systems of today and I'm not being reactionary, just try it yourself if you get the opportunity.

### Frequency Setting

The actual frequency indication is by 0 to 100kHz on the rotary dial above the tuning knob, with each 100kHz increment shown on the mechanical digital readout above the knob. Megahertz selection is by the knob to the left of the tuning dial, and this sets the MHz digits in the mechanical readout alongside the 100kHz increment reading.

Frequency setting is easy - just select the MHz digits and then spin the tuning dial to complete the setting. Now think, this is a completely mechanical readout, so the linearity of the v.f.o. in the receiver has to be absolutely correct across a 1MHz tuning range. Collins were complete masters of the design techniques involved in this requirement, and developed a permeability tuning system which could be linearised to an astonishing accuracy.

The calibration accuracy quoted in the 51S-1 specification states 'When zeroed to nearest 100kHz calibration point, the frequency will be within  $\pm 400\text{Hz}$ '. Doesn't sound too impressive these days, but I checked my own 51S-1 and it is



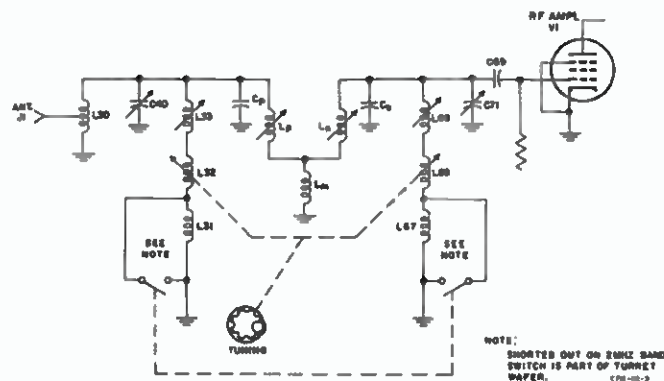
better than  $\pm 250\text{Hz}$  from end to end of the whole 1MHz tuning range, and this is typical of Collins v.f.o.s which haven't been messed about by unskilled fingers. If you are thinking of buying Collins equipment, take a very close look at the paper seals on the v.f.o. housing, and reject anything that has been opened.

## Other Controls

Matching the MHz knob on the other side of the tuning knob is the control for the notch filter. This is a Q-multiplier type of notch operating at the i.f. of 500kHz, and has a quoted depth of not less than 40dB. This is easily exceeded by a good 51S-1, and twiddling the notch control will wipe out enormous heterodynes with ease.

I know, I know, an audio d.s.p. system will do the same thing, but a major advantage of having the notch at the beginning of the i.f. system means that the interfering signal is removed before it is amplified and gets to the a.g.c. detector where it will either reduce the receiver gain or pump the gain up and down as the unwanted signal rises and falls, worst of all if its an interfering c.w. signal.

Mode selection is terribly simple, just a.m., u.s.b., l.s.b. and c.w., selected by the switch under the notch control. Sideband selection is carried out by a matched pair of Collins mechanical filters centred on 500kHz. There were two bandwidths available for these filters, and the manual I



**Fig. 1: A simplified version of the 51S-1 receiver's front-end.**

*Credit: Collins.*

have refers to bandwidth of 2.75kHz as standard, with an option to have 2.4kHz filters as fitted to my own receiver.

Investigation of the web page of Surplus Sales of Nebraska who seem to have cornered the market in genuine Collins parts show both filter bandwidths available at \$199 each for the 2.75kHz and a substantial \$290 each for the 2.4kHz. I never said that owning a Collins was cheap, but I'll bet an l.c.d. display for an RA1792 is pretty expensive, if you can locate one. The c.w. bandwidth is 800Hz, determined by a Collins crystal filter, whilst a.m. selectivity of 5kHz is achieved by critically coupled transformers rather than mechanical filters.

Quite why mechanical filters were not used for a.m. is not stated, but I'll bet its something to do with the gentler shoulders on the a.m. filter, which gives better audio results. As it happens, I have a 6kHz mechanical filter of the same type used in the 51S-1, which came from a Collins 618T h.f. airborne transceiver of the

same period; so if I have time before the end of this review, I will fit it to the 51S-1 and see how it behaves.

## Separate Gain Controls

The simplicity is carried on in the separate a.f. and r.f. gain controls, with a recessed line level adjustment preset in the middle of the a.f. gain knob. This preset adjusts the level of audio fed to the 600 $\Omega$  line output and is independent of the normal a.f. control which sets the level in the local loudspeaker.

Typical of the provision made for remote operation is the use of the 600 $\Omega$  line phantom for connection of a remote r.f. gain control. The r.f. gain is, as one would expect, a proper pedestal type with appropriate circuit design to allow rapid manual adjustment of the r.f. gain without hanging the a.g.c. system.

You will note the lack of selectable a.g.c. time constant facilities, the 51S-1 using the same attack and decay times for both a.m. and s.s.b./c.w. More on this later, but its an

odd detail decision in what must have been a no-compromise design.

Finally, the knob at the upper left hand corner of the panel which is the power off/standby/on/cal. switch. The calibrator is a high stability 100kHz crystal, used for checking the mechanical alignment of the tuning dial. Correction of the dial reading is carried out by moving the centre hairline using the Zero Set knob next to the cal. switch.

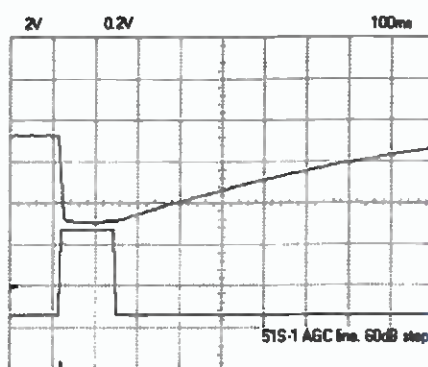
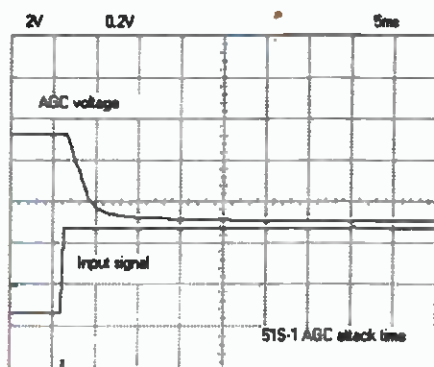
The signal strength meter is calibrated in dB above 1 microvolt over a 100dB range, and the meter also carries an audio calibration scale centred on 0dBm (i.e. 1mW in 600 $\Omega$ ), with meter range selection provided by the horizontal switch below the meter.

## At The Rear

The rear panel, in contrast to the simplicity at the front, is crowded by eleven phono sockets, an audio line terminal block and the main power input connector. I hate the use of phono sockets for r.f. connections, but Collins adhere to the American custom of using one even for the antenna connector.

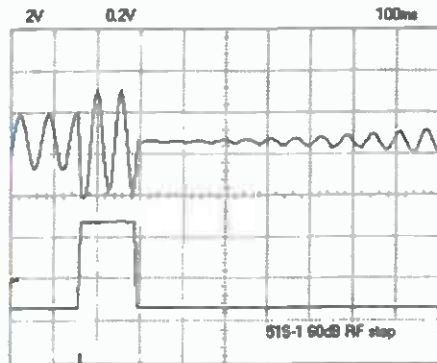
I would be tempted to replace it by a BNC, but I don't like my classics to be modified at all. I turned away an otherwise immaculate BC-348 last week because the front panel had been drilled to take a small loudspeaker and a signal strength meter. Pity, because the receiver was otherwise in tip-top condition. I located this at my favourite

**Fig. 2: 51S-1 a.g.c. characteristics. the leading edge of the r.f. step and you can see that the attack time of about 5ms.**

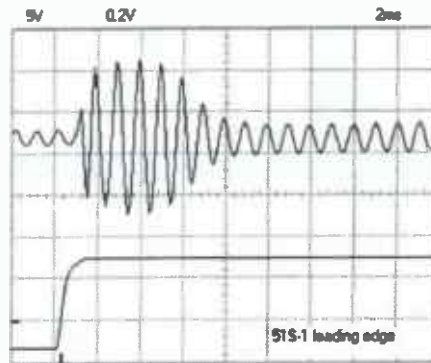


**Fig. 3: The complete step and the recovery of the a.g.c. which gives a recovery time of about 1.5s. These values apply to both a.m. and s.s.b./c.w. signals and the results in use are excellent.**

**Fig. 4: The audio response during the r.f. step. Note the a.g.c. holds the output change to about 5dB for a 60dB input change.**



**Fig. 5: Looking carefully at the leading edge of the audio waveform reveals that there is an irregularity which turns out to be a pulse of audio.**



source of equipment, the Gramophone Man in Wellington just off the M5 in Somerset.

Philip Knighton always surprises me by the range of receivers he manages to find, and I came away without the BC-348, but clutching one of the first h.f. receivers ever made by Trio in 1947, known as the 6R-4S. Don't know what I'm going to do with it, but I've never seen another one outside the Trio-Kenwood museum in Japan.

Other things I looked at were a totally original 52 set receiver, a superb HRO with the complete coil set (which was being sold as I watched), and a Marconi Atalanta for only £75. Now there's a project for someone. True 'Boat Anchor' enthusiasts should quickly call Philip on (01823) 661618. (I still need a BC-348 or 224 or 312 by the way). But I digress.

## Circuit Detail

The 51S-1 is specified as covering 200kHz to 30MHz in 30 1MHz bands, with a handbook note that the 200kHz to 2MHz portion of the coverage is intended for laboratory use or broadcast monitoring since there are spurious signals at 333, 666kHz, 1, 1.5 and 2MHz. I don't find these signals too intrusive, but its typically professional of Collins to list them, unlike some manufacturers I could name.

The two lowest bands, i.e. 0 to 1MHz and 1 to 2MHz are covered by up-converting to 28 to 30MHz in a separate i.f. mixer preceded by a block r.f. filter. Provision is made for connecting an external i.f. preselector for enhanced performance in the 0 to 2MHz

range. The up-conversion local oscillator is, as always with Collins, a low phase noise crystal oscillator.

From 2 to 7MHz the 51S-1 is triple conversion, with the five 1MHz bands being converted to a first bandpass i.f. of 14.5 to 15.5MHz, whilst from 7 to 30MHz the receiver is dual conversion, first to a tunable i.f. of 2 to 3MHz then the final i.f. at 500kHz. This all sounds horrendously complicated, but its not really, and by folding the 2 to 7MHz bands inside the 7 to 30MHz range, Collins manage to use their system of crystal conversion utilising only sixteen h.f. crystals instead of the thirty needed for straightforward conversion of the entire receiver r.f. range.

Not that a user would know what was going on

behind the front panel, because all the necessary electricrery is carried out by the MHz band selection switch which drives a superbly engineered twelve section thirty position turret mechanism stretching the full depth of the receiver. This might cause gloom and doom amongst anyone who has tried to repair a multi-section band switch, but fear not, I said superbly engineered, and so it is.

Each of the turret sections is simply dropped into place without any fixed wiring, and the centre shaft, which is about half an inch square, is passed through a hole in the rear chassis face and connected to the front-panel switch mechanism by a coupler. If you need to do any work in the r.f. section (and I have replaced one of the conversion crystals

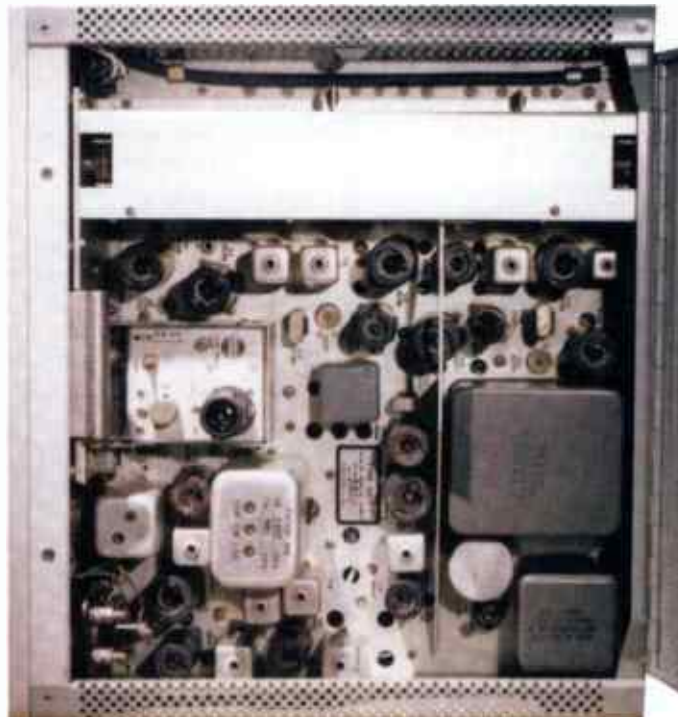
myself, so I know), you simply withdraw the shaft, lift out the turret wafer, do the repair and drop it back in again. They really don't make 'em like this any more.

## Classic Valve Line-Up

A classic receiver has to have a classic valve line-up, and the r.f. amplifier uses the 6DC6 which is said to have been designed by RCA in conjunction with Collins. Its probably an apocryphal story, but Collins were like that. If a component wasn't available, they designed their own.

The first mixer uses the triode section of a 6EA8 with cathode injection of the crystal oscillator for first conversion, and front-end selectivity is provided by critically coupled tuned circuits before the r.f. amplifier and single tuned circuits between the r.f. amplifier and mixer. A simplified circuit of the input circuit is shown in Fig. 1, and the important thing to note is that all r.f. tuned circuits are tracked tuned by a mechanical connection to the main tuning dial so that optimum front-end selectivity is achieved whatever the operating frequency of the receiver.

Nowadays, manufacturers fit band pass filters to get over the problems of providing tracked tuning with microprocessor controlled receivers, with JRC as a notable exception with their varicap tuned front-ends. JRC must have had a high regard for Collins because if you look at the front-panel of an NRD-505 you will see the resemblance to the 51S-1, and if you look inside you will find that the



**Immaculate inside and out.**

**Continued on page 24**

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SO239 BALUN

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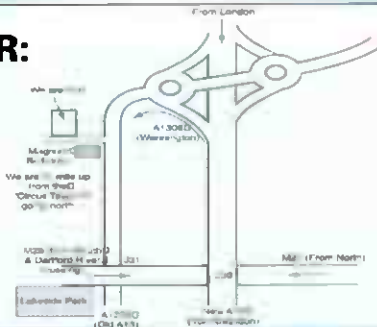
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Package includes UK metro guide mapsource CD, 16 megabyte datacard, PC interface cable, cigarette lighter adaptor, portable antenna + dashboard mount.

SPECIAL OFFER **£649.00**

Garmin Street Pilot colour.....£549.00  
Carry case for Street Pilot.....£14.99  
8 meg-mem + mapsource CD.....£139.95  
16 meg-mem + mapsource CD.....£169.95  
Mapsource CD.....£79.95  
8 meg data card.....£69.95  
16 meg data card.....£99.95

#### GPS-12 NAVIGATOR



(now with 24 hour battery life) 12 channel receiver. Includes: UTM, ordnance survey, waterproof to IPX-7 standard).

SALE PRICE **£129.95**

#### GARMIN GPSIII+



Powered by AA cells nr 13.8V, this compact navigational system gives detailed maps of the UK & Europe. Supplied with data lead and free on-board maps.

SALE PRICE **£329.95**

#### GARMIN ETREX SUMMIT



First combination GPS, altimeter and electronic compass in one small box.

SALE PRICE

**£199.95**

Etrex Special offer.....£109.95  
Emap Special offer.....£199.95

### SONY SW-30



The ideal holiday partner!

- ★ Fully digital world receiver
- ★ FM MW SW ★ Covers all short wave broadcast/MW plus FM stereo (on h/phones)
- ★ Programmable memories
- ★ Sleep timer + alarm function
- ★ 1kHz tuning for short wave.

RRP £79.95.

HALF PRICE **£39.95**

P&P £7.00

### SONY SW-100E



- ★ Miniature portable all mode SW receiver
- ★ Station presets for 50 frequencies
- ★ Single side band system
- ★ Synchronous detector
- ★ Tuning in 100Hz + 1kHz steps
- ★ Includes compact antenna/stereo earphones/carrying case RRP £229.95.

carrying case RRP £229.95.

SPECIAL OFFER **£129.95** P&P £10

### SANGEAN ATS-313 ACS



★ Portable SW receiver with built-in cassette deck ★ 54 memory presets ★ Continous coverage 150kHz-30MHz (all mode) ★ SW tuning in 1kHz steps ★ FM coverage 87.5-108MHz. SSP £199.95

SPECIAL OFFER **£119.95** P&P £10

### SONY SW-55E



In our opinion the best SW portable on the market. covers 150kHz-30MHz (all mode), FM, SW, MW & LW. Comes complete with compact pull out antenna, stereo earphones, carry case and power supply. RRP £299.00.

OUR PRICE **£249.00**

### JM-333



JUMBO WALL/DESK CLOCK.

- Wide screen/2" digit time display
- Barometer
- Calender
- Temp
- Auto RF synch clock from Rugby.

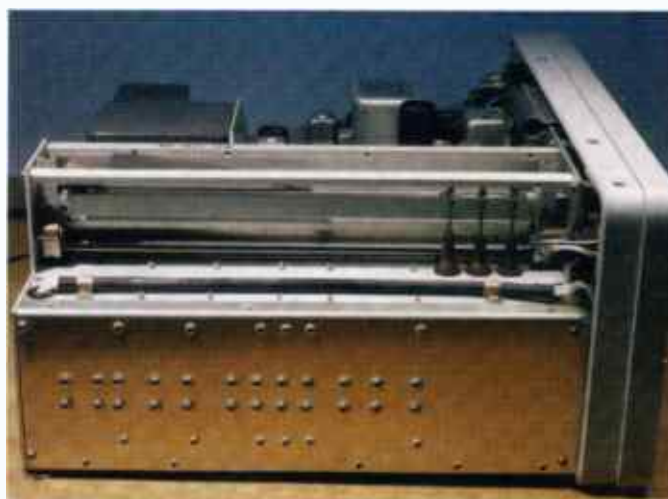
SALE PRICE **£49.99** P&P £4.50

v.f.o. driven by the main tuning knob is an exact (really exact) copy of the classic Collins round can p.t.o. It even tunes the same v.f.o. range. But I digress (again).

The reason for mumbling on about the tuned front-end is, as you all know, that it delivers very good second order intermodulation performance for out of band strong signals as you will see when you read the measured results for the 515-1. Cynics may say that you need a good front-end with a tube mixer, which is true to some extent, but doesn't detract from the excellence of the design.

First crystal controlled conversion is followed by the 2 to 3MHz tunable i.f., using a 2.5 to 3.5MHz p.t.o. to convert down to the 500kHz fixed i.f. I use the term p.t.o. to indicate that this is another Collins classic permeability tuned oscillator rather than a v.f.o. tuned by a variable capacitor. The p.t.o. is tuned by a ferrite slug moving in and out of a tuning coil and has, among other advantages, complete freedom from the frequency jumping that can result from corrosion or wear in the rotating contacts of a capacitor.

See the RA17 review of the MHz v.f.o. performance using a variable capacitor for tuning. The p.t.o. is driven by the main tuning knob which also track tunes three sections of tuned filtering across the 2 to 3MHz variable i.f. range, for



There is minimum inductance of the v.f.o.

additional selectivity. Once into the final i.f., selectivity is achieved by Collins mechanical filters for u.s.b. and l.s.b., a crystal filter for c.w. and critically coupled tuned circuits for a.m., as mentioned earlier.

Having the matched s.s.b. filters means that the demodulation carrier can be generated by a 500kHz crystal oscillator, but this has a drawback for c.w. reception since the operator is condemned to a fixed 800Hz beat note when using the c.w. crystal filter. (What did he say? A drawback in a Collins design?).

### Four Diode Bridge

The s.s.b. and c.w. demodulation uses a four diode bridge with careful input matching from the last i.f., and a.g.c. is generated using a feed from before the last i.f., usually done to prevent the s.s.b.

demodulated carrier from getting into the a.g.c. system and producing a fixed a.g.c. offset. Since I have been looking closely at a.g.c. performance of receivers, and having used the 515-1 for many years with complete satisfaction in the a.g.c. behaviour, it was surprising to find that there were no listed a.g.c. characteristics in the 515-1 handbook, so of course I had to get down to some investigative measurements.

I used my standard technique of applying a 60dB step of r.f. input signal at 14.2MHz, measuring the audio output from the receiver at the loudspeaker or 600Ω output, so that I test every stage of the unit at once. However, the first test I carried out on the 515-1 was to measure the a.g.c. voltage during and after the r.f. step input so that I could find out the attack and decay times which Collins had used.

Figure 2 shows the leading edge of the r.f. step and you can see that the a.g.c. has an attack of about 5ms. Figure 3 shows the complete step and the recovery of the a.g.c. which gives a recovery time of about 1.5s. These values apply to both a.m. and s.s.b./c.w. signals and the results in use are excellent.

### Audio Response

The audio response during the r.f. step can be seen in Fig. 4 and you can see that the a.g.c. holds the output change to about 5dB for a 60dB input change, which is reasonable but not great. Looking carefully at the leading edge of the audio waveform reveals that there is an irregularity which turns out to be a pulse of audio as shown in Fig. 5. The pulse lasts about 6ms which is about the attack time of the a.g.c. system so the 515-1 must overload during the time it takes the a.g.c. to get hold of the gain control and back it off.

The strange thing is that the overload does not manifest itself as a leading edge click on the audio, probably because of the very gentle rise and fall of the audio waveform, and that's why I had never noticed it in all the time I have used this receiver.

By comparison, the uncontrolled wild audio excursions experienced with the 955-1 were very unpleasant, and I have to say



The comprehensive rear panel.

that experience of so many receivers over the years leads me to believe that tube receivers which briefly overload do so in a very benign manner, possibly because of the voltage control range available in the  $V_g/I_a$  characteristics of the typical r.f. pentode. (We used to say they had a long grid base). But I may be completely wrong.

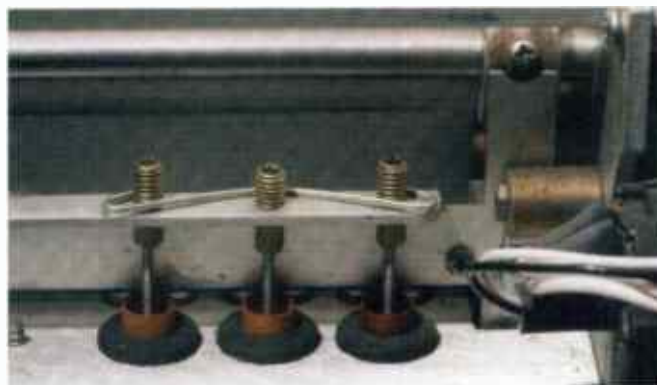
## Measured Performance

And so to the measured performance. It goes without saying that sensitivity is excellent, with s.s.b. figures of 120dBm for 12dB SINAD across the entire range from 2 to 30MHz. The a.m. sensitivity using a 60% modulation depth at 1kHz is almost constant at 111dBm across the same tuning range.

Below 2MHz the gain falls off with s.s.b. measuring 108dBm and a.m. at 100dBm for 12dB SINAD. No surprises there, except that the 515-1 in common with many receivers is probably too sensitive for today's conditions and could well use a 6 or 10dB attenuator ahead of it. Receivers of this era usually have third order intercept points of -20dBm, so it was interesting to find that the 515-1 came out at 9dBm with a dynamic range of 97dB, considerably better than expected.

Having a fully tuned front-end, you might have anticipated that second order intercept performance would be good, and so it turned out to be with a dynamic range of 114dB and a second order intercept point of +96dBm. Anyone who has read my scribbles over the last couple of years will also anticipate that the phase noise performance of the 515-1 was bound to be excellent: just take a look at the following:

Tone spacing (kHz)	Phase noise (dBc/Hz)
5	132
10	137
20	137
50	141
100	150



Maximum inductance position of the v.f.o. tuning.

These measurements were taken in s.s.b. mode using the 2.4kHz i.f. bandwidth. I took a quick look back through recent receiver tests I have carried out and think that this represents the best phase noise performance I have encountered, with the AR7030 coming closest, the exact comparison being that the 515-1 is better close in (up to 10kHz), with the AR7030 bettering the 515-1 from 20 to 100kHz. The crystal oscillator still reigns supreme as a conversion oscillator source.

## Its A Classic

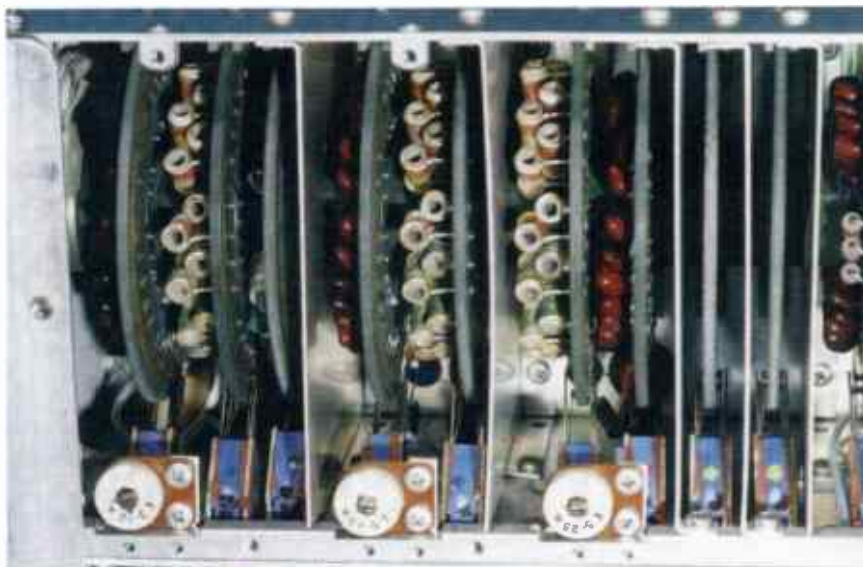
Overall, the 515-1 is one of those classic receivers in which everything was designed to the best standards of the day and the results are outstandingly good. Even though there are modern receivers which can stand up in the company of the 515-1, I don't know of one which gives me the same satisfaction to own and use. The RA1792 comes pretty close in

simplicity of use, but in many sheer performance aspects the 515-1 is better. The AR7030 r.f. abilities are legendary, but its not as easy to use as the classic communications receiver. If I only had the courage to dive into the 515-1 and modify it by installing a modern high level mixer I'm sure I could have the best receiver around, but I

want to keep it completely original so as to remind myself from time to time that truly great design lasts a lot longer than anyone might think. Its the ultimate landmark as far as I'm concerned, and it will be the last receiver I shall ever part with.

## And So To Other Things

I must here and now thank Michael O'Beirne for a wealth of information sent on after my somewhat uncomplimentary remarks about the RA17. Michael clearly has enormous background knowledge of this particular receiver and its derivatives and has many



helpful things to say. We agree on the pretty awful a.g.c. performance, but disagree fundamentally on the acceptance of Battleship Grey for front panels. Michael loves it: I hate it - at least it's straightforward. Something to do with the difference between an Army (his) and RAF (my) upbringing.

I bitterly regret disposing of my collection of AN/ARC-5 units before I moved to Devon from Derbyshire. The line-up of three black crackled transmitters and three black crackled receivers was quite bewitching. Hope they have a good home. Certainly, every aircraft of which I had experience (Comet II, Hastings, Beverley, even the V-bombers) had black front-panels on every bit of radio gear, so that's what I expect to see. Mind you, the 515-1 is grey, and I love it.

## Thanks To You

I'm always heartened by the amount of feedback I get from my articles in the magazine, and although I can't necessarily get to grips with all of the topics raised, it is clear that a great body of enthusiasts out there are using and enjoying classic receivers. Thank you all for your support as we enter yet another year of adventure in radio.

Happy listening.

**This receiver would take rather a long time to align! Here's the incredible permeability tuning arrangement for the MHz selection.**

Ian Doyle has provided a review of two new web sites that will be of immense importance to the 'civil aviation monitor' whether their interest centres on v.h.f. or h.f. listening.

# Air Track

## Flight Path UK

The National Air Traffic Services launch a new website, [flightpathuk.com](http://flightpathuk.com) which is due to be launched early this year and promises to be a very exciting development for the civil aircraft enthusiast.

Essentially the web page will offer the ability to both monitor and track flights in the UK near real time in the same way that an Air Traffic Controller can. The facility will allow the user to see all elements relative to the flight, flight paths, speed, aircraft type and arrival and destination airports, unfortunately, there is one glaring omission that may substantially effect the popularity of the service, it does not show the aircraft serial number, perhaps the most important constituent from the enthusiasts point of view. If this is rectified, take-up may well be astronomic. Despite this limitation, the site is still great fun and promises to provide a real insight into UK Air traffic Control. For this achievement, NATS, the authors of the site, are to be congratulated.

At the moment the system is still in Beta test, the accompanying images have been taken from the demonstration version of the web site and will hopefully provide a taste of what is available. For the 'Airband Listener' and 'Aviation Enthusiast' this will no doubt provide major benefits in terms of both monitoring and listening to the airwaves! Unfortunately, the service is not free, although it seems that monthly subscription charges will be fairly reasonable. Assuming that it is aimed at the general public and the enthusiast rather than commercial organisations this should be the case!

In order to run the software, a reasonable specified PC is required. I run a 233MHz with 64Kb of RAM and the software runs without a problem. Once I'd downloaded the demo version software I found that the features are extremely impressive. Mac users are also catered for with a Mac version of the user application is available from the home page. Once payment is received and processed the user can log on to the [flightpathuk.com](http://flightpathuk.com) website. Initially you are presented with a full map of the UK. This shows the various major civilian aircraft currently flying in UK Airspace. I am assuming that small light civil traffic and Military movements will not be available, although I personally hope that at least military transports will be tracked.

## Aircraft Tracking

The various trails that can be viewed, represent aircraft flying in UK airspace, the refresh rate is once every two minutes, as the aircraft progresses on it's course, a fading trail will appear on the screen to illustrate where the flight has been. To observe all the data relative to the aircraft presented such as airline, type,

height, speed, arrival/destination airport and so on, you simply move the mouse over the aircraft of interest and click its icon.

Due to the volume of aircraft in UK Airspace at any one time it may be difficult to track all aircraft, therefore a search facility has been provided which will allow identification of more specific aircraft and their profile. A full, detailed list of the search criteria is beyond the scope of this article.

However, typically it is possible to identify all aircraft inbound to a specific airport, say for instance Manchester, or perhaps identify all aircraft at or above FL 300. Up to eight selection criteria will be available, by marking the appropriate selection criteria, specific information can be readily viewed - Fig. 2. Overlays are available with options consisting of: Longitude and Latitude Lines; Air Corridors; Airports; Radius from Airport; Hazardous Transmitters sites and ATC Sectors.

## Other Options

The Flight Path site also allows the user to zoom in /out onto various sectors of UK airspace. The dial on the bottom left hand side allows you to fully navigate the map. It will also be possible to add and subtract various data as required. Airport locations, air corridors, ATC sectors, transmitters sites et al can also be added with the option to overlay onto the map in different colours in order to aid readability.

All in all, this is a superb site and one which I feel sure will be extremely popular. More so, if the issue of providing an aircraft Serial/Registration can be addressed. In time, I would hope that a link could also be made to EuroControl, Maastricht and Shanwick allowing the coverage of aircraft approaching UK Airspace rather than just those currently there to be accessed. In addition to being of considerable interest to the 'aviation monitor' there are of course clear implications for the airline industry allowing considerable improvements in flight time management. NATS are to be congratulated for taking the considerable time and trouble to develop a site of this nature.

## Flight Explorer

If your interests lie further afield than the UK, then you may also be interested in the [flightexplorer.com](http://flightexplorer.com) site. This too is a fabulous website which enables aircraft flight-planned in and out of the USA to also be tracked real-time. Similar to the Flight Path service, a small subscription is due; in this case the cheapest





**Air 2000 could well use Flight Path UK to assist traffic management and monitoring.**

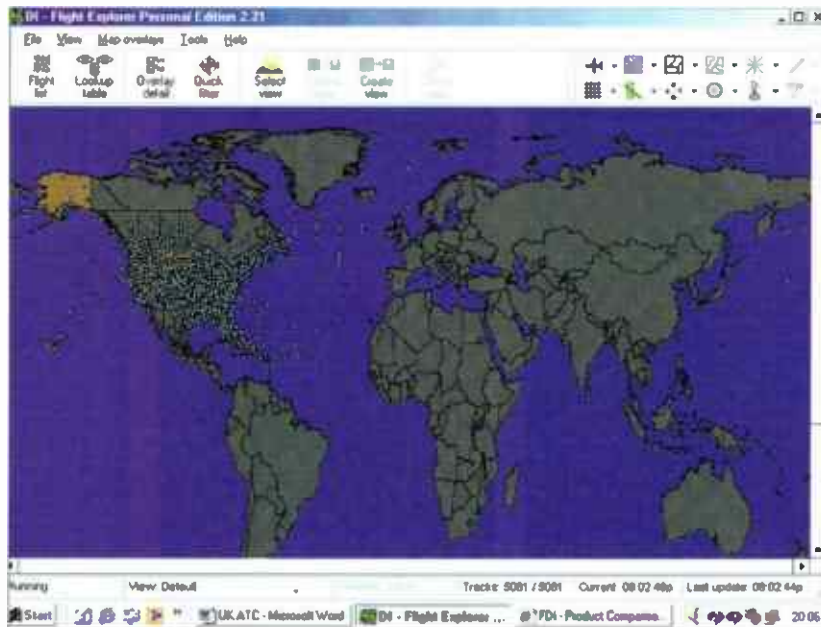
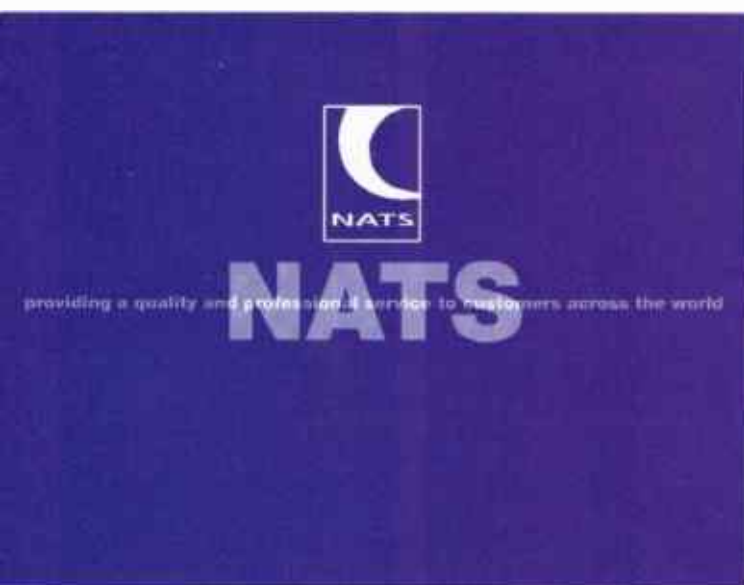
option is about \$9.00 per month, about £6.

Loading the program is quite easy, simply log on to the FlightExplorer website and download the package, you will be given an access code and once payment is made, you are able to access the appropriate web-page required to run the program. Two versions of the software are available; the one which I guess most enthusiasts opt for is *Personal Edition*. This should be adequate for most users; if however you are feeling flush, there is a professional edition, which is aimed more at the corporate airline or professional user.

Once you have an account and user ID set up, have successfully performed the software installation on your PC and logged onto the site, what can you expect? Well, this is truly an Aladdin's cave.

In the same way that NATS provide a real-

**Fig. 1: National Air Traffic Services Ltd., the provider of Flight Path.**



time image of any aircraft over the UK, Flight Explorer will allow the user to monitor any aircraft anywhere in the world which has a flight planned in to or out of the USA. As a large percentage of h.f. aviation monitoring is performed on aircraft flying over the Atlantic Ocean, Northern Canada, The Caribbean and South America, the advantages of access package like this are obvious.

*FlightExplorer* will run on a 'reasonably fast PC' using a dial-up Internet connection or better. The system allows the retrieval of aircraft and weather information from the Flight Explorer data centre and provides the user with a real-time picture of aircraft and weather over the US (including Alaska and Hawaii), Canada, Europe, parts of Mexico and the Atlantic and Pacific Ocean.

Since a large percentage of h.f. aviation listening targets flights over these areas, the advantage of being able to see graphically what you can hear increases the interest enormously. When you first log on to the site you will see a picture of the world with every aircraft registered with the centre represented as a dot - **Fig. 3**.

It is however possible to click and drag to draw a box on a particular area - for example the Caribbean. So if you were listening to the h.f. Caribbean net and wanted to identify a particular aircraft that was providing a position report, using the mouse to 'right click' on the aircraft icon and then selecting 'Properties' from the drop down menu, the aircraft type, airline, position, height, speed arrival/destination airport will all be displayed. If you 'tag' an aircraft this information will be retained as the aircraft moves across the screen. It is likely of course, that we actually hear an aircraft and wish to interrogate the flight details, press the horizontal aircraft icon in the top right of the screen, this will clear the screen in readiness for our query, now select the 'Quick Filter Option' and key in the flight

**Fig. 2: Flight Path tracking options. The red dots represent the aircraft; simply clicking on the dot will allow a variety of data to be interrogated; Airline, Departure Airport, Arrival Airport, Height, Speed, Latitude - Longitude, Airways, Airports and ATC sectors can also be added.**

**Continued on page 30...**

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FIRST IN RADIO

# WATERS & STANTON

WE WILL MATCH OR BEAT COMPETITIVE PRICES ON GENUINE UK STOCK



## NRD 345 Communications Receiver



**£399.95**  
Plus £7.50 Carr.

The new NRD 345 is one of the best value packages on the market. Covering the range 100kHz to 30MHz, it offers SSB, CW, AM and synchronous AM modes. Includes 4kHz and 2kHz switched IF filters, noise blanker, scanning, pass mode, keypad entry, RS 232 port, timer function, 100 memories, low/high impedance antenna switch and more! Requires external 12V supply, (available as extra) @ 800mA approx.

**S-3479**

Frequency: 1452-1492MHz

Supplied with LNA, 4 element Yagi, mounting bracket and fittings and 25m of 50 Ohm coaxial cable with 'F' plugs

**£149.95**  
Plus £7.50 Carr.

## Hitachi World Satellite Receiver

**NEW**

This new Hitachi receiver comes complete with mini flip-up dish letting you receive high quality radio broadcast signals from around the world. No more background noise and atmospherics. It also covers the FM VHF broadcast bands, medium wave and the major short wave bands.



**£299.95**  
Plus £7.50 Carr.

## YR-5000

Arriving Soon

**Phone**  
Plus £7.50 Carr.

## AR-5500

Now In Stock

**£719**  
Plus £7.50 Carr.



Yaesu's exciting new scanner.  
\* 100kHz - 2599MHz  
\* FM AM SSB CW  
\* Real-time band scope  
\* DSP Noise and notch filters  
\* 2000 Memories  
\* Optional digital voice recorder  
\* Large digital display  
\* Super HF performance  
\* Ultra sensitive  
\* Fully programmable



AOR's exciting new scanner.  
\* 500kHz - 2040MHz  
\* FM AM SSB CW  
\* 1000 Memories  
\* 2000 pass frequencies  
\* 37ch sec scan  
\* 8.33kHz airband steps  
\* RS232 PC interface fitted  
\* 10.7MHz IF for SDU5500  
\* Accommodates up to 5 slot-in cards  
\* Detachable MW bar aerial

## GRUNDIG Satellite 600 Millennium Receiver

**NEW**



**£549.95**  
Plus £7.50 Carr.

Frequency: 100kHz-30MHz, 87-108MHz, 118-137MHz  
Modes: AM, USB, LSB, FM (AM synchronous, AM air band, FM broadcast)  
Tuning: Direct keyboard entry & manual rotary knob tuning  
Memories: 70  
Separate volume, bass, treble & air squelch controls  
Supply: 6 x D cells (Not supplied), 230V mains adaptor included - Size 535 x 234 x 215mm - Weight: 6.6kg  
Supplied Accessories: Headphones, 1/4in to 3.5mm adaptor, Handbook

New for the Millennium is the Satellite 800 Millennium receiver. Designed for ease of use, it has many features normally found on communication receivers. Superb sound through its 4in speaker or headphones. It has a choice of bandwidths 2.3, 4.0 & 6.0kHz, normal AM or synchronous AM modes available as well as airband AM, FM stereo through headphones (supplied) or phono connectors on rear. Large LCD with informative displays, large direct entry keyboard, as well as analogue S meter. The Satellit 800 is ideal for both the newcomer to radio or the experienced SWL and will give years of pleasure

Special Offer

## 30MHz - 30MHz NASA HF-4E Receiver



**£149**  
Plus £6.00 Carr.

This new receiver covers 30kHz to 30 MHz and is designed for SSB, CW and AM modes. A much improved version of the Tairat HF receiver with 2kHz SSB filter, advanced mixer design, backlit display, active active antenna relay and computer output. Included in the package is a software disk and 12V AC mains adapter. **Optional self-powered active antenna £59.95**

Was £199.95

## IC-R75 Receiver



The IC-R75 has received rave reviews in the Amateur Radio Press. It's a very serious short wave receiver with coverage right up to the exciting 6m Ham Band. Features include USB, LSB, CW, AM, FM \* 101 Memories \* Super High Dynamic Range \* Synchronous AM detection \* Twin Pass band Tuning \* Digital Signal Processing \* Automatic Notch Filter \* 101 Alphanumeric Memories \* RF Gain/Squelch \* Cook \* Numeric Keypad \* Attenuator \* 2-level Pre-Amp \* Scanning



**£595**  
Plus £7.50 Carr.

## YAESU FRG-100 Receiver



**£339**  
Plus £7.50 Carr.

The FRG-100 has stood the test of time. It offers full coverage of the short wave bands plus long wave and medium wave. It features \* USB, LSB, AM, CW \* 50 memories \* 2 stage attenuator \* Noise Blanker \* Band Scanning \* Memory Scanning \* Dual Speed AGC \* High and low impedance antenna inputs \* Programmable steps from 10Hz - 1kHz \* Optional Narrow Filters, PSU and FM board \* BFO reverse for CW \* Twin Clocks. Ask for leaflet.

**MOW**

**UK RADIO COMMUNICATIONS**

**2001**

**NEW EDITION**

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We are pleased to announce the new 2001 UK Radio Communications Equipment guide. Running to over 300 pages, this is Europe's largest guide and catalogue devoted to amateur radio equipment. You'll find over 2000 products described in detail with full colour illustrations and specifications. It's a complex shopping guide to an amazing selection of radio products. There are also some informative articles and the usual selection of tips. And the price remains the same as last year. To order simply phone your credit card number to 08000 73 73 88 or send a cheque for the total amount. **£2.95 plus £1.25 postage.**

## Fairchild RD-800V VHF/VHF Receiver

Needing little introduction, this receiver has become a classic of design. Features USB, LSB, CW, AM, FM, \* 100 Memories \* Dual VFOs \* Resolution to 10Hz \* Clock and Timer \* Variable Bandwidth \* Wide Dynamic Range \* Seamless Tuning using Single Loop DDS \* Clear LCD Readout \* Infrared Remote Controller \* AC Power Supply. Send for leaflet.



**Phone**  
Plus £7.50 Carr.

## Fairchild RD-800V VHF/VHF Receiver



**Phone**  
Plus £7.50 Carr.

This very wide range receiver offers a complete receiver station in one package. Features include USB, LSB, CW, AM, FM, Video out \* 5Hz step accuracy \* Over 50,000 memories with 20 Alphanumeric Characters \* Noise Blanker \* Text Search \* Pass Band Tuning \* Stereo CW Reception \* Notch & Peak Filter etc.

TURNKEY MVT-3000S (MK2) Version

Latest MK2 Version

Here's your chance to purchase the most exciting receiver from Yupiter at an unbeatable price. Coming with a 3000 channels from long wave to 100MHz, it's a real gem on your pocket. Features include: FM, AM, WAM, LSB, SB, CW, 1000 tuning steps \* 1,000 Memories \* 10 bands \* 100 Preset memories \* 10 Priority channels \* Built-in Scope display Duplex receive feature for better blocking of the unwanted signal \* Fast scan feature \* Backup AM antenna \* True frequency display \* Five keypad entry \* Rechargeable batteries, AC charger and telescopic antenna.

Phone Plus £7.90 Carr.



Phone Plus £6.00 Carr.

Probably the best value for money it has stood the test of time and is very sensitive. Offers USB, LSB, CW, AM, FM, WFM, \* 1,000 memories \* 100 Preset channels \* 12 Tuning steps \* Fast scan mode \* Rechargeable batteries, AC charger and telescopic antenna.

Phone Plus £6.00 Carr.

The scanner for those who are more interested in VHF and UHF. Features include: FM, VHF, AM reception \* 210 memories in 10 banks \* 20 steps per sec scanning \* 6 Tuning steps \* Ground sensitivity \* Support with rechargeable batteries and AC charger. Telescopic antenna included.

Phone Plus £6.00 Carr.

This wide range scanner is fitted with a data port for computer control. Features include: USB, LSB, CW, FM, WFM \* Programmable scan \* 1000 memories in 20 banks \* Programmable display \* Built-in AM antenna \* 200 memories for air band \* Rechargeable Ni-cad, AC charger and telescopic antenna.

Phone Plus £6.00 Carr.

USB, LSB, CW, AM, FM, WFM \* 1,000 Memories \* Telescope \* Noise Blanker \* Wide range of 1000 steps \* Auto scan \* Priority \* RDS for FM band \* 100 Preset memories \* Duplex receive \* Programmable scan \* Ni-cad power \* AC charger and telescopic antenna.

Phone Plus £6.00 Carr.

This pocket size handy offers great performance. Offers FM, WFM and AM \* Auto square \* 400 Memories \* 11 Tuning steps \* CTCSS decoda \* Duplex monitoring feature \* PC Programmable \* Built-in antenna \* Priority \* Ni-cad \* Ni-cad 2 x AA cells (extra). Antenna included.

Phone Plus £7.00 Carr.

The lovely little scanner in your pocket offers up to performance. 100kHz - 130MHz \* 1,000 Memories \* 100 Preset channels \* 10 Search bands \* 8 Channels for memory display \* Band scan \* Priority monitoring \* PC Programmable \* Smart search feature \* Alpha numeric call \* Size 58 x 95 x 22mm \* 220g

Phone Plus £7.00 Carr.

Phone Plus £7.00 Carr.

Singean ATS-900

£149.95 Plus £6.00 Carr.

- \* AM, USB, LSB, FM
- \* 307 Memories
- \* Five tuning methods
- \* Auto tuning system (ATS)
- \* E2 Prom memory back-up

\* AM RF gain control \* Radio Data System (RDS)  
\* FM stereo via earphones \* Direct one button recall  
\* Built-in 42 world cities time - day light saving time  
\* AM wide/narrow filter and FM mono stereo

UBC - 220MHz Handheld Scanner

£129.95 Plus £6.00 Carr.

Ideal for general listening, this scanner covers all the major bands from 66MHz - 956MHz AM and FM. 200 memories and a very fast scanning speed make this a very attractive buy. You also get the flexible short antenna, AC charger and batteries. Very popular with Airband listeners.

ICOM

Mode USB, LSB, CW, AM, FM, WFM.

Connect this up to your PC and enjoy high quality reception with an amazing station data base and memory log. Can be used remotely from PC. Requires PC (not included).

WATSON

Supplied with telescopic antenna and AC battery charger. If you are within 200 ft or so of the handheld, you should be able to read off the frequency. Note it down and enter it in your scanner. It's that simple and it's pocket sized. £59.95 Plus £6.00 Carr.

Yupiteru MVT-7300 New Scanner

£289 Plus £6.00 Carr.

INITIAL FM NAM WAM USB  
LSB, CW  
100Hz - 100MHz  
1000 memory channels  
High sensitivity  
Scan memory meter  
High speed scan and searching  
1000 memories  
Duplex receive feature  
Telescopic antenna  
Close cover function  
Visible colour display  
High illumination  
Auto function  
3.5mm stereo jack  
12V 30W AC mains

PC Desktop

Features include: 1000 memories \* 100 Preset channels \* 10 Search bands \* 8 Channels for memory display \* Band scan \* Priority monitoring \* PC Programmable \* Smart search feature \* Alpha numeric call \* Size 58 x 95 x 22mm \* 220g

Whisper Antenna

Whisper antenna with magnetic base and built-in ferrite core. Coverage: 100MHz and above. Price: £24.95

SW-02 VHF Ant

Cover 1.5 - 100MHz with built-in ferrite core. Price: £25.95

Global AT-3000

Global AT-3000 scanner with built-in ferrite core. Price: £25.95

BETTER SHORT WAVE RECEPTION ON YOUR SCANNER!

MAKE IT PERFORM LIKE A BASE RECEIVER

The MFJ-956 will transform your short wave reception and make your scanner perform as a very respectable short wave receiver. How does it work? when you attach a long wire antenna to your scanner, it amplifies everything, mixes it together, and invents a few signals on the way! The result is lots of noise and hardly any signals. Does that sound familiar? To unlock the true potential of your scanner, you simply place the MFJ-956 between your scanner and the random length of wire. No power is required; just connect your wire antenna to the input of the MFJ-956, take the output to your scanner and adjust the controls on the MFJ unit for best reception. You will hear the noise drop away and the previously masked signals appear - just like magic.



BNC lead to connect MFJ-956 to your scanner. BNC socket, £6.95

MFJ-956 £39.95 Plus £7.00 Carr. NOT INCLUDED

# Air Track

...continued  
from page 27

"I believe this is a superb product and is bound to be of tremendous interest to the serious h.f. monitor with an interest in aircraft."



Fig. 3: Flight Explorer World Map.

number heard, if this is flight planned into or out of the USA it will appear as a dot on the main screen, ensure that the aircraft you are monitoring corresponds to the one you can see on screen, otherwise the aircraft may not appear as it may be outside the interrogated range - Fig. 4.

Numerous other search options are available in this mode. You can input Flight Numbers, Aircraft Types or Airport Codes; all aircraft currently in the air with a live flight plan, which is either to or from the USA, will appear. The screen must be cleared down first after each query. It is also possible to overlay the latitude and longitude co-ordinates, which is

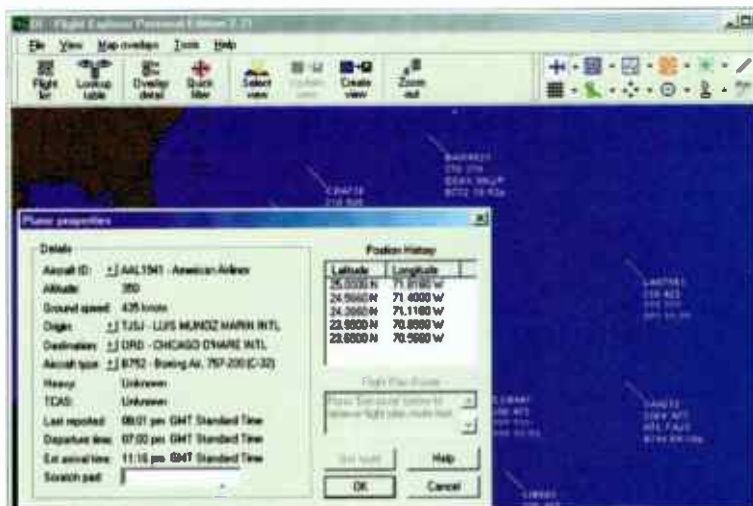


Fig. 4: Aircraft Marked.

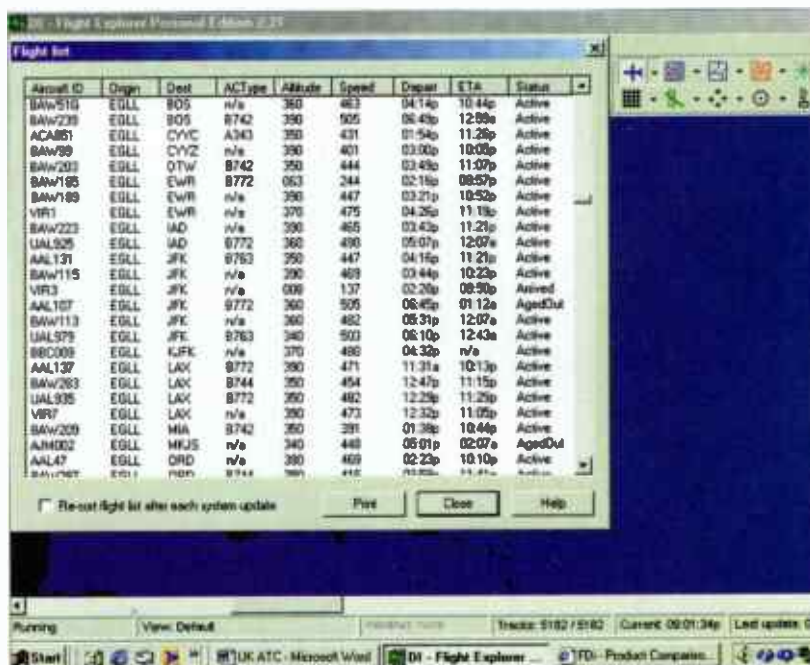
particularly useful over the North Atlantic, Canada and Pacific Areas.

One word of warning, it is possible that displayed data can be up to 40 minutes old, as only the last reporting point is provided, hence the

reason why the picture over the North Atlantic consists of rows of dots in vertical groupings, despite this limitation there are still numerous advantages in using the service.

Although not relevant to the UK, various overlays can also be added with the additional of beacons, Nav aids, airways and ATC sectors within the USA, this is useful for monitoring the Caribbean area, sadly as with the NATS service, aircraft serials do not appear. A very useful feature is the 'Flight List Look Up', see Fig. 5, this allows the user to click on Aircraft Flight Number, Origin,

Fig. 5: Flight List Look Up.



Destination or aircraft Type, the list can then be sorted in alpha-numeric order by clicking on one of the title bars, or instance to sort in Destination order you must click on aircraft 'Dest'.

## Worthwhile Technology

I believe this is a superb product and is bound to be of tremendous interest to the serious h.f. monitor with an interest in aircraft. Obviously with both products linked together aircraft can effectively be monitored from both in and out of the UK to their eventual destination in the USA and vice versa.

Although there has been much criticism of the Internet from some quarters, there seems little doubt that technology that would have been unthinkable five years ago is now a reality, I feel sure that many readers would agree that such developments will only enhance the future of radio monitoring and the general radio listener!

**SWM**



# High Resolution Picture Telemetry

Lawrence Harris reviews the leading reception system from Timestep.

## Introduction

My neighbours stared in disbelief as I fitted the dish on the mount. I had not yet explained what it was all about because I had not seen either family for some while due to several days of rain. I make a point of keeping both sets of neighbours up-to-date with my current activities - this helps prevent any surprises that could leave them worried about the things that go on in my backyard. Maybe I should start at the beginning?

My yard has a 1.8m dish on a fixed mount, near the house, and discretely at low level. There is also a 1m dish, originally used for ASTRA (domestic satellite television); a 1.6m controlled dish is used for multi-satellite television.

The large dish monitors high resolution telemetry on 1694.5MHz from METEOSAT-7, known as Primary Data. METEOSAT-7 is in geostationary orbit, so this embarrassingly large dish does not have to track satellites across the sky.

On the roof is one of my a.p.t. antennas. Most readers will be familiar with the term 'a.p.t.' - the 'automatic picture transmission' format. These are low resolution images transmitted by the operational NOAA weather satellites (WXSATs). My telescope is also in the yard, but that is another story.

I have been monitoring low resolution (a.p.t.) signals from the NOAA WXSATs for about 15 years, and the thought of 'upgrading' to h.r.p.t. had simply not arisen, but during March 2000, it did. A brief discussion via E-mail and I ordered a system from Timestep of Cambridge.

Delivery came, following their receipt of a new batch of receivers. I have seen a basic description of an earlier version of Timestep's h.r.p.t. system in two publications, but my view was that neither was comprehensive, excluding topics such as tracking.

Here is my own review of their most recently released hardware, taking a detailed look at their complete system that monitors high resolution picture telemetry from the NOAA WXSATs. Some background information first!



**Fig. 1: METEOSAT PDUS dish near the house, telescope under cover, new tracking dish. The house is near due east and cuts off passes below 60° elevation!**

## NOAA Weather Pictures - Two Levels Of Resolution

There are currently three operational weather satellites: NOAA-12, NOAA-14 and NOAA-15 in orbit, some 850km above the earth, controlled by America's

National Oceanographic and Atmospheric Administration. **Figure 2** shows an illustration of these satellites.

As at mid-July, NOAA-15 has been experiencing severe problems and may leave operational status. The satellites carry a highly sophisticated package that includes a telescope pointing at the earth below. This telescope produces an image of the earth that is scanned and analysed - line-by-line.

The instrumentation produces a number of these image lines - each from different parts of the electromagnetic spectrum - ranging from visible-light to

thermal infra-red. During the daytime, visible-light images provide an easily recognisable picture of the earth below. At night, the thermal images are of greater use.

To see these images, transmitted from the satellites when they pass over your own horizon, you have to have suitable equipment. The image produced by the on-board system is simultaneously transmitted in two forms - low and high resolution.

The first form (a.p.t.) has a relatively low resolution in which each pixel (picture element) represents about 4km at ground level - the high resolution pixels



**Fig. 2: NOAA satellite.**



**Fig. 3: Close-up of rear of dish and support brackets.**

## CHRPT - China's Colour HRPT Satellite Data

*Fengyun-1C* is China's latest polar orbiting weather satellite, and not only carries a generally compatible h.r.p.t. system, but also provides more channels - ten including colour! More channels of data requires more signal bandwidth, so an extra module is required for

more, current drives usually include over 13GB space.

4) 32MB RAM. Most computers now come with about 128MB RAM.

5a) For USB usage, Microsoft *Windows-98 SE* (or *Windows 2000*).

5b) For internal card systems: one spare 16-bit ISA bus slot and *Windows 95, 98* or *2000*.

6) SVGA screen (1024 x 768 or bigger, and 256 or more colours).

For this review, I used my main computer: 128MB RAM, *Win-98SE* and 400MHz processor.

## Arrival

The system arrived in five boxes and unpacking took some time because it had been posted well protected. Units included in a complete system comprise the receiver, auto-track box, USB unit for NOAA and/or *FENGYUN-1C* reception, the dish and ground stand. I searched for some documentation and found the main manual, together with separate notes for the Yaesu controller and the modules.

There is a caution to be mentioned here. Before assembling anything, it is essential to study all the paperwork and notes. There were various documents on individual units, including two on the controller.

represent about 1.1km. The difference in resolution is matched by a difference in reception cost.

A complete system for reception of the low resolution images may cost from about £500 or more, depending on exactly which components you choose and your preferred method of decoding. My monthly column 'Info in Orbit' deals with these matters.

High resolution images naturally require a much higher bandwidth for their transmission. Whereas a.p.t. (NOAA low resolution images) operates in the 137MHz band (with the other WXSATS) and

reception. This was not available for this review.

## Your Computer - Minimum Specification

The satellite receiving system requires a computer to process the telemetry stream from the receiver. It does not require a dedicated computer to do this job - you can happily do some word processing during data acquisition - but surely you would want to watch the real-time data coming in? Your computer needs to meet, or preferably exceed, this specification:-

1) Pentium 100MHz or better. My slowest computer is a 120MHz system that is several years old, my (borrowed) laptop runs at 600MHz - there is

unlikely to be a problem unless you use an old machine.

2) A CD-ROM drive is required for the installation of the software. During the last five years, these drives have fallen from about £150 to around £30.

3) 200MB free hard disk drive space. Passes produce between 30 to 60MB data or

brackets (to the rear of the dish), I felt these were insufficient. The pictures in the hardware manual were not as informative as might be wanted by someone unfamiliar with such construction. Ultra close-ups can be ambiguous.

Two brackets must be fitted to the back of the dish, but they were too long for straight matching to either set of pre-drilled holes. I decided that the least strain would be imposed by using the four matching holes furthest apart on the dish.

The next problem was - outside or inside? The brackets are not symmetrical, so they could be fitted leaning in to the centre or out towards the rim. I chose the outside, and later found that this was wrong, so I had to re-assemble them. A sequence of pictures showing the layout of the brackets and their positioning on the boom is essential - see Fig. 3. The brackets need to be strained together to fit the through-bolts.

With the brackets in place (facing inside), another problem arose. The gap between the U-bolts was about 234mm. The corresponding gap on the Yaesu unit was also about 234mm, but each was of a different size, and there was no picture to show how they should be fitted.

It transpired that the brackets needed to be physically strained outwards, and then the U-bolts inserted. The holes for these were too close - requiring considerable strain to fit them - while simultaneously supporting the dish. Wifely help was essential! Not too surprisingly, this was the most difficult aspect of assembling the whole system. I think some documentation editing is needed, together with perhaps a minor change to the pre-drilled metalwork.

Overall, this was still considerably easier to construct than some of the products that I have put together over the years, using nationally known suppliers, whose idea of a construction manual is a sheet



**Fig. 4: Dish feed and pre-amp.**

**Fig. 5: Yaesu controller (rear view).**

**Fig. 6: Controller and receiver units.**



## Dish & Mount Construction

I decided to construct the ground-stand, and then fit the support brackets to the dish. Although there were general instructions for fitting these

occupies about 35kHz of bandwidth for 4km resolution, h.r.p.t. transmissions are made in the 1.7GHz (1700MHz) band, and, because several bands are transmitted together, requires about 3MHz bandwidth. That is why the equipment necessary for h.r.p.t. reception and decoding is considerably more complex.

of paper with a few diagrams, often showing missing parts! This job was finished in a few hours without tears!

My system included the ground stand mount, and this arrived with one nut and bolt missing. This was the fault of the original supplier - not Timestep. The metalwork was of good quality and well protected against the elements. The pictures (supplied) of its final appearance were good enough to complete construction without any problems.

Signals from the NOAA polar orbiters are right-circularly polarised. A number of feed designs can cater for this, and, after considerable experience and testing in the field, Timestep have chosen a helical feed. This is fitted to the supporting rods during dish bracket assembly.

Many demands are placed on the pre-amp. Timestep supply theirs with 35dB gain for less than 0.5dB noise figure. It has a built in ceramic microwave filter to reject interference. The supplied cable (CT100) has connectors that attach to the pre-amp and should then be sealed against the weather. The pre-amp fits the N-type connector on the helical feed. The cable can be fixed to the rods for neatness.

## Yaesu Controller

Although seemingly expensive, this is a remarkable piece of gear. In the early 1980s, I was part of a team controlling a giant dish located in Oxfordshire, used to collect high frequency signals from a number of satellites, including IRA5. The dish was controlled remotely, and we could point it anywhere, and have it driven automatically by computer. Now, just a few metres away from me, the new 0.9m dish is under full control of my own computer, from where I can also make it point anywhere - and track satellites! That is progress and it costs!

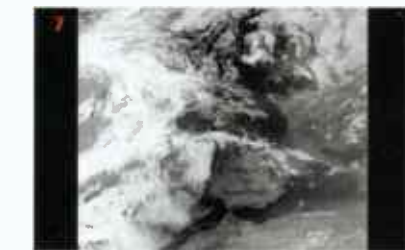


Fig. 7: Channel 1.

Fig. 8: Channel 2.

Fig. 9: Channel 3.

The rotator came in two parts, requiring a bracket (supplied) to be used to fit them together. There is a picture of the completed unit on the front cover of the manual, and a similar one inside.

Unfortunately, the units could not be fitted to match the picture.

The bracket is designed with a unique slot to fit over a raised portion on the lower (azimuth) unit. The picture showed the two units fitted at right angles - an impossible situation. What may have happened is that the motors were probably tested and left in an arbitrary position, not as implied in the manual. I decided to complete the fittings regardless of the picture.

The controller includes a unit used indoors by which the azimuth and elevation can be controlled either manually, or automatically by software. It arrived with both cables already fitted and plugged, although the instructions implied that this had yet to be done. My assumption is that Timestep did this before despatch, to ensure correct wiring and minimal chance for errors.

The software supplied by Timestep includes a tracking facility compatible with Yaesu 5400/5500/5600 rotators, and Emotator 700 and 800 units. It includes a calibration facility - see later - that drives the dish to clockwise and counter-clockwise extremes where meter zeroing can be done. The dish is also taken through elevation movements from -90° to +90°, and it was here that I first realised that the dish could move from horizon to horizon in elevation - even our 'Rutherford' dish mounting could not do that (at least at



that time, as far as I can recall!).

An incident happened during this test. I had apparently not tightened the Yaesu U-bolts enough. During the elevation



test, while driving downwards, the dish made a dramatic drop of several degrees, hitting the vertical pole. I hit the 'cancel' button to end the test.

On examining the set-up, I was relieved to see no damage done. Inspection showed that although apparently tight, the U-bolts were still able to allow the boom to rotate inside the housing. Care must be taken to ensure that the bolts are properly tightened against the boom. The hardware is robust!

## Connecting It All Together

The 'indoor' electronics comprise the receiver, the auto-controller and the h.r.p.t. USB unit. The latter takes the data stream from the receiver for signal processing by the computer. A set of pictures provides enough information to physically connect the units together. I would like to see a more detailed description of the function of the various parts - yes, I know the function of a

Fig. 10: Channel 4.

Fig. 11: Channel 5.

receiver - but even a brief description of the nature of the telemetry would help to put everything in perspective.

Unlike a television set, anyone purchasing an h.r.p.t. system is likely to have an interest in the background design features. Finally, the dongle. This plastic fitting is screwed to the parallel printer port to protect the software against illegal copying.

## Calibration

The dish can be driven to point in any direction, either under the control of the computer, or manually. For effective computer control -

and this is surely what you want - it is essential to run the



calibration sequence so that the computer knows exactly where the dish is pointing. The Autotrack program can do this. Selecting 'satellite', 'options', 'calibrate' puts the controller through a cycle of tests that allows you to ensure that tracking is correct.

After this process is complete, you can tell the computer to track the sun and - assuming the sun is in clear skies - its shadow should be clearly central within the dish. The software can be adjusted in real-time to compensate for small 'fixed' tracking errors.

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## ICOM IC-R2

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The IC-R2 is one of the smallest radios we have ever seen. But Palm size wide band size is not everything. Packed in this receivers small package are some pretty big features.

- 500kHz - 1310MHz
- AM/FM/WFM
- 400 memories for storing favourite channels plus 25 band edge memories for easy scanning between specified frequency

**PRICE MATCH**

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**Beacat**

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AIRBAND Base Scanner

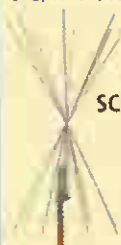


A stylish low profile base scanner with TWIN TURBO scan and search facility. Covers civil airband, marine, police, cellular plus more!

- 66 88, 108 174, 406 512, 806-956MHz
- 100 mems | Turbo Scan - 300 steps/sec

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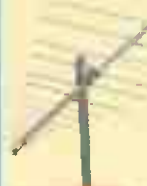
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- 200 memories
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- Data Skip facility
- 10 Priority Channels
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- Supplied complete with earphone, belt clip, charger and rubber duck antenna

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## UBC 120XL

Perfect for long distance reception of Aircraft, Public Services, Land Mobile and much more! OUTSTANDING VALUE FOR MONEY!

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- 100 memory channels
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- 10 Priority Channels
- Programmable Search
- Channel Lockout Key

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## UBC 9000XL



- 25 - 1300 MHz (with Gaps)
- 500 memory channels | VFO Control
- Selectable Attenuator | Selectable Delay
- Selectable Mode AM/FM/WFM
- TURBO SCAN 100 Ch/Sec
- TURBO SEARCH 300 St/Second
- Alpha Numeric Display
- Automatic Store | Frequency Transfer
- Auto Tape Record | Data Skip facility
- Programmable Search

NEVADA PRICE- £269

## UBC 60XL



A brand new low cost scanner that covers MARINE, POLICE, LAND MOBILE and more!

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- 30 memories
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- Channel Lockout
- Scan Delay

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Fully portable flexible wire scanning receiving antenna. Covering both VHF & UHF it's compatible with all scanning receivers. Compact & lightweight, simply suspend it with the cord supplied. Length: 1.5Mtrs 4M coax & fitted BNC.



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ICOM IC-F72	HF Receiver..... 399
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YAESU FRA-7700	Active antenna..... 49
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**YAESU FRG-100**  
**PRICE MATCH**

This receiver provides solid coverage from 50kHz to 30MHz with all mode reception of AM, SSB and CW. The set requires 12V DC.

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- Duplex RX capability
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**CHEQUE SPREAD**

**PORCHE P2000**

- FM Stereo
- AM/FM/WW 13 SW bands from 2.3MHz-26.1MHz
- 20 station presets
- Auto search
- Clock, alarm, sleep function, world times
- Supplied c/w leather cover & in-ear stereo headphones
- Mains or Battery (Optional AC adaptor)

Stylish radio designed by FA Porsche

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 COMPUTER RADIO SYSTEM

- 100kHz - 1300MHz
- ALL MODE RECEPTION
- Plus Lots More!

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PCR OPTION DSP UNIT UT 106 £82.00 £2.75 p&p

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- 166 - 88MHz 108 - 170MHz 300 - 470MHz 806 - 1000MHz
- Modes AM/NFM
- Steps: 5, 6.25, 10, 12.5, 25kHz
- memories: 200
- Band memories: 10
- Priority channels: 10
- Scan/Search speed: 30/s sec
- C/W Antenna Earpiece, Carrying Strap and built-in Desk Stand

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**NEW!**

- LW/MW/FM/SSW
- 45 presets
- SSB reception
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- Clock/alarm functions
- AC adaptor

PLL Digital World Band Radio

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**CHEQUE SPREAD**

**SONY SW30**  
 Fully digital world band shortwave FM, MW & LW portable radio

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**£39.95**

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 DIGITAL SATELLITE RADIO

Receive over 40 channels of fade free digital programs direct from satellite to this radio from almost anywhere in the world!

Hitachi radio features:

- WorldSpace satellite plus FM/MW/SSW
- Portable, battery powered with AC adaptor
- Stereo headphone socket
- Stereo line out connectors for integration with your stereo or home theatre system
- Built-in easy to aim antenna
- Decryption and narrowcast capability
- Program selection by language and category
- 10 presets and last station memory
- Clock display/timer function
- 1-line 8 character LC display
- Port for easy attachment to the WorldSpace PC card to enjoy multimedia services
- Easy to set up and operate

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**CHEQUE SPREAD**

**ALINCO DJ-X10**  
 Wideband scanning receiver

- Receives 100kHz - 2000MHz
- Multi Mode Reception
- 1200 Memory Channels
- Channel Scope spectrum analyser
- Channel Scope Peak Search
- Advanced scanning features
- User Friendly features
- A super sensitive receiver
- Dual VFOs
- Facilities for cloning another set

**NEVADA PRICE £299**

**CHEQUE SPREAD**

**AOR AR 3000A**  
 100kHz - 2036MHz

Classic receiver as used by Government, Military etc

**PRICE MATCH**

AR 3000A+ £899

**NEVADA PRICE £744**

**CHEQUE SPREAD**

**AOR AR 5000**  
**PRICE MATCH**

All made top class receiver & scanner packed with features

AR 5000+3 £1799

**NEVADA PRICE £1,544 CALL**

**CHEQUE SPREAD**

**WORLDSPACE**  
 DIGITAL SATELLITE RADIO

Receive over 40 channels of fade free digital programs direct from satellite to this radio from almost anywhere in the world!

Hitachi radio features:

- WorldSpace satellite plus FM/MW/SSW
- Portable, battery powered with AC adaptor
- Stereo headphone socket
- Stereo line out connectors for integration with your stereo or home theatre system
- Built-in easy to aim antenna
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**NEVADA PRICE £99**

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- Channel Scope spectrum analyser
- Channel Scope Peak Search
- Advanced scanning features
- User Friendly features
- A super sensitive receiver
- Dual VFOs
- Facilities for cloning another set

**NEVADA PRICE £299**

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**ITS EASY TO PAY - Pay by three post dated cheques!**

- Simply divide the price into 3 equal payments. (ON ANY ITEM OVER £100)
- Write 3 cheques dated in consecutive months starting with today's date.
- Write your telephone No, cheque card No & expiry date on the back of each cheque.
- Post them to us, enclosing your name & address & we will (subject to status) send your goods immediately.

World Radio History



**Fig. 12: Pre-set 1 using channels 1, 2 and 4 producing 'real' colour.**



**Fig. 13: Pre-set 2 using channels 3 (inverted), 2 and 4.**



**Fig. 14: Pre-set 3 using channels 3 (inverted), 2 and 1.**

**Fig. 15: Pre-set 4 using channels 3 (3A), 2 and 1 producing a NOAA-15 'false' daylight colour.**



## First Reception Test

After the tracking has been set up correctly, the equipment is ready for h.r.p.t. reception. Unless you wish to hand-point the dish and aim semi-randomly for a satellite,

itself immediately upon connecting to the pre-amp. The manual describes the process of adjusting the 'gain', but the meter resolutely refused to move from -10dB. After discussing this via E-mail with Timestep, a new receiver was despatched, so - a little later than originally anticipated - I was ready to receive my first image.

**Table 1**

Satellite	(MHz)
NOAA-12	1698.0
NOAA-15	1702.5
NOAA-14	1707.0



**Fig. 16: Tracking program.**

you will want to leave the tracking to the controller. After you have tested it on the sun, you are ready!

When I reached this stage, there was a problem with the receiver that manifested

The main manual lists the numerous settings that must be made for proper reception. The frequency must be selected for the satellite that you propose to monitor - see **Table 1**.

For my first pass, I used the separate auto-track program for controlling the dish, and started the main program for reception. While watching the dish move upwards from the horizon, I did not notice the 'data lock' light come on, but suddenly the picture was forming on the screen, it was channel 2 - the default setting.

My first response was to enhance the contrast, but this brought the program to a halt. The problem turned out to be the wrong selection of an option while receiving data via the USB port. Timestep confirmed that the selection of 'unpacked' data should not be made when using the USB unit.

After monitoring several passes, on one occasion I forgot to change the frequency from NOAA-14 to NOAA-12, so I did not see data for several minutes into the pass - when I finally realised. This type of incident is easily avoided by using the 'automatic schedule' facility that does channel changing for you! Apart from that incident, image reception has proved problem-free.

## Software Facilities

The software provided comprises the *Autotrack* program and the main reception program. Once calibration has been completed, the most effective way for all tracking purposes is to use the h.r.p.t.-reception program

under automatic control. This ensures that data from all passes are correctly labelled, and the correct frequency selected.

Setting the software for automatic reception is simple. First check that the computer's clock is accurately set, preferably to within about two seconds. I have a Rugby clock that I use for the accurate timing of the measurements of asteroid positions, this cost about £15 and is extremely useful.

A simple program can be used with an Internet connection to check the time from a variety of international time standards, and I use this for routine checks - comparing the result with the Rugby clock. The latest Kepler elements can be downloaded from any of several sources. I use the Orbital Information Group site, from which daily elements can be obtained - though this is not essential. Visit OIG at <http://oig1.gsfc.nasa.gov/scripts/>

The main (reception) program does it all, so a comprehensive look at its facilities is useful. In its raw form, the options are 'File', 'Receive', 'Update', 'View' and 'Help'. Menu options change dynamically as the program is used. 'File' allows the opening of image and configuration files, tracking windows, and options such as 'display' variables.

'Receive' includes options for both 'automatic' and 'manual receive'. There is a scheduler that allows satellite pass selection by virtue of either satellite 'priority' or maximum



**Fig. 17: North Africa - close-up.**

'elevation'. Satellites can be selected for data collection, or omitted. You will probably find that your local horizon dictates your preferences, and these can be saved as a 'configuration' file for future use. Such files allow you to have most of your favourite settings - such as window positions - pre-programmed.

'Autotrack' allows the setting of parameters such as 'com' port and dish parking requirements. Once these are defined, you are unlikely to go back there again. 'Update' is for various options including Kepler elements and additions to the satellite database, as well as GPS reception. 'View' and 'Help' are for display options and assistance.

## Common Operations

The most frequently used functions will be image opening/processing and scheduling. Every pass received by the system results in a file being saved - without the need for an explicit 'save'. If the process was performed manually (that is, manual selection of frequency and collection of data), then the file is labelled 'new.hrp'. Automatic reception is by far the better option.

Under automatic control, passes are labelled with the satellite name as well as the AOS time. Selecting 'file', 'open' leads to a menu offering the various file-types, opening a previously recorded pass (type \*.hrp) brings up additional main menu options, including channel selection and image processing options. Channels 1 through 5 can be selected, causing the window display to change.

## One Pass - Five Channels: NOAA-12 1713UTC 18 July 2000

The images Fig. 7 through to Fig. 11 show the same pass as seen in each of the five NOAA h.r.p.t. spectral views. The same scene has been sensed in

regions of the spectrum between 0.58 and 12.5µm (micrometres) - these regions radiate different amounts of energy and distinguish different features. Each of these images has been slightly contrast enhanced for clarity. NOAA provides a description of the expected usage of each channel - see info panel.

## NOAA-12 Channel Detail

### Channel 1: 0.58 to 0.68µm

A visible-light band for general cloud and land surface resolution, giving good land detail in summer.

### Channel 2: 0.725 to 1.10µm

Good visible-light band even in winter; biased to the red end (that emphasises surface water).

### Channel 3A and 3B:

**3A is 1.57 to 1.64µm - 3B is 3.55 to 3.93**

Channel 3A shows good ice and cloud discrimination, and good land detail; channel 3B shows thermal data for sea surface, cloud and land detail.

NOAA-15 and successors have channel 3B (the same as channel 3 on the older satellites). In sunlight, channel 3A is transmitted; in darkness channel 3B is transmitted.

### Channel 4: 10.5 to 11.5µm

Infra-red channel showing rivers, sea surface and cloud mapping due to thermal differences.

### Channel 5: 11.5 to 12.5µm

Similar to channel 4; good for sea surface mapping.

## Spectral Channel Combinations

There is no colour sensor, but a consideration of the positioning of the channels in relation to the colour spectrum, means that by selecting certain channel combinations and interpreting these as representing specific colours (red - 1, green - 2 and blue - 4), some useful interpretations can be made.

Fig. 18: Denmark - close-up.

Fig. 19: Britain - close-up.

Fig. 20: Looking north-west.

Fig. 21: View to south.

The software comes with pre-set - but totally adjustable - selection options.

Figures 12 - 15 show the results obtained using the same NOAA-12 pass shown in Figures 7 to 11.

There is an additional pre-



set channel combination (6, 5 and 3) for processing of SeaWiFs images. Your preferred multi-spectral combination can be stored and retrieved at will. You can even set it for real-time reception - and this is a knockout! Do remember though, that if you are showing this feature to people having little knowledge of this topic, do explain that it is a software feature and not an actual view from the satellite.

## More Features

Familiarity with the software is essential to get full value from your system. The use of accurate Kepler elements - apart from being an essential tracking aid -

permits the addition of grid lines and/or country outlines. With an image loaded, the option 'grid' is added to the upper menu.

The relevant element file can be loaded, and the option to 'calculate grid' and/or 'country outlines' can be selected. These are unlikely to match perfectly, but the facility to make adjustments to their exact position is impressive and enables the position of cloud systems over land to be identified. If they are wildly out, you may have chosen the wrong satellite elements - (I confess!).

Image processing can be done in real-time, or before image files are exported for

## Costs

Dish, metalwork and helical feed: £233.83

P-HEMPT pre-amp and connector: £199

20m cable: £18

Yaesu R5500 rotator: £549

Autotrack computer/dish controller: £293.75

20m rotator cable: £99 (ordered with unit)

6-channel C/HRPT receiver: £762.58

HRPT USB interface/software £499.38

Complete system: **£2,699.00**

These prices were correct at the time of writing; please contact Timestep for the latest prices.

**Timestep,**  
PO Box 2001,  
Newmarket CB8 8XB

Tel: (01440) 820040

FAX: (01440) 820281

E-mail:  
sales@time-step.com



**Fig. 22: Dish and proud owner.**

further manipulation. Selecting colour provides several options such as 'brightness' and 'contrast adjustment' where these parameters are changed 'live' - that is, the results of changes are displayed 'on the fly'.

A graph of spectral intensity appears when the 'contrast' button is selected. For multi-spectral use, the graph offers both individual and combined adjustment. The 'autolimits' option is very effective, adjusting higher and lower limit points automatically.

Temperature information can be extracted from thermal images by selecting 'image info' from 'view'. The 'temperature slice' option on the 'window' menu produces an adjustable temperature profile in colour.

The contents of a window can be exported as a BMP image by selecting 'window, save contents'. Complete images can be saved using 'file', 'export'. Files can also be exported using the h.r.p.t. Level 1B format - a format used by researchers.

## Tracking Program - Track II

This is a slightly modified version of Timestep's well-known tracking program. It shows the positions of the sun and up to five satellites. For my purposes, I have the three NOAA satellites running.

If you have facilities to receive FENGYUN-1C, then this can be added. The program can be updated with current Kepler elements either via the Internet or from a file on your drive (probably downloaded from the 'net). In addition to the usual items (including current azimuth and elevation), the maximum elevation of the next pass is shown - see Fig. 17.

Details for future passes can be obtained instantly using the 'table' option, when the map is the active window. Remember that the displayed menu options always relate to the currently selected window; this avoids a constant large number of menu options.



**Fig. 23: Side view of the dish.**

## Selected Images

During the course of several weeks running the system, I collected gigabytes of data and had to regularly delete several large files in order to prevent the computer's hard drive from becoming full. Features invisible on a.p.t. images became dramatic spectacles in h.r.p.t. The following image sections include some interesting regions: Fig. 17: North Africa - close-up; Fig. 18: Denmark - close-up and Fig. 19: Britain - close-up.

My thanks to **John Worsley**, my neighbour who kindly took and produced the pictures of the tracking system and hardware.

## Final Thoughts

No matter what h.r.p.t. system you might buy, the original data is the same. The questions needing answering therefore include: How good is the software? Does it provide all the necessary facilities? Is the supplier responsive to queries?

In Britain, there is only one supplier of h.r.p.t. equipment for the home user: Timestep. Of two other companies in this field, one does not supply the amateur market and the other is not based in Britain. These were my personal reasons for looking at the Timestep product.

I am still a little puzzled about one aspect of Timestep's h.r.p.t. system. Just a few years ago, the prospect of acquiring a system that could receive NOAA high resolution picture telemetry (h.r.p.t.) was only possible for those with enormous financial resources, or a tremendous expertise in electronics.

Agreed - modern electronic devices can now do that which was almost impossible a few years ago, but to be able to buy an entire tracking and data reception system for a total cost of two thousand pounds plus seems little short of remarkable. I seriously wonder whether the system is under-priced? If Timestep can survive on the income flow from sales of this product, then perhaps we can expect new products from them in the future. I hope this is the case.

**SWM**



# scanning scene

**Inside:**  
• Scanning  
with Dave Roberts  
• Simple & Cheap  
Scanning Antenna



■ **DAVE ROBERTS** c/o SWM EDITORIAL OFFICES, BROADSTONE

■ **E-MAIL:** scanning@pwpublishing.ltd.uk

# Scanning Scene

Is it me or have the manufacturers and marketers of radio equipment in general and scanners in particular become rather boring with their advertising material? I remember the advert for the early Bearcat receiver (was it a 220?) that had a fine colour picture of skyscrapers in a city and the slogan, 'Listen in to a million lives tonight'. Do you remember that? That fired my interest in the hobby.

The advert for the Standard 8800 mobile 2m radio which featured a Japanese car, a Toyota coupe of some sort, driving across an empty desert and the legend was something like, 'Never out of touch'. What's happened to imaginative advertising from those who build and sell radio equipment?

Now all we seem to get are lists and lists of the model numbers of sets and little in the way of inspiring graphic work. The best that I have seen lately, apart from a few photographs of products, is the Alinco advert that has a picture of a healthy looking pair of folk in their open top Jeep. If we could see their faces, I expect that they would look very smug indeed, because they live, no doubt, in the United States, where scanning is seen as part of the whole communications scene and some police departments have decided against audio encryption or digital communications because people would not be able to listen to the police work that they are doing. This is all seen as part of open government there.

Not so, as we know in the UK, where the scanning hobbyist is looked upon as some sort of closet criminal waiting an opportunity to acquire ill gotten gains from the insider knowledge obtained from his radio that PC 1944 has just gone back to the nick for his breakfast. Partly to confuse such naughty monitoring folk and partly to make it more easy for police staff to understand what their colleagues were on about, the police and other services have been using codes for some time.

These codes have been issued and implemented by the different police forces and ambulance/fire services and have usually been different. Firstly there was the ten code (or rather there were many ten codes). I know those of you who had CB radios used these codes sometimes. This all started in America where police and all services used ten codes extensively for years, and many still do.

## Many Versions

There were as many versions of American ten codes as there are Americans and I have most of them

on file. For the UK police and emergency services it was necessary to have our own different sets of ten codes...all for ourselves. Logically each code would start with 10-1 which often meant that an officer was on patrol and would run through differing numbers which clearly would indicate a different message.

10-7 usually meant that the message was unreadable and the officer or operator should transmit again. 10-3 usually indicated that the officer was required to attend a specific location and so on. 10-10 was the 'off duty' status. Some forces then brought in computer command and control systems and this generally required all the staff to learn new codes so that they could be entered straight into the computer. So all change again!

Anyhow, no doubt after a working party and a lot of free lunches and heavy expense claims there has been a new basic code structure established to be used by all Home Office police forces. No doubt other forces will adopt the scheme as well, since it has been long overdue.

So should you be stood near a police officer and overhear his radio chattering at him, these are the new basic codes that have been adopted. Remember where you read them first!

Code	Explanation
00	Urgent assistance required
01	On duty
02	Available/resume patrol
03	Available/Office stand by
04	Refreshments
05	En route to incident
06	At scene/ Dealing with incident
07	Committed but deployable
08	Unavailable/ Not deployable
09	Prisoner escort
10	At court
11	Off duty
12	Confidential message

There will be other more local codes remaining in use for many years, but this is a sensible basis from which police forces can work so that should officers have to work with their colleagues in other police force areas then some of the confusion can be eliminated. The main reason for these codes is not to confuse the casual listener, but to standardise communications throughout the UK and a good idea it is too.

Remember it is not legal to listen to the police radio systems and they will be cross if they find out that you are, but should you be near an officer and hear this kind of

transmission, then you will know that it is legitimate and you won't think that they have just transmitted the lotto results over their system. In any case, with forces headed the TETRA way, standing near a police officer is the only way you are going to hear their radio talk anyhow...unless you join the police that is.

## Your Letters

A letter from **John** came in with an interesting press cutting attached to his letter regarding the police in the Forest of Dean going down the TETRA route...he also sent a very fetching picture of a strippagram girly in police uniform. Thanks John.

I have had an interesting letter from **Dave Robson** in Kent. Dave has returned to the scanning hobby after an absence of five years due to childbirth (not him - his wife - you know what I mean) and he has purchased an AOR AR8000 receiver. Now shrewd old Dave had left the selection of antennas on the roof, even though he was radioless, and on the 5th November when he plugged the '8000 into one of them (the discone I imagine) he found himself listening to New York taxi companies. He could hear the dispatchers and the responses from the cabs as they picked up jobs.

Dave monitored between 30 and 31MHz and heard several different companies. Yes Dave, that's what they were. If you continue to scan through the low v.h.f. segment, say from 30 to 45MHz, and if conditions are right, you will not only hear cabs, but also police forces, fire and paramedic units and service companies. They are all there.

As SWM has something like a six week lead time on articles it is hard to predict just when you are going to hear anything, but for the latter part of November and early December these signals have been there. It does make interesting scanning.

I have recently seen an enquiry on an Internet newsgroup from a chap enquiring whether a Bearcat UBC 9000XLT (sounds like a Swedish car)

radio is any good. **Yes, yes, yes.** A simple to operate radio with a good frequency coverage that will pick up anything that the casual hobbyist who scans for general interest will

want to hear. That radio will receive those frequencies that Dave has been listening to and with a good sized memory bank he will be able to pop them in a memory location for recall when the band is lively again. I do not have a '9000XLT, but I wish that I did.

## Hand-Helds

I have received a letter from a regular correspondent in Swansea who read a previous column that I wrote regarding using amateur v.h.f./u.h.f. equipment and is looking for a dual-band hand-held amateur set for scanning. These can be cheaper than dedicated scanners and provided that they can be easily reprogrammed into wideband mode can be a most useful acquisition. This is particularly the case if you have an amateur licence of course.

I have two old hand-held radios of this type. They are both old Standard C520 sets and they can even be programmed to receive the PMR-446 frequencies as near as dammit. I was able to reply by 'phone with a selection of reprogrammable radios which may be of interest to him.

Quite a number of people seem to be going down the POCSAG path that I described in December SWM. A correspondent in London has

made the purchase and is very impressed. He swiftly got it running in conjunction with his Yaesu FRG-9600...well that is an excellent receiver for a start, and he also is hearing pager traffic in London on 138.075MHz. So far he has not been able to get it running from the audio output of

his AOR AR2002 and AR3000. I think that you may have to tap the discriminator output on these rigs I'm afraid. The man has a AR3000...lucky feller.

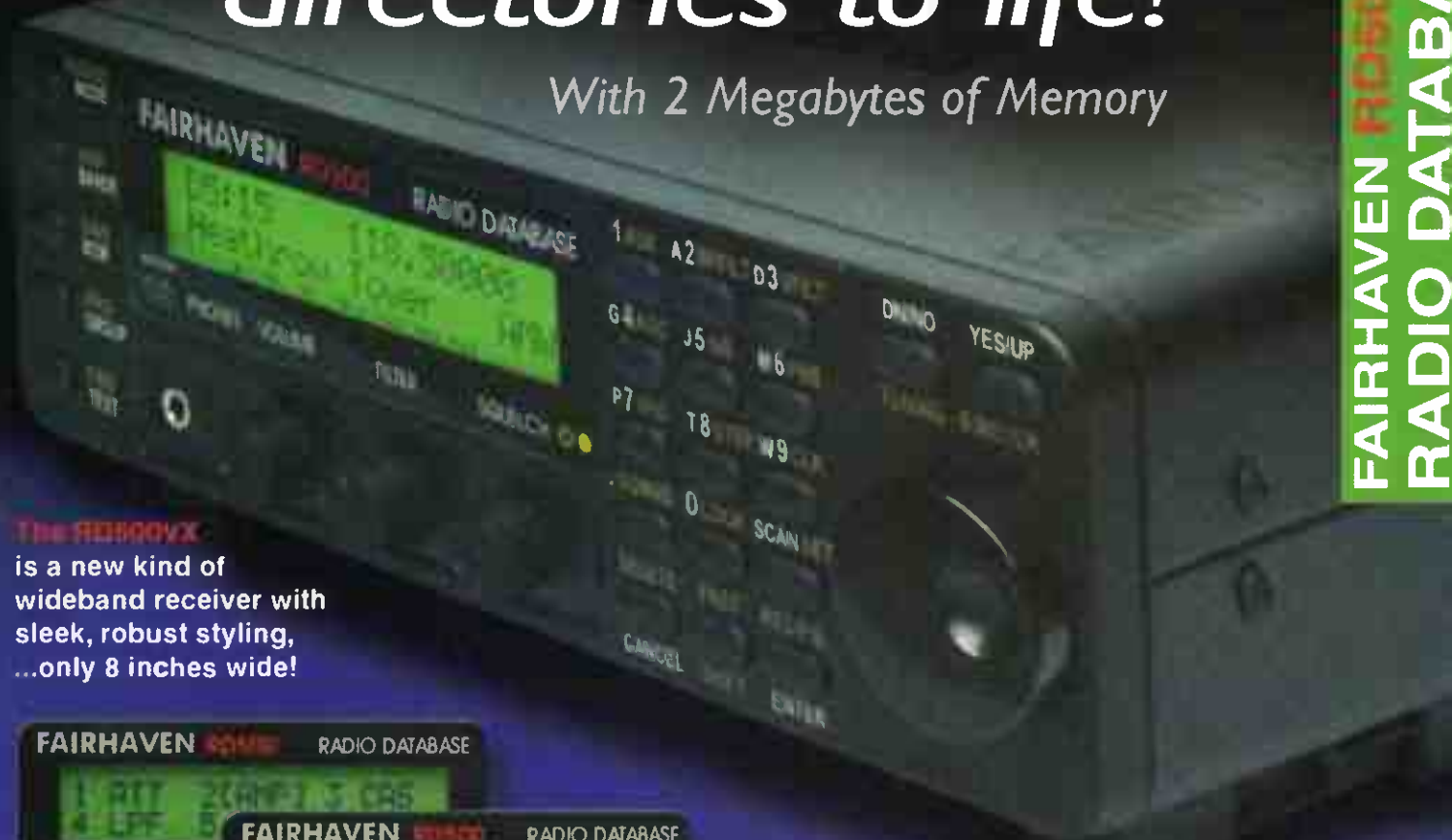
## Three Winners

Finally (roll those drums please) the three winners of the Perivisell Demodulators for POCSAG, and incidentally JVFAX, HAMCOMM, RadioRaft DL4SAW and SKYSPY as well...are: **Andrew Shepherd** (Nairn), **Stephen Barnes** (Newtownabbey), and **J. Morrison** (Glasgow). These folks are going to find the software and demodulator units most useful I can tell you.

'Til next month then...

# ...bring your scanning directories to life!

With 2 Megabytes of Memory



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## The **RE3000X**

is a new kind of wideband receiver with sleek, robust styling, ...only 8 inches wide!



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...No more thumbing through scanning directories, and no PC needed!

The **RE3000** gives wideband coverage with auto memory, skip list, priority channel, pause/hold, AFC, world time clock, and S-meter, and its HF performance is complemented with pass band shift, notch and peak filter, noise blanker, and smooth 5Hz tuning steps.

Modes include USB/LSB, AM, sync AM, stereo CW, NBFM/WBFM and stereo FM, with TV sound and video output as standard.

We include Windows software to make it easy to gather information from document scanners, the Internet and other sources. The **RE3000X** can be linked to your PC to backup or download information, and a database is loaded into the receiver before shipping.

It also has a built in digital sound recorder and editor so a news flash or rare DX can be recorded. Up to 4 minutes of sound can be permanently stored!

## Specifications:

Sensitivity (10dB S/N) HF SSB 0.2uV. IP3 +10dBm.  
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ARA 60

Technical performance

Frequency range: 30-60MHz (full performance), 60-120MHz  
2.3dB loss  
Output impedance: 50-75 ohm coaxial  
Connector to Rx: PL type delivered as standard. Other standards can be fitted on request  
Gain: 10dB +/-0.2dB  
Intercept Point: +50dBm IP 3rd order (10MHz/12V)  
DC power supply: 11.5-13 volt DC at 80mA typ. (230V/12V DC stabilised mains adaptor is supplied with the antenna)  
Max diameter: 30-60mm can be fitted  
Dimensions: 115cm total length. Antenna tube 50mm x 160mm  
Ideal for base stations

£169

ARA 2000

Technical performance

Frequency range: 2000MHz  
Output impedance: 50-75 ohms coaxial  
Gain: 13dB 1000MHz, 18dB 1400MHz, 18dB 2000MHz  
Noise figure: 1.5-2dB 1000MHz, 1.8-2.5dB 1500MHz, 2.5-4dB 2000MHz  
3rd order IP: +35dB typical  
Output impedance: 50-75 ohms coaxial  
Connector standards: N type connector at the antenna. BNC male connector to the receiver  
Power supply: 12V DC at 160mA DC Power supply for 230V AC is delivered comes with the antenna  
Dimensions: Length 450mm, Diameter 90mm, 2kg  
Mains wall plug adaptor (230V A/12V DC). Interface unit (remote supply unit), 12m coaxial cable and mast mounting clamps

£169

This outstanding range is ideal for use with all base station receivers, the ICR-8500, AR-5000, PCR-1000, NRD-545, FRG-100 & more! Beautifully constructed and designed in Germany - we are pleased to be appointed for this range of products.

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# The JRC NRD 545 Deluxe Receiver

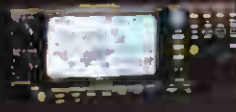
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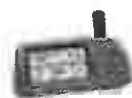
As a World Wide radio it can receive digital broadcasts via 2 satellites oriented towards Africa, The Middle East and Asia. A third Satellite will be launched in 2001 covering South America and the Caribbean.

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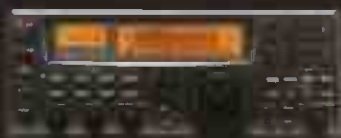
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# A Simple & Cheap Scanner Antenna - buy or build?

Buy or build? Paul Unwin shows his way of a conversion from a domestic set top TV antenna into a wide-band scanning antenna, with a minimum of workshop tools and facilities.

**T**his article came about as a result of a need, rather than an intentional attempt at a design. After some 30 years involved in electronics, I find I would rather build than buy a commercial product. The truth is that a home-built item is not only substantially cheaper, but is often far better than its commercial counterpart. Thus, when I decided to put my old desktop scanner back into use, I found a definite need for some sort of small pre-amplified indoor antenna to compensate for my location and the now defuncted telescopic antenna adorning my scanner.

## Active Antennas

Pursuing the pages of *SWM* showed a goodly selection of active antennas designed



Fig. 1: The unit as sold.

especially for scanner use. Nothing wrong with them - other than the prices - some of which are quite shocking!

Over the next few nights I spent quite a lot of time going back over some old issues of *SWM* looking to see if anyone had previously published any articles on the design and

construction of active scanner antenna systems. Then, by chance, I saw an article, or rather a few column inches that Jerry Glenwright had penned in his 'ShackWare' column. Jerry referred to a small active device specifically sold for use as a portable (l.c.d.) TV antenna.

This jogged my memory as just a few days earlier I had been shopping with my good lady when I had noticed a TV accessory stand in a large supermarket. Our next shopping trip had me make a beeline for this stand and I was

rewarded as right there in the middle of the display was what I was looking for - a small self-contained set top antenna that covered from 40-870MHz.

Now, I must warn any possible buyer, there were two models for sale, only one includes the pre-amplifier, so you must ensure that you get the correct type (see end

notes). If you look at Fig. 1 you will see the unit as sold. It is neat and tidy and has its own internal power supply. All of this, plus a comment from the XYL that it was acceptable enough to live in the lounge made me feel like I was onto a winner.

## The Internals

In fact, it gets even better. Take a look at Fig. 2 - this shows the internals of the antenna. Getting the unit stripped down into this condition required only the removal of four screws. As can be plainly seen, the whole assembly consists of three main parts - the battery holder, a small p.c.b. for the pre-amp and the antenna element itself.

A close up of the actual antenna element can be seen in Fig. 3. This is what we must remove and replace, the original element was constructed with a section of foil stuck to a card base. At this point, I should mention that as this unit was originally intended for use with UK TV,

Fig. 2: The original internals of the antenna.

Fig. 3: A close up of the antenna pre-amp.



# Based on the Maxview Contour Plus

# Scanning Scene



**Fig. 4: One of the prototype replacement elements.**

and hence the polarisation can be either horizontal or vertical and that the element has been constructed with this in mind.

For our use, however, we are mainly looking at vertical polarisation and as such we can optimise the replacement element for vertical use. A look at **Fig. 4** shows one of my prototype replacement elements. It was etched on thin card, like p.c.b. I started by removing the original element and using this as a basic template to ensure that the new element was the correct size and had the locating holes in the right places.

As my particular interest lay in the upper regions of the u.h.f. region, I formed the new elements on the p.c.b. with a Dalo etch resist pen, the sizes of the elements were not calculated for any specific frequency, rather they were put together in a log periodic fashion so as to get the best wideband coverage.

## To Suit You

Experimentation is the rule of the day here and should be

fashioned to best suit the individual needs. Once you are happy with your prospective design, etch away the surplus copper to produce your new element.

There may be those individuals who do not wish to go to the lengths of etching a new element, and so I offer another possible method of producing the element.

Purchase a piece of 'plastic card' that's the stuff like cardboard but made of plastic, its available from most artists shops. Ensure that it's a bit bigger than the original

element, cut away the surplus card using the original element as a guide.

Once this has been done, borrow some baking foil from the kitchen, cut a sheet to size so it directly fits over the plastic card. You now carefully draw onto the foil the design of your elements using a felt pen or the like, then simply cut away the surplus foil. The foil element can then be glued onto the card.

A problem arose here as to how to attach the coaxial feed from the pre-amp to the foil. In the end I resorted to using small rivets similar to the type used in belts and other clothing. In use, this little antenna has proved to be great fun and I have spent many happy hours testing it in conjunction with my little old and well battered PRO-57 scanner.

Some directivity has been noticed, and I put this down to the construction of the elements having something like the effects of a small log periodic. However, this minor drawback can sometimes be used to advantage in nulling out co-channel interference. This, plus the fact that it falls into the realms of acceptable decor with my good lady has meant that I can now use the set-up in the lounge to monitor various channels whilst doing other things.

of 'plastic card' that's the stuff like cardboard but made of plastic, its available from most artists shops. Ensure that it's a bit bigger than the original

**Fig. 5: The rear view of the assembled unit.**



## The Cost

At a purchase price of £14.95 for the original unit, I cannot in all fairness compare it directly to a commercial outdoor active scanner antenna that can cost well over £100, however, it does put a smug grin on my face and a warm feeling in my wallet!

The original unit is a Maxview Contour Plus - available from ASDA, Makro, B&Q and other outlets. Note: since purchasing this antenna, I have discovered that Maxview makes another similar unit, designed for f.m. reception, and I believe it also includes a pre-amp, however, it is slightly larger in size. This bigger casing could possibly be used to enable a constructor to produce a larger replacement element and thereby further improve the reception of the lower v.h.f. frequency ranges, i.e. airband, etc. Whatever model you purchase, ensure its the unit that includes a pre-amp.

**SWM**

PRI AUT  
 PR10 NFM  
 MKR 145.0000  
 144M HAMBAND  
 S\_ \_ \_ \_ \_

ADJ  
 2UFO NFM 14.0k  
 U-A 145.2100  
 U-B 76.1000  
 S\_ \_ \_ \_ \_

DUP AUT  
 2UFO NFM 20.0k  
 U-A 439.9000  
 U-B 88.0000

AFC AUT  
 2UFO NFM 20.0k  
 U-A 1295.0000  
 U-B 88.0000

COPY 232C  
 LOAD  TRUE  
 ALL-DATA  
 Next

AUT  
 SCAN-GROUP 1  
 ABCDEFGHIJ  
 abcdefghij  
 BANK LINK

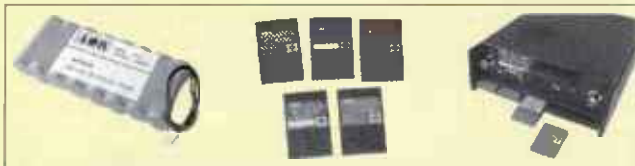
AUT  
 2UFO AM 25.0k  
 U-A 123.5000  
 M-WRITE E25  
 PROTECT OFF

HL  
 80.000 ↔ 10M  
 MKR 80.000

AUT  
 EDIT MEM-CH  
 MEM LSB 0.05k  
 029 14.200  
 BANK/CH SEL



\*High sensitivity design



(\*high sensitivity) design with a first rate switched attenuator and preselection around VHF to ensure the highest levels of adjacent channel rejection with software spuri cancellation. In addition to a hinged telescopic whip aerial, the AR8600 is supplied with a detachable plug in medium wave bar aerial which locates on the rear chassis of the receiver for localised medium wave monitoring. An additional BNC socket is mounted on the rear chassis so that 10.7MHz i.f. output may be extracted for use with external spectrum display and vector analyser units such as the AOR SDU5500. The TCXO ensures high stability with minimal internal spuri and is usually only seen in top of the range (more expensive) models such as the AR5000 and AR7030.

The chassis is manufactured from two metal compartments, effectively a metal chassis inside a metal cabinet... this provides excellent screening characteristics and great robustness highlighting its multi application role. The front panel is also manufactured from die-cast aluminium. Size is 155(W) x 57(H) x 195(D) excl. projections, weight less than 2kg.

The all important 8.33 kHz airband channel step is correctly implemented. Computer control is available via a standard 9-pin RS232 D-type connector on the rear chassis, just a standard RS232 cable is required for connection to a PC, the extensive RS232 command list is printed in the operating manual. In addition, 'optional internal SLOT CARDS' (which fit into the rear chassis of the AR8600) extend the capabilities even further, five cards may be fitted with two operational simultaneously. Supplied with: Swivel base telescopic whip aerial, MW bar, comprehensive illustrated operating manual with RS232 listing, a.c. power supply.

# NEW AR8600

MOBILE - BASE - TRANS-PORTABLE

The AR8600 is an extremely versatile all mode receiver (530kHz - 2040MHz) which can be used virtually anywhere, mobile, base or trans-portable... powered from an external 12V d.c. power supply, optional d.c. lead from a 12V vehicle or from an optional internally fitted NiCad battery pack. A strong twin metal case with die cast front panel characterises the multi-purpose role. All mode receive capability is provided including Single Side Band with programmable tuning steps down to a resolution of 50Hz with the frequency established by a highly accurate Temperature Compensated Crystal Oscillator (TCXO). An RS232 port further extends the capabilities with free supporting control software available from the AOR web sites.

Although many microprocessor features have been adopted from the trendsetting AR8200 Series-2 hand portable receiver, the AR8600 RF front-end is an all new

# AR8200 SERIES-2

NEVER BEFORE HAS ONE HAND PORTABLE OFFERED SO MUCH



The AR8200 represented a beacon when first released, technology marches forward with the NEW AR8200 SERIES-2 keeping the innovative concept and forward thinking alive and bright. It has not been easy improving on what many thought to be the ultimate, however the NEW AR8200 SERIES-2 does provide even more with nothing taken away.

A Temperature Compensated Crystal Oscillator (TCXO) now forms the heart of the AR8200 SERIES-2, this ensures high stability with minimal internal spuri. Performance too has seen the AOR R&D team fine tuning the design for best sensitivity and strong signal handling over the extremely wide coverage of 530kHz to 2040MHz (all mode receive without gaps). The aerial has also been replaced by a telescopic whip on a swivel base, this ensures the best results, a medium wave bar aerial is also provided as standard. The design team have certainly been taking account of customers wishes, the keyboard ZERO key has been swapped in position with the DECIMAL to match the telephone layout, LCD illumination has been increased (for improved visibility) and following requests for longer operation between charges, the 4 x AA size NiCads have been increased in capacity, again reflecting improvements in modern technology. The obvious change has been left for last... the cabinet colour has been changed from green to black!

The list of features is vast, tuning step sizes are programmable in all modes down to 50Hz with comprehensive step adjust and correctly implemented 8.33kHz for the new VHF airband spacing. Connection to a computer is possible with the optional CC8200 lead/interface with free PC software available from the AOR web site. Unique optional slot cards further enhance features (CTCSS, tone eliminator, record / playback, external memories, voice inversion).





★★★★☆ **AR5000+3** awarded four stars by both the authoritative **Passport To World Band Radio** and **World Radio & TV Handbook**

#### AR5000

True base receivers are few and far between, some have simply evolved from the hand held equivalents with little tangible improvement in performance or facilities over their smaller counterparts - *the AR5000 is not like this!* High performance, top quality build and true wide coverage all mode receive. The "+3" version offers even more with synchronous AM, AFC and Noise Blanker. Popular with government agencies throughout the world.

#### AR5000c

When making critical measurements, the frequency coherence is very important whether a single or multiple unit is employed. This involves the use of a single reference for all oscillators employed throughout the receiver. The AR5000C now provides this commercially required capability. The "C" version may be provided to order in either the standard AR5000 format or with two of the +3 additions of AFC and NB. If you are a commercial operator with this application in mind, please request the separate specification leaflet for the AR5000C.

#### AR5000+3 - Sync AM, AFC, NB

The "+3" version offers even more with synchronous AM (upper side band, lower side band and double side band with excellent lock range), AFC (Automatic Frequency Control for accurately tracking moving transmissions or unusual band plans) and Noise Blanker.

#### Passport to World Band Radio'99.

*"Front-end selectivity, image rejection, IF rejection, weak-signal sensitivity, AGC threshold and frequency stability all superior".  
"Unlike virtually every other receiver we have tested over the past 21 years, the frequency readout is unfailingly accurate to the nearest Hertz. This should make the AR5000+3 of exceptional interest to broadcast engineers".*

#### World Radio TV Handbook'99.

*Speaking of the AR5000+3 in conclusion... "Compared with the ICOM ICR-8500 it offers considerably more features, better strong-signal handling, wider coverage and decidedly superior filters".*

#### AR5000+3

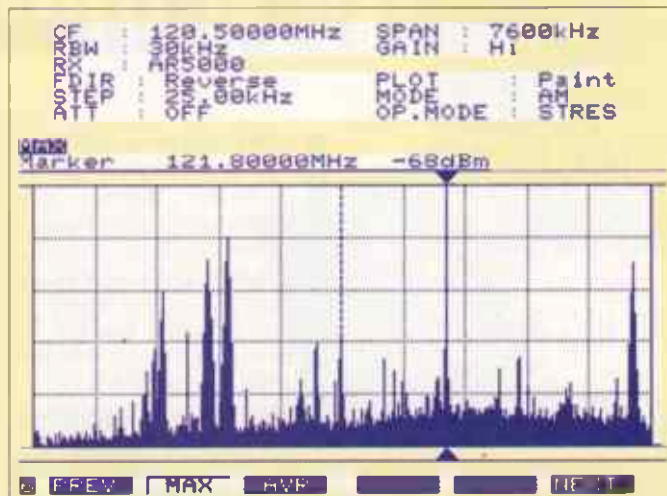
- ✓ Wide frequency coverage 10 kHz - 2600 MHz
- ✓ All mode reception: USB, LSB, CW, AM, Synchronous AM, NFM, WFM with automode tuning (any mode and bandwidth on any frequency is possible)
- ✓ Automatic Frequency Control
- ✓ Noise blanker
- ✓ High stability TCXO reference, 1 Hz NCO tuning
- ✓ 1,000 memories, 10 memory banks, 20 search banks, 5 VFOs (all twice!), alpha tag, EEPROM chip storage
- ✓ Multiple IF bandwidth 3 kHz, 6 kHz, 15 kHz, 30 kHz, 110 kHz, 220 kHz with an option position for 500 Hz CW. (30 kHz is ideal for WEFAX).
- ✓ High sensitivity and excellent strong signal handling assisted by a preselected front end from 500 kHz - 1 GHz
- ✓ Extensive RS232 control list
- ✓ SDU ready with IF output for spectrum display unit

**FOR FURTHER DETAILS, PLEASE VISIT YOUR DEALER,  
CALL FOR A LEAFLET OR VISIT THE AOR UK WEB SITE AT  
[www.aoruk.com](http://www.aoruk.com)**

#### Setting new standards, **SDU5500** Spectrum Display Unit

The SDU5500 is an 'all new' Spectrum Display Unit and a worthy successor to the SDU5000 (which offered practical and cost effective monitoring). Coupled to the AR5000 receiver, it provides a spectrum display of 10 MHz bandwidth anywhere between 10 kHz and 2600 MHz.

Already pressed into commercial usage by the government, the professionalism of the unit has truly been grasped. The SDU5500 has a high resolution monochrome (white/blue) LCD with improved status read-out on the top-half of the display with a spin wheel tuner controlling the marker position, similar to a dedicated high-priced spectrum analyser.



The SDU5500 supports a number of AOR and ICOM receivers. **Free internet download software** for the PC Windows operating system is available from our UK web site.



*As reviewed in the December '99 edition of Short Wave Magazine*

#### ARD-2 - ACARS & NAVTEX DECODER

If you think that data reception of aircraft ACARS and marine NAVTEX is only for experienced professional commercial

operators, the ARD-2 may cause you to think again. This decoder & display unit has been designed with both the newcomer and experienced "go anywhere and everywhere" operators in mind.



The ARD-2 provides portable operation from internal batteries or external 12V d.c. without the need for a computer. The built-in LCD provides two lines of text with up to 32 characters of text per line and a scroll back buffer of 512 characters. **Free software** is available from the AOR UK web site.

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# some thoughts on Station Identification Techniques - 1

There are all sorts of ways to log and identify short wave stations. In Part 1 of this feature, Michael L. Ford touches on some points which should make the whole process of intercepting and identifying weak stations easier.

It cannot be denied that there are many fascinating aspects to the hobby of short wave listening. Whatever your interests are in h.f. communications, whether it is simply listening to foreign countries through to Aero and Meteo stations, through to hunting down and identifying obscure clandestine or numbers stations, there is something in the short wave hobby for almost everybody.

If you're a broadcast band listener or DXer, one of the most fundamental objectives in your facet of the hobby is the identification and logging of short wave stations. Over the years - more years than I care to recall - I have found all sorts of ways to do exactly this and the following text is intended to introduce and explain some of the techniques I use.

Some of the methods, as you will see, are capable of identifying a station entirely by themselves while others, which are a little more tenuous, require some supporting data. When the techniques used in identification have been explained, I will touch on some general points which will make the whole process of intercepting and identifying weak stations easier.

## Two Groups

Essentially, all the methods involved can be divided into two broad groups. The second group, which we will look at later, I call the 'circumstantial evidence' methods because they are not capable of unambiguously identifying a station on their own. This comes about because there is not enough data available, for a variety of reasons, to totally rule out other possibilities, however remote they may appear. There are ways around

this and I'll come onto this group of methods later.

The first group of methods I call the 'Proof Positive' methods because these are capable, of themselves, of proving a station's identity unambiguously and without any requirement for further information or supporting evidence. We will look at these methods now.

## The Verbal Announcement

If you think back and consider how your interest in short wave radio got started, it was probably something like this - tuning around on an old receiver, probably just for something to do initially, you would wander up and down the bands until you found a

station speaking your native language or perhaps a programme of interesting music. Upon hearing this, you would stop and listen to see what it was all about.

Eventually the station would say who they were and, almost without knowing it, you have made your first identification. With interest now aroused, and never realising that the short wave bug was biting ever harder, you would move on to find another interesting station to listen to. Again you would listen to them until they identify themselves.

Pretty soon you would come to the conclusion that unknown short wave stations were always identified this way. Without doubt this appears to be the simplest way of identifying a short wave station and is probably the one that most beginners start with - I know, it was the way I started.

So, based on your experience to date, all it seems you need to do is listen to a station until an identification is heard. The station can then be logged. It sounds simple, and essentially it is simple, but like all simple things in life, it has its problems.

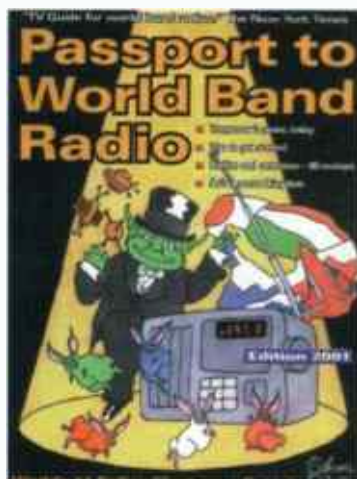
The principal problem, and the one that puts many listeners off using this method, is that it may be a long time until an identification is heard, possibly up to an hour if one has just been missed, or several hours if a programme of non-stop music is being aired. This is not so bad if the station is airing a programme of interesting music or commentary, but if a monotonous dialogue in a foreign tongue is being broadcast, it can get a bit boring.

It is also useful, though not always possible, to know when an ID might be forthcoming, i.e. on the hour and half hour, etc. With many of the international broadcasters an ID is often preceded by a musical break or general preamble. Listen for this and await the ID.

Additional difficulties arise with clandestine and tropical band stations. Looking at each of these in turn, we see that the remit of stations broadcasting in the tropical bands is different from that of the international broadcasters. The remit of tropical banders is essentially to entertain the local populous and relay messages and items of local news.

In fact, the only reason these guys are on short wave at all is because this is the only medium they have available which provides the geographical coverage they want at reasonable transmitter power (medium power f.m. stations are now starting to take over from short wave). As a result, tropical band broadcasters are really only interested in transmitting to the local populous and they don't particularly care who else is listening.

Since these stations are not interested in broadcasting to an international audience, they don't always use their official identification or full station name.



Very often these stations will only quote their slogan, state the name of their town or region, or play a particular sound byte.

The local populous, who are familiar with the stations in their area, will know from this who they are listening to. Good station profiles, which will be found in the better club journals, will include all these details - more about this later.

Clandestine stations, as might be expected, are a different issue altogether. These stations are also not interested in transmitting to an international audience, but for different reasons. Their target is usually a country with an unacceptable (from their point of view) political regime or even just a particular political faction in a particular country.

However, they do generally identify themselves with their official identification, the problem being, unless you are fluent in Kurdish or Persian or whatever, you won't recognise it as the identification when it comes. The way out of this is to acquaint yourself with what to listen for beforehand. Phonetic spellings of this type of ID will also be contained in a good station profile.

As you get deeper into the hobby of short wave listening, you will probably join a club or two and there find sections dedicated to particular facets of the hobby. Typically there will be sections containing listeners loggings, sections containing new schedules and others containing, perhaps, news on utility stations or clandestines, etc.

As you read through these sections it is likely that you will see particular stations you want to receive and log. If it's a good club, the station profile will contain all the information you need to receive, identify and log the station.

Although the language used by the station may not be English, a good profile will point out certain words, phrases, bars of music and the identification, with phonetic spelling, all of which, when heard, will unambiguously identify the station. This is, as above, a situation where familiarisation

with the expected ID will definitely reap rewards.

It might seem at first sight that this method has more problems than virtues. This may be so, but when all the criticisms are in, if you listen for long enough, this method will usually deliver the goods.

## The Interval Signal

The interval signal dates back to the earliest days of radio. It originates from a time so long ago, in fact, when radios were called wirelesses. your position in the h.f. spectrum was measured in wavelengths and your grandfather - or perhaps great grandfather - would take the accumulators (i.e. secondary cells like small car

batteries) which powered the set to the local garage to get them re-charged.

In these early days digital frequency readouts were undreamt of and frequency - sorry wavelength - readout was

done with a pointer which moved over a tuning scale as the tuning knob was turned. This scale would have been coarsely calibrated in wavelengths and principal station names.

As you can probably imagine,

setting the receiver on frequency and awaiting the start of a programme was impossible - the whole system was simply not accurate enough to allow you to do that. In order to get around the basic inaccuracy of the receiving sets, each station would transmit a marker tone for 20-30 minutes before the start of the programme. What the listener was required to do was tune around where the station was expected to be until the tone was received.

When your set was tuned onto the marker tone you knew you were on frequency and could await the start of the programme. As things progressed and more stations appeared, the tone gave way to a slogan or musical jingle which, in the fullness of time, would become synonymous with a particular station. The final refinement appeared when stations began playing their particular tune between items in the schedule for listeners who joined the transmission part way through the programme.

The approach using interval signals is generally as per 'The Verbal Announcement' - just keep listening until an interval signal comes along. The problems are also generally the same with a couple more thrown in. These are, first, the need to have a repertoire of interval signals to refer to and, second, certain types of stations (tropical banders and clandestines again) don't use interval signals at all.

As far as I am concerned this is not a particularly useful method because I cannot remember many interval signals. If I'm honest - which I generally am - I can only claim successful identification with this method for R. Moscow (as was), VoA, BBC and R. Australia.

The interval signal is a poignant thing though.

Many is the time I remember sitting in the shack, late on a windy winter's night, listening to a Russian voice from half way round the planet on a weak and fluttery channel, give way on the hour to the five descending tones of the Kremlin bells.

## Combing Through The Schedules

This method is definitely one for the masochists! As a general and sweeping statement, short wave stations exist for one principal reason only, which is to pass on information of one sort or another to their target audience. Therefore, for an international broadcaster, programme content might range from items of a cultural nature and items of national news aimed at expatriates living abroad, to programmes of general interest aimed at listeners in foreign countries, to political rhetoric and diatribe in the case of clandestine stations.

Whatever message the station is trying to get across, it will have a target audience who want to hear its broadcasts. Therefore the station must have a schedule,

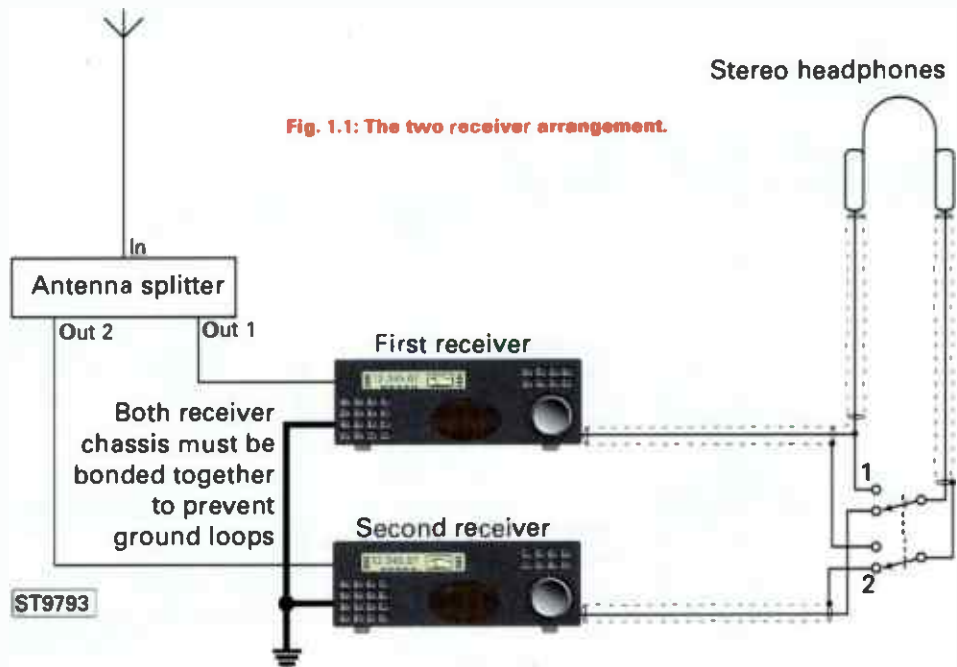
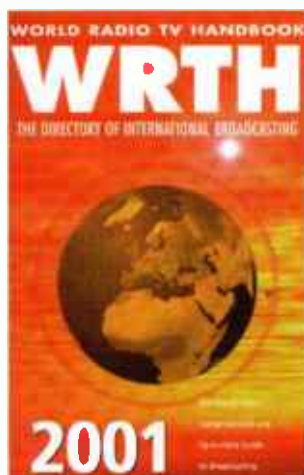


Fig. 1.1: The two receiver arrangement.



## some thoughts on Station Identification Techniques

however rudimentary, and it will make every possible effort to ensure that the target audience knows what this schedule is.

This is where publications such as *World Radio & Television Handbook* and *Passport To World Band Radio* enter the picture. These organisations obtain by various means all the schedules they can get hold of and publish a list - albeit not an over accurate list in some cases - of the stations transmitting on a particular frequency at particular times in particular languages.

These listings, it will be seen, are the basic raw material of this technique. Both *WRTH* and *Passport*' plus other similar publications can be obtained from the *SWM* Book Store.

The technique with this approach is to reduce the number of candidate stations to as few as possible by determining the language in use, the frequency of the transmission and time at which the transmission was observed. Armed with this information, what you, the listener, are then required to do is search through all your available schedules until a match is found (i.e. the language, time and frequency observed fit an available schedule). As you can imagine, wading through this is the king of tedium.

The obvious problem with this method is that it will only work if the programme in question is currently listed in a schedule somewhere and you have a copy of that schedule. This means that all the really interesting and often short lived stations (i.e. those of short duration set up in response to some disaster or political event, etc.) cannot be identified by this method simply because they have not been around long enough to find their way into the likes of *WRTH* or *Passport*.

Also, for the same reason, recent changes to an established station's schedule, i.e. less than one month typically, are unlikely to be identified by this method. It is, of course, necessary to identify the station to know which schedule to add it to so one can use the schedule for identification (catch 22 did I hear somebody say).

This is clearly a situation where accurate, timely information is worth a king's ransom. Very often

the short lived stations and recent schedule changes referred to above will appear in the journals of the more internationally biased (in terms of membership) short wave clubs within a month or two of the station's instigation. An added bonus is that these journals often carry details of transmitter tests, etc. often allowing a station to be heard and logged before it even begins official operation.

In addition to the various club journals, I have also found the Internet to be a rich picking ground for this sort of information. In fact, the Internet is particularly good because the medium is so fast that new station information and schedule changes get disseminated in almost real time. A further advantage of the Internet is that most of the medium to large international broadcasters have web pages which contain their latest schedule plus a host of interesting information about the country in question.

So, when all's said and done, depending on the information you have access to, this method will work well on stations which have established schedules which have remained steady for a long time and stations which have changed or come into being in the past couple of months.

### Parallel Frequency Operation

When the time comes for a station's frequency manager to determine the frequency schedule for the coming year, his paramount objective will be, of course, to get the signal through to the chosen target area. In attacking this objective he will consider such things as predicted propagation conditions, position in the sunspot cycle, band occupancy, etc. in the year ahead.

Unfortunately, as all readers of *SWM* will know, propagation conditions can deteriorate unexpectedly at short notice and this, as the frequency manager will know, could prevent reception of his station in the target area. If the

broadcaster is one of the big players, i.e. BBC, VoA et al, one of the key methods he will use to maximise the probability of the signal getting through is to transmit the same programme on several parallel frequencies.

In addition, if a new programme is added to an established schedule, it is frequently transmitted in parallel to an existing service. This pluralism of transmission is very convenient because it provides a powerful tool in the identification armoury.

In fact, for me, it is probably the most powerful and versatile method of station identification. Not only is it good for identifying who a station is, it also provides useful guidance for other attributes too, such as the start and stop times, language in use, target area, etc.

With this method, the technique is to again reduce the number of candidate stations to as few as possible by determining the language in use, the frequency of the transmission and time. Then, with the aid of existing schedules, find another frequency carrying the same programme.

Since the second frequency will have come from a known good source, and both programmes are seen to be the same, the unknown station is identified. At first sight it might seem as if this method is as tedious as its predecessor. In reality its not because the frequency used and time of broadcast will significantly reduce the candidate stations to a few at most. Determination of the language - not always possible it's true - will reduce them even further.

There is a snag though (there had to be one didn't there!). The problem stems from the time it takes to re-tune a single receiver to the parallel frequency via the tuning knob. This takes so long that by the time the parallel frequency is tuned in, programme information may well have changed sufficiently to cast doubt on whether a parallel broadcast is in fact being heard.

In order to use this approach

effectively, it is essential to have some means of either being able to jump instantly between frequencies or being able to hear both transmissions simultaneously. Therefore a receiver capable of keypad operation, or with memories or at least with dual v.c.o.s, is required.

An alternative, and much better approach, is the use of two, preferably matched, receivers - lottery winners one pace forward! This is the way the professional monitors do it.

Both receivers would be driven off the same antenna via an antenna splitter and the headphones connected to the receivers through an interface switch to allow both 'phones to be driven off one receiver or one 'phone driven off each. **Figure 1.1** shows the overall arrangement.

For normal bandscanning and general mooching around, the switch would be set so that both 'phones are fed off one receiver - the main receiver. When the time comes to test for parallel frequencies, the switch would be thrown so as to connect one 'phone to the other receiver. The tuning on the main receiver would then be left as set and the tuning of the second receiver adjusted to all the frequencies it was required to test.

Initially, hearing a different signal in each ear is a bit disconcerting, but you'll soon get used to it. When a parallel transmission is found and the same programme is coming out of both 'phones, believe me, it jumps out at you like a rabid dog.

When searching for a known parallel frequency, the best place to start is with transmissions airing at the same time as the unidentified signal. If the language is known you can go straight to that language section, if not you will have to sift through them all.

If this fails to turn up the parallel frequency, test the previous and succeeding time slots in the same way. With this approach the search moves outwards until the match, if there is one, is found.

**See *SWM* next month for the concluding part.**

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# SSB Utilities

By the time that you read this, Christmas will be well past and we will be well into 2001. I hope that the festive season was good to you, and that you found something interesting to listen to. Just because it is Christmas, it does not mean that radio-signals suddenly stop. This is the time to start searching for new and different signals. Most of the major networks are much quieter than usual, so this will give you plenty of reasons to search around for something different.

## Hunter 02

First up this month is another letter from regular contributor **Richard Patterson** who writes with several questions regarding the signals he has been hearing in recent weeks.

Richard says that he has been getting good signals during the early morning (i.e. before 0700) on 8.971MHz from a US station using the callsign 'Bluestar'. Richard has done some research into this station and found entries in *Ferrell's Confidential Frequency List* and an old edition of the *USDoD Flight Information Handbook*. Both these sources indicate that 'Bluestar' is at NAS Roosevelt Roads in Puerto Rico in the Caribbean. Richard goes on to say that most of the callsigns heard on this frequency have American accents, but recently he has heard an English accent with the callsign 'Hunter 02' - naturally, Richard would like to know about this station.

I have seen reports of callsign 'Hunter 01' operating on this frequency, and the consensus of opinion is that these callsigns are British forces involved in drug interdiction patrols in the Caribbean Sea, in conjunction with the US Navy and predominantly the US Coast Guard. Whether Richard heard training flights of 'live missions' is very hard to say - it depends upon the kind of messages that were passed. After listening for several months you probably would be able to tell the difference between training and 'for real' because of the different messages passed, but sometimes you can get lucky and just 'chance upon' some interesting signals.

There are three possibilities (that I can think of) who 'Hunter 02' may be. The Royal Navy always has a Frigate operating in the region - this patrol is known as the 'West Indies Guard Ship' - and this would be the most likely asset to be involved in drug interdiction operations. Some of you may even remember a series of Royal Navy recruitment advertisements on TV which showed this kind of operation. Maybe 'Hunter 02' was a RN Frigate in the region?

It is also possible that a RN Lynx helicopter would participate in such operations. This could also be 'Hunter 02', but a helicopter would operate from a RN Frigate, and I would not expect to hear low-powered signals from a Lynx helicopter on this side of the Atlantic.

The final option is perhaps the most likely. Maybe a RAF Nimrod maritime patrol aircraft (or even two aircraft!) were operating from somewhere in the western Atlantic as part of a combined anti-drug force. It is quite common for the RAF to send Nimrod aircraft to this region for training. Could this have been 'Hunter 02'?

All the above options assume that it was involved in anti-drug operations, but it is equally feasible that it was nothing more ordinary than simple anti-submarine training flights with the US Navy in the region. Richard says that one morning 'Hunter 02' got a weather forecast for 'TJNR' (the ICAO designator for NAS Roosevelt Roads) which supports the theory that the

callsign was being used by an aircraft.

During October another callsign with an English accent was heard on the same frequency - 'Octopus 23' was heard, along with 'Eiffel 22' (with a French accent). Just to add weight to the theory that the aircraft with an English crew was a RAF Nimrod, there is a RAF Squadron (206 Squadron, I believe) which has an octopus as part of its badge. That's a bit of a tenuous link, but it's the best I can do.

## Architect

**Bill Semmens** from Cornwall has been listening to the RAF 'Architect' frequency of 11.247MHz and writes to comment upon something that he heard. A Virgin Airlines flight had a medical emergency aboard, and the doctor on the flight wanted to speak with a doctor on the ground. For some reason the flight made a phone-patch via the Architect network. Bill says that Architect made phone-patches for commercial aircraft, and he wonders why this didn't go through Stockholm Radio.

I have heard quite a few phone-patches via Architect, but they have always been from military aircraft or ships. I have never personally heard a civil flight and Bill's report is the first time that I have seen one reported. One possibility is that the flight was actually a Virgin aircraft operating on a military charter. The RAF regularly use civil airlines to transport personnel from one place to another. Many years ago there used to be a regular (perhaps weekly) flight to the Falkland Islands which was operated by British Airways.

Bill's letter lists the date and flight number involved, but I am going to keep those 'out of print' for various reasons. However, I was able to determine that the flight was a scheduled flight from Delhi to London-Heathrow, so it was obviously not a military contract flight. As an informed guess, I would say that the crew may have attempted to establish a phone-patch via one of the commercial h.f. networks (Stockholm or Berne perhaps) but found that they got the best reception condition using the Architect network. Virgin Atlantic have been providing a number of aircraft for troop flights in recent years, so maybe the crew decided to try that network when all else failed.

Bill also commented about the noise blanketing 5.680MHz at night, and asks about any jamming on this frequency. This very subject was covered several times earlier this year, with some very interesting comments and observations from various readers. Bill says that it is strange to hear African ATC on 11.300MHz, but to struggle to hear Kinloss on 5.680MHz.

Well Bill, that's one of the features of propagation - different frequencies are affected in different ways at different times. For all you know there may be an s.w.l. in Cairo cursing that he can't hear 11.300MHz, but 5.680MHz is end-stop on his meter. Bill asks that I mention some more frequencies each month, and even mention which ones I have been listening to, so as to provide some sort of guide for readers, so read on!

## Web Watch

J1ATFE -  
<http://www.jiatfe.org>  
 NAS Roosevelt Roads -  
<http://www.navstarr.navy.mil/>  
 Virgin Atlantic Airlines -  
<http://www.virgin-atlantic.com/>

## This Month

In response to Bill Semmens above, I thought that it would be worthwhile listing what I have been listening to during the past few weeks. This is not a complete log, just a few frequencies and notes about what I heard, and also where I may have failed!

I have been listening to the CCF (Combined Cadet Force) quite a bit during the past few weeks. They held a radio contest on the weekend of 2nd/3rd December, so I spent some time getting used to their style of communications. Most of the signals were on 5.343MHz, but during the contest all the CCF frequencies were active.

The USAF GHFS on 11.175MHz has been quite active with 'all the usual sort of flights'. On one Sunday there were a series of RAF flights to Puerto Rico who used the GHFS rather than 'Architect' for flight following. Information from other sources indicated that these flights should have been some of the new RAF C-130Js on their way to Puerto Rico, possibly having departed from the former Nimrod base at RAF St. Mawgan. Maybe there was some connection with the 'Hunter 02' flights in that area at about the same time.

I also found a NATO AWACS net setting-up on 5.7055 one morning, involving 'Magic 52' and several other stations using standard NATO tri-graph callsigns. Unfortunately, they all changed to another frequency, and I lost them.

Finally, I spent a morning listening to the French Air Force net on 6.712MHz, hoping to hear some new and different SELCAL codes. For a Saturday morning, it was surprisingly busy, with several 'COTAM' and 'JGD' flights around Europe. This was all prompted by a message on the Internet from somebody who had intercepted an AFTN message concerning a flight from Paris to Bulgaria and back. It seemed a good opportunity to listen for the flight, but I didn't expect to hear so many other French Air Force flights on a Saturday.



■ PETER BOND c/o EDITORIAL OFFICES, BROADSTONE

■ E-MAIL: milair@pwpublishing.ltd.uk

# MilAir

## USAF UK - Fairford

As soon as I made a comment about the future of Fairford last month and *SWM* then went to print, needless to say an official announcement was made shortly afterwards. Up until now the USAF have been operating the B-2 stealth Bombers direct from their base at Whiteman AFB in Missouri.

These global combat missions were up to 30 hours endurance, which without any doubt placed quite a strain on both man and machine and greatly reduced the effectiveness of the aircraft in terms of time over the target. It has been speculated for some time that the B-2s may be based abroad either permanently or in time of crisis and Fairford was an obvious choice with its 3000m runway and existing facilities.

The announcement at the end of November indicated that none of the bomber fleets, (B-2, B-1, B-52), would be based abroad, but would operate from selected forward operating locations known as contingency bases. Four locations were identified which were RAF Fairford, Anderson AFB on the Pacific island of Guam, Diego Garcia, (a UK controlled island in the Indian Ocean), plus a location in the Middle East which was not identified.

In their words the USAF are, "building up a capability to send aircraft in times of crisis to spots like Guam, from which they could rearm, refuel and be sustained by ground crews much closer to a potential combat zone". Whilst still being based at Whiteman the aircraft will deploy to whichever location is geographically most suitable, keeping them much closer to the target area, giving a quick strike capability and much reducing the need for in-flight refuelling. Incidentally, the unidentified Middle East location was described by the USAF spokesman as being looked at for "other capabilities" - read into that what you will! My interpretation of the statement is that the B-2 will not be deployed to this Middle East base.

Having named these four locations, it was also suggested that other European airfields may be used if necessary, (presumably, only for B-1s and B-52s). With the nuclear aspect of bombing missions now greatly reduced with almost all missions being flown with conventional weapons, this makes the deployment of US bombers overseas much more politically acceptable to many governments.

One of the main reasons that the B-2s operated directly from the USA, was that due to the special materials used in the construction of the aircraft, it is desirable for aircraft maintenance to be completed under climate controlled conditions in a purpose built hanger. Consequently, a number of variants of these 38m hangers are currently being evaluated, and if successful, it is presumed that one, or more, will be erected at Fairford.

In addition to the visits of B-1s and B-52s we are now likely to see B-2s, temporarily based in the UK in the future. These new hangers are capable of withstanding wind speeds of up to 110mph and the way the weather has been in the UK during the past few months they will probably need a bit more than 110!

The current \$100 million worth of work now taking place at Fairford will upgrade the runway and will allow a larger number of aircraft to operate

from there in future times of crisis. I am assuming that the construction of these special hangers will be incorporated into the current work, at present expected to be completed by the spring of 2001. This will hopefully seal the long term future for Fairford and will, in theory, greatly increase the possibilities for MilAir listening (my thanks to Stars & Stripes).



This month's photo is 800 Sqn Sea Harrier F/A.2 in the circuit at Yeovilton.

## USAF UK - Mildenhall

Word has reached me that plans are being drawn up for Mildenhall to also have some major reconstruction work. Starting in late 2001 or 2002 the work which will last up to three years will be split into three phases. (1) South of the runway, (2) North of the runway and then, (3) the airfield will be closed for the runway itself to be resurfaced.

Quite a number of the hardstands have already been widened and resurfaced, so much of the initial work will be resurfacing the taxiways from tarmac to concrete. Other major parts of the work include moving the Control Tower and the Fire Station. How long the airfield will be closed for is as yet unknown, but if memory serves me correctly, the last time it was resurfaced in 1988, it was closed for about five months.

## Sunday Fun

As a general observation, MilAir listening on Sunday mornings can be relatively quiet, so it was a pleasant surprise when the airwaves chirped into life two weeks ago. I was on route on the 56km journey to have Sunday lunch with friends in South Devon. With a little time in hand, I decided for part of the route to take the scenic coast road - I'm glad I did!

My hand-held was searching 225-400MHz, but I didn't really hold out a lot of hope of hearing anything. Then almost simultaneous I spotted a couple of military boats out in Lyme Bay and the radio stopped on a strong transmission on 369.1. A quick check soon confirmed my thoughts that this is the Royal Navy's primary Air to Deck common frequency.

A quick detour soon saw me parked up at Hopes Nose with a good view across both Lyme Bay and Start Bay. The two boats turned out to be HMS *Ocean* and RFA *Fort George*, who I have assumed were both on their way back from Sierra Leone. The *Fort George* can accommodate up to six Sea Kings and two soon arrived from and departed back to Yeovilton, (I missed the callsigns).

Unfortunately, I couldn't stay very long, but as I drove down the coast further pairs of helicopters called up including Navy 670/671 and Navy 630/637. One of the boats, (most likely *Fort George*), was using the callsign 'Papa One November'. It was only a brief visit, but it was nice to see some live deck landings.

Looking forward to the next issue of *Practical Wireless*? Take a look at what's on offer!

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# Satellite TV News

As I write these pearls of wisdom mid December, it's raining outside. It's been raining for weeks and more rain is forecast! Not 20 yards from this keyboard a tributary of the River Test is in flood with the fields locally now resembling an inland sea. Last week there were cows and chickens in the nearby field, this week replaced with ducks and swans swimming around.

The nearby footpath into town went to a 1m water depth in eight hours! So it was no surprise to see the Meridian Newbury satellite truck tonight, 11th December, feeding into Meridian Tonight a live OB insert with the reporter up to his knees in swirling floodwater outside the village pub in Shipton Bellinger.

The feed was carried via Intelsat 801 @ 31.5°W, 10.964GHz-V (digital parameters SR 5632; FEC 3/4) over the BT -TES-43 truck. With United Media - the former Meridian/Anglia owners - now sold out to Granda - it'll be interesting to see if the on-going SNG truck contracts are retained for their evening magazine programme inserts!

Less interesting perhaps now to UK folk is the election for the new US president dating back to November 8th last. At the time

of writing, the Florida recount farce is still ongoing. There have been countless news feeds back into Europe over the 'usual' Reuters/Globecast leases detailing each twist and turn of this melodrama.

Perhaps more interesting were the pictures arriving back into the 'States from North Vietnam when Bill Clinton visited Hanoi on November 16th. The most significant picture seen were the flags of the United States and North Vietnam gently moving in the Vietnamese winds, yet 30 years or so previously these two countries were at each others throats in a devastating war of human attrition.

Reuters via their 11.462GHz-V (5632+3/4) lease on NSS-K, 21.5°W, carried the arrival of Air Force-1 - the President's jet plane - the presidential cavalcade through the streets thronged with silent spectators and to the hotel where the entourage were B and B-ing the night. What was of particular interest relating to the video coverage however - at least for the arrival of the President - that once again the whole video coverage was captured from the rear tail car by the FBI/G Men surveillance camera.

As the cavalcade wound through the streets from the airport, the camera zoomed into the crowds, buildings and with background chat from the FBI men.

Approaching the hotel, one spoke to keep a look out for their on-site security guy (mentioned by name). This is the second time in recent weeks that FBI footage has somehow been transferred into Europe over the Reuters lease suggesting that this is a switching error.

A few years back pictures - no audio - from an unmanned surveillance aircraft transmitted back to the ground showing in tests how the machine visually zeroed into military targets together with video of the strange craft taking off from a desert airstrip were transmitted back into Europe, I suspect due to

another switching error. One of these unusual aircraft was shot down a few months later in the Balkans conflict, recognising the unusual shallow V shaped tail amongst the other wreckage in a Serbian propaganda news feed!

Of planes and things...Roy Carman (Dorking) logged an unusual PanAmSat-3 - 43°W - transmission some weeks back - running NTSC @ 12.634GHz-H (SR19875-FEC 7/8) - from 1800. A B52 NASA aircraft in flight with an attached small single engine aircraft with ESA markings and with operation control ex Houston. The B52 inner engines then trailed smoke as a visual ground/air id and at 1818 the ESA craft 'launched' with on-ESA cameras showing parachutes deploying about 20 seconds later with a single larger chute later.

At 6000 feet a.g.l. ski type landing gear deployed and ESA landed safely in the desert - a very hot desert since another ground camera showed ESA shimmering in a heat haze - this operation was similar to the Bell X15 launches years ago. And dramatic pictures were carried by NASA-TV out of Houston Mission Control early December, again over NSS-K, showing astronauts constructing the International Space Station from the sections brought up progressively by the various Shuttle missions.

The December 2nd/3rd/4th period took up the main solar panel section in the Endeavour's cargo hold, the crew floating around in space cranking up the section by Endeavour's crane, moved it into a 24-hour holding position to 'condition' same, and having bolted on the section to the space station, extended the panels which spread 76m tip to tip. The whole operation was carried out in camera, live, and with quite dramatic pictures.

At one point an astronaut queried the integrity of a bolt fixing, Houston responded by saying 'lift your head and we'll bring up the iris to look'. On the space helmet is a small camera controlled by Houston, tilting his head panned the camera up, widening the iris lifted the video gain and it then zoomed in to the bolt in discussion for distant observation controlled from back home in Texas, remarkable! Just some of the remarkable and unusual sightings over the Atlantic path!

But all has not been peaceful in the Arabic world. Conflict continues in the West Bank area and further South there has been terrorist activity in the Sudan. The JSC news group were uplinking the arrival of an (unknown to the writer) Arabic dignitary at Khartoum Airport, Sudan, on November 23rd. The feed was uplinked via C-Band Arabsat 2B capacity @ 4.081GHz-RHC analogue. Interesting to note the mob enthusiasm in the welcome of this visitor to the Sudan completely swamping the group, contrasting to the heavily controlled spectator viewing from a distance when Bill Clinton comes to town and FBI heavies posted everywhere with earpieces and unbuttoned coats!

In a more peaceful theme, Roy in Dorking watched a French news report via 'TF-1 London' carried over Intelsat 801 - 31.5°W, 11.007GHz-V, 5632+3/4 - showing a newly consecrated stained glass church window somewhere in London which depicts progress of the last millennium including a flush toilet! November and Eutelsat 2F3, 21°E and dramatic footage of the Army desperately sandbagging river banks to minimise flooding, a nearby sound post advises the York area - police are evacuating local folk - this a live feed into News at 10 o'clock - 11.039GHz-H, 5632+3/4.



Meridian TV live insert into the Newbury Meridian Tonight news magazine programme via Intelsat 801, the reporter is actually standing in 0.6 metres of water!



Air Force-1 and the president of N. Vietnam welcomes Bill Clinton.



History in the making - Stars and Stripes alongside the North Vietnamese flag at Hanoi.



End of the FBI feed back to the 'States is 'LID' an abbreviation for security? Pictures via NSS-K



The Shuttle's on-board crane looking towards the tail of Endeavour.



News report from Khartoum airport via Arabsat 30.5°E in C-Band.



The RTV-21 channel from Pristina transmitted from Eutelsat 2F3 @ 21.5°E.



Test pattern from the SNG uplink van concerning discovery of the Enigma machine, via Intelsat 801.



The Globecast digital channel leases on NSS-K often ratay PGA goN.

Anelogue is still active, PanAmSat's *PAS 1R* satellite replacing the now ageing *PAS 1* at 45°W was launched night of November 16th and successfully popped into orbit. The whole launch sequence was carried from the Kourou, French Guinea Arianespace rocket launch site courtesy of the resident TV crew and carried live via the *Astra 19.2°E* Bayerischer Rundfunk downlink in their nightly *Space Night* programme.

It seems that all launches ex Kourou are now featured as part of the live content in this programme. Both Bayern TV analogue transponders carry *Space Night* type programming, but with different content after midnight UTC and its worth checking out for both live launches and classic film/video of launches, lunar landing, etc. on 11.141GHz-H and 11.686GHz-V (Bayern-Alpha) with audio 7.027.20MHz. Essential viewing for space anoraks!

Several interesting captions were seen over the period - on *Arabsat 2B*, 30.5°E with an analogue programme and background captions 'TIXMAAL'. Content suggested perhaps coloured contestants in a village quiz from the Transvaal, but it eventually identified as Radio Television Djibouti - 4.077GHz - RHC. An unknown facility company ident inlaid over colour bars was 'NNN PARIS' seen on the 11th December via 801 on the BT Paris digital lease, carrier suddenly cut with viewers none the wiser. And via *NSS K* the Belgium Sait-Videohouse facility company were uplinking the 'INS - Instant News Service' caption ex Brussels - 11.558GHz-V, 5632+3/4, only the caption on colour bars and no news pictures were ever seen!

The 801 - 11.007GHz-V digital frequency slot is obviously a popular one since November 17th carried via 'SUI GA 001' from the 'Jorg Kachelmann Production AG' group a very detailed regional ski report covering South Germany, Switzerland and Austria - no sound but the graphics were sufficient to extract all the required ski-ing info.

There's a new Balkans programme channel uplinking late evenings out of Pristina called 'KTV/RTV-21' airing in clear analogue via *Eutelsat 2F3* @ 11.578GHz - vertical with audio 6.50MHz. This is a tricky satellite to capture being close to the *Astra 19°E* 'hot spot' requiring accurate dish setting on 2F3 to minimise adjacent slot signal spread - at least with my 1.2m prime focus.

The channel is quoted at closing around midnight, but I noted their close down around 2305. The programme content played heavily on the problems of the local population living post-conflict in less than ideal conditions and generally I found it pretty depressing to watch - (info from Stefan Hagendorn's newsletter).

Mid November and the tragedy of the funicular ski railway in Austria, several news feeds were carried over this period - mainly of the rescue operation - and of several press conferences. One ORF sourced press conference on the 13th and carried over *NSS-K* showed the press becoming very aggressive towards the investigating gendamerie.

However, by the 14th, emotions had simmered down as seen via *Kopernikus DFS 3* when the investigators spoke to a more receptive press though there were still calls to serve criminal charges against the owners of the railway - this carried via the Telemobil DSNG-2 truck, 12.638GHz-H, 6111+3/4. This feed was also carried over *NSS-K* as was the previous *NSS-K* feed. Further reports were also carried on the 15th and sighted on *Eutelsat W2* @ 16°E though this dealt with the rescuers' support backup such as on-site catering, logistic operations with helicopters, control vehicles, etc. @ 12.558GHz-H.

And Cyril Willis (Kings Lynn) has reported signs of life at the 45°E slot where *Europe\*star-1* has recently slotted and has been testing intermittently in analogue on several frequencies. Further up at 47.5°E *Europe\*star B* has also been on test, again analogue, but in Ku-Telecom band.

## Orbital News

The Luxembourg based RTL group are combining their various technical departments across Europe as RTL proceeds to make itself a pan-European media entity. RTL now have interests in Germany with the Cologne Broadcasting Centre, Pearsons - London; Video Comms. France - Paris.

The Inmarsat organisation are launching a 144Kbit/s mobile broadband service in Spring 2002 via the *Thuyaya* satellite system. This will provide Internet/packet data services which should prove useful for the expanding e-commerce user group.

Check out the 5°W orbital slot from April 2002 when the *Stellat* satellite should hit the air waves. This a joint-venture between the expanding *Europe\*star* group and France Telecom. *Stellat* will offer both C Band and Ku band servicing from 10 and 35 transponders in each band respectively and footprint across Europe, North Africa, Middle East and into the Eastern Americas.

The World Radio Network (WRN) have a digital international radio programme service downlinking from the *Hot Bird* slot @ 13°E which offers up to 40 different radio channels daily from the 12.597GHz-vert @ SR 27500+FEC 3/4. Entitled 'Euromax', the programming is also available from *Astra 19°E* analogue - 11.538GHz-V on the 7.38MHz subcarrier and *Astra 28°E* digital on ch.937. During the day many international broadcasters are heard such as Israel Radio, ABC Australia, CBC Canada, Sweden and China. The *Hot Bird* coverage is all Europe and the Middle East, programming uplinked over French Globecast facilities.

Intelsat is now planning to increase satellite capacity to enhance Internet traffic with the deployment of high capacity multibeam satellites from year 2004 onwards. The broadband access, when available, will offer cost effective 2-way communication for data comms, networking and 'other services under development'.

*Eutelsat* have signed an agreement with the Italian CNIT (a university based telecomms group) to exploit Ka-band (18-20GHz) capacity on the *Italsat F2* craft (13.2°E) for 2 way educational and distance learning traffic until *Hot Bird 6* arrives in slot Spring 2002.

The 28.5°E slot has been active with both the *Kopernikus DFS 2* and *Eutelsat 2F4m* operational sats - *DFS-2* however ceased operations and December and just the *Eutelsat* will continue operating until the DFS replacement *Eurobird 1* arrives in slot during this coming summer, i.e. 2001.

The vacated DFS 23.5°E slot will soon become a German hot-spot in the sky with SES *Astra* signing an agreement to position their Spring 2002 launching *Astra 3A* at this orbital slot. The Boeing Satellite Systems craft will feature 20 hi-power Ku-band transponders to continue downlinking cable feeds and data/Internet information. SES however intend to exploit the *Astra 3* slot for DTH transmissions which will in turn enhance the dual feed dish German market for the 19°/23°E German slots.

SES *Astra 19°E* capacity downlinks the Spanish PAY-TV 'Canal Satellite Digital' package which has just passed a one million subscriber base, beating digital rival 'Via Digital' (on *Hispasat*, 30°W) with their 150,000 subscribers. SES *Astra* however have been in discussions with the Spanish for use of the 30°W slot in an integrating move and to run the two digital platforms in partnership. SES may have a distant interest in this slot when *Hispasat* exploit their Amazon satellite in 2003 which will target Latin America and Brazil, thus creating SES an instant international player.

Finally, the launch of *PAS 1R* into the 45°W slot November 15th last has replaced the elderly *PAS-1* satellite, some twelve and a half years service at 45°W. *PAS 1R* is the largest and mega powerful commercial satellite launched to date and runs 36 transponders in each of C and Ku-band providing reliable downlinking into the Americas, Africa and Europe from its mid Atlantic slot.



**Astronaut floats in space whilst assembling the solar panel array, these pictures live.**



**NSS-K is seen relaying floodlit horse racing ex Germany.**



**Caption seen during the Miami gold series.**

**American election time with many trans-Atlantic circuits into Europe.**

**A Brussels based news service often links via NSS-K digital.**



**A scratchy C-Band signal ex Djibouti with a local TV quiz programme.**



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AR3000A	Unique all mode extremely wide band base-mobile receiver 100kHz - 2036mhz with no gaps. RS232 port fitted.	£699.00
AR3000A + (plus)	Customised AR3000A with switchable narrow SM & SAT filters, Tape relay, SDU ready and discriminator output.	£799.00
AR8200 Series 2	New advanced wide band all mode hand-held receiver with enhanced microprocessor facilities, slot card options available, multi-function display.	£395.00
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ALINCO	DJ-G1 HANDY 2M WIDE RECEIVER	£123.00	JRC	JR-535 RECEIVER	TOKYO	HY-POWER HL 166V 6m 180w
ALINCO	DJ-G5EY 270W WIDE BAND TRANSCEIVER	£200.00	JRC	JR-545 OSP RECEIVER	TRIO	TR-9130 25 Multi mode 2m
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DAIWA	PS-120MK11 10amp PSU	£50.00	KENWOOD	TL-922 LAST SERIAL No (MINTII)	YAESU	FT-1000MP AC LATEST SERIAL No. I
DAIWA	PS-304M11 20amp POWER SUPPLY	£85.00	KENWOOD	TM-455E 70CM MOBILE MULTI MODE TRANS	YAESU	FT-101ZD HF TRANSCEIVER
DATONG	FL2 FILTER	£80.00	KENWOOD	TM-751E 2M 25W MULTI MODE	YAESU	FT-101ZD MK111 FM HF TRANSCEIVER
DIAMOND	GSV 3000 PSU	£100.00	KENWOOD	TM-V7E DUAL BAND TRANSCEIVER	YAESU	FT-225RD 2M BASE MULTIMODE
DIAWA	CNW 518 2KW CROSS METER ATU	£199.00	KENWOOD	TR 851E 70cm Multi mode	YAESU	FT-2500CM 50w 2m MOBILE
DIAWA	ROTATOR MR-75D1 HEAVY DUTY	£250.00	KENWOOD	TS-140S HF 100W BASE/MOBILE	YAESU	FT-290MK1 2M Multi-mode
DRAKE	DRAKE 2700 ATU 2.5KW (MINT CONDITION)	£295.00	KENWOOD	TS-680 HF 8M BASE/MOBILE	YAESU	FT-290R MK11
DRAKE	DRAKE 17 LINEAR AMP (MINT CONDITION)	£899.00	KENWOOD	TS-690 SAT TRANSCEIVER HF/6M	YAESU	FT-3000M 70w 2m MOBILE TRANS
DRAKE	R 8 RECEIVER (MINT)	£350.00	KENWOOD	TS-811E 70cm MULTI MODE TRANSCEIVER	YAESU	FT-480R 2M MULTIMODE
HEATHERLITE	2M EXPLORER 2m AMPLIFIER	£399.00	KENWOOD	TS-850 SAT 100w HF BASE TRANSCEIVER	YAESU	FT-530 270cm HANDY
ICOM	IC 207 DUAL BAND MOBILE	£210.00	KENWOOD	TS-870 SAT HF/BASE TRANSCEIVER	YAESU	FT-690MK11 6M MULTI-MODE TRANSCEIVER
ICOM	IC 239H 2M MOBILE	£120.00	KENWOOD	TS-940SAT HF BUILT IN ATU BASE	YAESU	FT-726R 270/6M TRANSCEIVER
ICOM	IC-251E AC 2M Multi-mode	£325.00	KENWOOD	TS-950 SD DIGITAL 150W TRANSCEIVER	YAESU	FT-736R AC 2M/6M/70CM BASE
ICOM	IC-275H 2M 100W BASE TRANSCEIVER	£950.00	KENWOOD	TS-950S HF 150W BASE BUILT IN ATU	YAESU	FT-736R AC 2M/70CM BASE
ICOM	IC-3J UHF MINI HANDY	£399.00	KENWOOD	TS-950SDX HF 150w TRANS (FLAG SHIP)	YAESU	FT-757GX
ICOM	IC 475E AC 25W MULTI-MODE 70CM BASE	£525.00	KENWOOD	VFO-180 VFO	YAESU	FT-757GX11
ICOM	IC-706MK1 TRANSCEIVER	£499.00	LINEAR AMP	EXPLORER AMP	YAESU	FT-840 HF MOBILE BASE TRANSCEIVER
ICOM	IC-706MK11 OSP TRANSCEIVER	£599.00	LOWE	HF-225 RECEIVER	YAESU	FT-847 HF/6M/2M/70cm/4m
ICOM	IC-706MK11G IAS NEW!!	£799.00	MAYCOM	AR-108 AIRBAND HANDY	YAESU	FT-8500 DUAL BAND MOBILE TRANS 50w
ICOM	IC-725 HF MOBILE 100w	£400.00	MFJ	1278 TNC Incl SSTV	YAESU	FT-900 HF MOBILE/BASE FACE DFF
ICOM	IC 728 HF MOBILE 100w	£425.00	MFJ	MFJ 2598 ANTIENNA ANALYZER	YAESU	FT 900AT BOXED
ICOM	IC 729 TRANSCEIVER HF/50MHZ	£425.00	MFJ	MFJ 784S DSP FILTER	YAESU	FT 901 Deluxe mode Transceiver
ICOM	IC-735 HF 100W	£450.00	MFJ	MFJ-962 1.5KW ATU	YAESU	FT-902 Deluxe mode Transceiver
ICOM	IC-746 HF/50/2M 100w	£999.00	MFJ	MFJ-989 ATU 3KW INPUT	YAESU	FT-920 AF HF- 50 MHz BASE TRANSCEIVER
ICOM	IC-756 HF/6M BASE TRANSCEIVER	£1,050.00	MICRO MOD	Microwave mod's 144/100 100w 2m	YAESU	FT-990 TRANSCEIVER AC HF BASE
ICOM	IC W31E DUAL BAND HANDY	£175.00	MIRAGE	D3010 430 450MHz AMPLIFIER 100W	YAESU	FT-990 TRANSCEIVER DC HF BASE
ICOM	PCR-1000 PC RECEIVER SSB/FM/AM	£200.00	NAG	144XL 2M BASE AMPLIFIER 400W	YAESU	FT-ONE BASE HF
ICOM	PS-15 POWER SUPPLY	£100.00	PACCOM	32D TNC	YAESU	FV-707DM DIGITAL VFO - MEMORIES
ICOM	PS 55 PSU 20 amp	£120.00	PACCOM	TINY 11 PACKET TNC	YAESU	MD-10 DESK MICROPHONE (MINTII)
ICOM	PS-85 POWER SUPPLY	£175.00	PAKRATT	PK-232 MODEM	YAESU	MD 100 DESK MICROPHONE
ICOM	R10 HANDY SCANNER	£195.00	REALISTIC	PRD-2005 25-1300MHz BASE SCANNER	YAESU	QUADRA AMPLIFIER HF/6M 1KW
ICOM	R2 HANDY RECEIVER	£110.00	REALISTIC	PRD-2026 SCANNER	YAESU	SP-980 EXT SPEAKER
ICOM	R-7000 25-2000MHz ALL MODE RECEIVER	£875.00	S E M	TRANSMATCH	YAESU	VX-1R MICRO 270 WIDE RECEIVER
ICOM	R 72 RECEIVER AC	£450.00	SONY	CRF V21 World band radio built-in printer MINTII	YUPIERU	MVT 125MK11 AIR/BAND SCANNER
ICOM	R 72 RECEIVER DC	£400.00	SSB ELECTRON	LT 23/S 23CM TRANSVERTER	YUPIERU	MVT-8000 BASE
ICOM	R-75 RECEIVER	£450.00	SUNMERKAMP	PT-690MK1 6M MULTIMODE		

■ GODFREY MANNING G4GLM, C/O THE GODFREY MANNING AIRCRAFT MUSEUM, 63 THE DRIVE, EDGWARE, MIDDLESEX HA8 8PS

# Airband

Last October's 'Airband' reported the risk that politics will influence our air traffic control system and hence raised questions about safety. Should it be 'privatised,' for example? Are there alternatives?

A valid safety concern is that the CAA is joint operator of much of the system (as part of NATS) but is also the regulator. Would it be philosophically more acceptable to separate the two rôles? One option, debated in government circles and discussed in recent media, is for a public trust to take over NATS rather than to sell it off. This is certainly a possible compromise that has the desired effect without disturbing political sensibilities. We must remember that the entire Transport Bill could be lost due to opposition to this one aspect.

## Secondary Radar

The earliest idea for British radar, immediately pre-war, was conceived by Watson-Watt. It resulted from calculations that showed the impossibility of a 'death ray' having sufficient power of emitted radio energy to bring down enemy aircraft. However, the echo of a radio wave bouncing back from an object might aid an aircraft's detection. I am reminded about this by the mention of Chain Home on page 4 of last October's *SWM*.

This is primary radar, relying on receipt of a simple echo. Secondary radar triggers a transponder in the aircraft and then looks for the powerful, defined, radio signal that this transmitter sends back. The signal conforms to a pattern so that it can be recognised and in the War an early version of this was called Identification, Friend or Foe (IFF).

These days the system carries a binary code, a method of conveying data that is also the basis of modern computers. We now call it Secondary Surveillance Radar (SSR), so I was amused to find that the French still refer to it as IFF! The irony of this throwback to the wartime era, in these days of computers, was lost on the French pilot to whom I was talking.

If you ever come across a wartime IFF set, make sure that it is safe. It was designed to transmit a recognisable code, as I said. It was vital that the enemy never discovered the code, or they could then install similar equipment in their own aircraft and fool our radar operators. So, all IFF sets contained self-destruct explosives that were to be detonated after a crash-landing in enemy territory. That way, the equipment would never fall into enemy hands. The same applied to magnetron airborne radar equipment, a considerable charge being needed to destroy the chunky magnets and other metalwork.

Andrew Green (Barnsley) is also interested in radar. The information transmitted by mode 3A/C (the usual civil standard) consists of the squawk four-digit code and the flight level, an extra code being momentarily sent if the pilot presses the 'ident' button. The controller sees more than this as a label on the radar screen, usually call sign and

destination, only because the air traffic control computer has been suitably programmed and not because the aircraft transmits this data. An amateur won't have access to this extra information.

I don't know of any software that enables a computer to decode 1090MHz secondary radar responses, presumably when fed from a receiver through an interface. Any ideas?

## SIDs & STARS

I'm not going to tell you any more about these apparent mysteries other than to read my article on the subject in the 'Airband Special' edition in the April *SWM*. To help Andrew Green, though, I see that he lives in a village about 7km west of Barnsley, close by a railway line, not far from a wind farm. Is that correct, Andrew?

If it is, then the pilot's way of finding Andrew would be on airways (U)B1, 6nm east of STOCK on the Ottringham 265° radial. The centreline of the airway is immediately to Andrew's north. This means that eastbound traffic out of Manchester on STOCK 1R/1S/1Y/1Z SIDs (departures) pass the STOCK reporting point and then fly over Andrew's house on airways. Low-flying B.747s look lower than other aircraft to Andrew. Despite following the same profile as other types, they are just so big that they look lower!

Generally in Andrew's area, from Pole Hill to Ottringham and then out over the North Sea, London Airways control flights on 126.775 prior to handing over to Maastricht on 132.633MHz.

## The 8.33kHz Story

This Maastricht frequency is of course one of the new 8.33kHz channels, pilots actually being instructed to call 132.635MHz. How can you find out the real frequency when a controller mentions an 8.33kHz channel? Just like Andrew, you can write in and I'll tell you. There's also a page on the *SWM* website, or you can have that same information on disc if you send me one (IBM compatible format) with return postage. The file is readable by a web browser.

Andrew may be lucky to tune 8.33 channels in 1kHz steps on the MVT-7100 if the filtering is wide enough. Lack of a balun on a dipole (see December 1999 'Airband') prevents perfectly omnidirectional reception, but this might not be noticeable with signals of varying strengths arriving from all directions, unless precise measurements are made.

## North Atlantic

This extensive area is busy, but air traffic control could only be accessed by h.f. radio until recently. Most short wave enthusiasts and licensed amateurs will know how frustrating the vagaries of h.f. propagation can be. In the case of air traffic control, this could be safety-critical.

The traveller can carry a cellular 'phone between countries, ships at sea can make calls through Inmarsat (unless beyond the 70° latitude lines), so why can't pilots have something more reliable than h.f. these days?

On page 4 of the October/November edition of *The Log* I see that a data-link system is already undergoing trials, certainly for sending clearances to aircraft. Then, on page 59 of the November *SWM*, Graham Tanner tells us (in his 'SSB Utilities' column) of a satellite telephone link, although this early system can only initiate a call in one direction. A report on an incident to a B.747-400 (*AAIB Bulletin* 9/00 page 4) coincidentally mentions that the crew have access to a satellite telephone for operational purposes.



## Abbreviations

AAIB	Air Accidents Investigation Branch
AIP	Aeronautical Information Publication
ATIS	Automatic Terminal Information Service
B.	Boeing
CAA	Civil Aviation Authority
d.m.e.	distance measuring equipment
FL	flight level
h.f.	high frequency
ICAO	International Civil Aviation Organisation
i.l.s.	instrument landing system
kHz	kilohertz
km	kilometres
MHz	megahertz
NATS	National Air Traffic Services
n.d.b.	non-directional beacon
nm	nautical miles
SID	Standard Instrument Departure
STAR	Standard Terminal Arrival Route
UIR	Upper Information Region



Luccombe Silvaire. Christine Mlynek.

Continued on page 64



■ KEITH HAMER & GARRY SMITH, 17 COLLINGHAM GARDENS, DERBY DE22 4FS

# DX Television

F2-layer reception continued into November, went into decline, then emerged again after the 18th, but with less intensity. A few Sporadic-E openings materialised, notably Italy on the 15th and 22nd. Late night Auroral Es reception between the 4th and 10th resulted in clear and stable pictures from Scandinavia and several CIS countries. The Leonids Meteor-Shower event was generally given the thumbs down by TV DXers. Having said that, Kenya E2 was received in South Africa at over 3500km!

## Reception Reports

F2 reception on the 1st provided clear pictures from Syria on Channel E2 – even the corner logo could easily be read. As the opening progressed, **Stephen Michie** (Bristol) saw the distinctive petal clock preceding the news.

On the same day, **Peter Barclay** (Sunderland) noted a signal from the south-east with a logo in the top-right resembling a figure '1'. Peter also mentions the start of a programme with non-Arabic titling.

At around 1430UTC, weak African signals on Channel E2 were resolved in Derby from a south/south-westerly direction, tentatively from the 1kW outlet at Malabo in Spanish Equatorial Guinea. It was identified in The Netherlands by its offset frequency of 48.250MHz and empty sync bar. The only other country operating in that general direction is Ghana, providing the 5kW Kisi outlet is still on-air.

On the 4th at 1040, a programme via F2-layer propagation with Chinese-looking pictures emerged on Channel R1/C1. There was no VITS (Vertical Interval Test Signal) or text information in the sync bar. This was seen in Derby and also by **Simon Hockenhill** in Bristol.

F2 began building up again from the 18th, with tentative reports of Thailand and Malaysia.

At 0850 on the 25th, **Ian Milton** identified Syria by matching pictures on Channel E2 with satellite reception. Co-channel signals were also visible at times and at one point, clear pictures were present revealing a sloping E-shaped logo in the top-left. It is thought that this was from Iran.

On the 30th at 0745 in Derby, a mystery caption was observed on E2, consisting of a large white circular shape to the left of the screen with a few lines of Arabic text to its right. A white block or logo was displayed in the lower-right of the caption which remained for several minutes. The sync bar was empty.

Sporadic-E had its moments with Rai Uno from Italy seen by **Tom Crane** (Hawkehill) on the 15th and 22nd. On Channel E2 at 1119 on the 26th, cross-country skiing was identified tentatively as Norway by **Peter Barber** (Coventry).

## Frequency Offsets

Some enthusiasts are identifying transmitters by reading offsets to several figures but this can be unintentionally misleading.

Several 'mystery' offsets have been encountered, but transmitter frequency stability can be affected by temperature changes, thus creating conflicting readings. Here are some of the Channel E2 offsets recently identified, to be used as a guide:-

MHz	Station
48.2501	Dubai (DRCTV)
48.2598	Iran
48.2502	Syria (SYR-2)
48.2396	Iran, Thailand
48.2598	Iran
48.2504	Equatorial Guinea (TVGE)

## Auroral Es

Late-night Auroral Es reception has been encountered by Simon Hockenhill, Tom Crane, Peter Barclay and Ian Milton. According to Peter, the most impressive opening occurred during the evening of the 6th when the m.u.f. reached the dizzy heights of Channel R3! Norway, Sweden, Estonia, Belarus and Russia all put in a most welcome out-of-season appearance, with Estonia displaying a different logo from usual.

Reception was less than perfect, but from what could be made out, the logo situated in the top right consisted of the letters 'ETV' in block capitals - the 'E' being in white while the 'TV' appeared to be transparent. This is one to look out for next season. Ian Milton reports a new logo in use by the Russian ORT network, aptly describing it as a slanting fat figure '1' with a line down the middle.

## Mysteries Solved

According to Stephen Michie, the mystery PM5544 from the north-east on Channel R2, reported recently by Peter Barclay, may be Estonia. Peter also resolved a French-speaking programme on E3 (on July 24th) and this may have originated from the 1kW Beit Mery outlet in the Lebanon.

Simon Hockenhill suggests that the recent report of Radio 1 on 93.40MHz is interesting and is possibly a rebroadcast from one of the many private, possibly illegal, local stations operating in Italy, Greece or Spain. Even more mind-blowing, it could be from someone's sender unit, again anywhere from Spain to Greece as there are many British people who live in these parts. They receive radio via satellite then use these senders so they can listen to their favourite British radio stations on their portable radios



Fig. 1: Unidentified E2 transmission with sloping E-shape logo in the top-left, received by Stephen Michie.



Fig. 2: Reception by Stephen Michie of a Syrian broadcast on E2.

## DXTV Log For November

This month's compilation log has been supplied by **Peter Chalkley** (Luton), Peter Barber (Coventry), Stephen Michie (Bristol), Simon Hockenhill (Bristol), Tom Crane (Hawkehill), Peter Barclay (Sunderland), Ian Milton (Ryton).

Day	Log
1	F2 from 0830-1330: Syria (SYR-2) E2; Unidentified signals on E2; Equatorial Guinea (TVGE) E2 at 1435.
2	Meteor-Shower at 0734: Sweden (SVT-1) E3. F2 from 0810: Syria E2; Several unidentified signals on E2.
3	F2 between 0830 and 1030: Weak unidentified signals on E2.
4	F2 from 0820: Iran (IRIB-2 and an unidentified network) E2; Syria E2 with relatively clear pictures; R1 Chinese-looking people. Auroral Es from 1945: Norway E2, E3; Sweden E3.
5	F2 from 0800: Iran E2 (IRIB-2 and another network) via F2. Auroral Es from 2045: Finland (YLE-1) E3; Norway (NRK-1) E2 and E3; Sweden E2 and E4.
6	F2 from 0800: Syria E2. Auroral Es from 2030: Sweden E2 and E3; Russia (RTR) R2; Russia (ORT) R3; Unidentified signal on R4; Belarus (BT-1) R2; Estonia (ETV) R2.
7	Auroral Es at 0140: Finland E3.
10	Auroral Es from 2230: Norway E2, E3 and E4; Sweden E2, E3 and E4; Finland E3.
15	Sporadic-E at 1010: Italy (Rai Uno) A and B with 'tg1' news.
17	Denmark E3 via Meteor-Shower.
18	Leonids Meteor-Shower reception: Denmark E3; Switzerland E3; Many unidentified 'pings' on E3. F2 from 0800: Iran (IRIB) E2.
22	Sporadic-E at 1800: Italy (Rai Uno) A.
25	F2: Syria E2 at 0855UTC, Iran E2 at 0950.
26	Sporadic-E at 1037: Unidentified cross-country skiing on E2.
28	F2 from 1000: Iran E2; Unidentified signals E2.
29	F2 from 0800: Syria E2; Iran E2.
30	F2 from 0740: Iran E2; Syria E2; Unidentified signals E2.

## DXTV

Continued from page 63

either alongside the pool or on the patio.

### FM Reports

Although the *Leonids* Meteor-Shower activity was disappointing on the TV bands, Iain Menzies (Aberdeen) discovered an almost constant babble of f.m. stations during the early morning of the 19th, leading to speculation that the opening was Aurora-induced like last year. On the 20th, F2 signals reached 35MHz and Iain heard several fire services in the USA. One was tackling a blaze at the junction of State routes 11 and 26, which is thought to be in the mid-west. The time difference was UTC plus six hours.

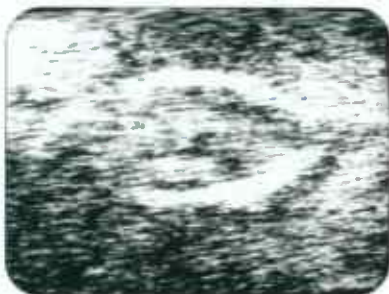


Fig. 3: Jordan E3 received by Stephen Michie via Sporadic-E.



Fig. 4: A Russian clock caption. The name Olivetti appears in both the Roman and Cyrillic alphabet.



Fig. 5: An example of slow-scan TV reception noted by George Newport in Canterbury.

### Baird Book

A fascinating book has just been published detailing the experimental work carried out by John Logie Baird to record his early TV pictures. *Restoring Baird's Image* (ISBN 0 85296 795 0), written by Donald McLean, runs to over 290 pages and includes many rare photographs. It costs £29 and is published by the Institution of Electrical Engineers, Tel: (01438) 313311.

### Service Information

This month's Service Information has been supplied by Stephen Michie and Roger Bunney.

**Syria:** SRT-2 now has a teletext service. The sync bar is fully filled with text information. The teletext service was not in operation when received last via Sporadic-E during August 2000.

**Belarus:** Colour bars are shown briefly before the transmitter is switched off.

**Iran:** A religious programme is shown daily on IRIB-2 between 0830 and 0930UTC, the logo changes to a logo very similar to the IRIB TV1 logo. This logo is shown in the top-left corner. Another difference is that during the religious programme the sync bar has less text information when compared to the 'normal' programme.

**Australia:** Australian Channels 0, 1 and 2 are due to close on September 9th, 2008. The frequencies are being re-allocated to other users. The current users of these Band I channels (mainly ABC) will move to Band III or u.h.f. in digital format only.

**India:** The first phase of digital terrestrial broadcasts is planned for New Delhi, Mumbai (formerly Bombay), Calcutta and Chennai (formerly Madras).

### Keep On Writing!

Please send your DXTV, slow-scan TV and f.m. reception reports, news, off-screen photographs and information to arrive by the first of the month to:- Garry Smith, 17 Collingham Gardens, Derby DE22 4FS. We can also use off-air pictures stored as JPG files on PC disks and good-quality video recordings.



Fig. 6: This month's brain-teaser in the 'Down Memory Lane' spot. Does anyone remember this Welsh identification caption?

## Airband

Continued from page 62



Piper Cub. Christine Mlynec.

Such systems will enable clearer communication between pilot and controller, but could remove the safety element of pilots being aware of surrounding traffic by hearing the radio calls made by other aircraft.

### Closer To Home

What frequencies (all in MHz) control the airways near where Nigel Haslop lives in Cambridge? (U)B317 is only available eastbound between Clacton and Davenport (129.2 and 131.125 from Davenport to abeam Barkway, from there to Clacton it's 127.425 and 135.425 above FL275 and 127.825 and 133.45 below). Then, there's UN866 between KESON (on the coast) and Brookmans Park (126.775, 128.125).

The only Conditional Route in the area is UN866, as described above. There is no magic about frequencies for these routes, they are the same as for any other in their sector. These routes potentially conflict with airspace reserved for military purposes and are hence only available on condition that the military are not exercising their rights over them. In practice, this means that they are released to civil aviation during weekends, especially late on Fridays when civil demand is high.

What else is in the area? Nearby are B4, R77, UL613 and UM14 which are unidirectional and UP6 which is bidirectional. Likely frequencies (in addition to those already mentioned) for these are 127.1, 127.875, 128.475, 130.925, 132.6 and 133.975. If you're despondent at the number of frequencies handling the dense traffic in such a small area, think how pilots feel when having to make so many frequency changes in rapid succession. Some are secondary frequencies with little activity unless the corresponding primary is unusable.

### Frequency & Operational News

Beacon enthusiasts might have noticed that, late in November, the Luton locator/outer marker (LUT, 345kHz) appended a Morse dot, the letter E, to its identification. This is E for Emergency and indicates either that the beacon is running on standby power or from a reserve transmitter, in order to continue operations after a failure of a main system.

Martin Sutton (CAA) sends the AIP amendments for which we all have reason to thank him. On UG1 the eastern limit is now the KONAN point on the London/Brussels UIR boundary. Further east, the same airway becomes UL607.

Now to individual aerodromes. Cambridge has ATIS on 133.7MHz, says Nigel Haslop. Campbeltown has n.d.b. CBL on 380kHz. Coventry's i.l.s. includes d.m.e. ICT on runway 23 and i.l.s./d.m.e. ICTY on runway 05 (109.75 localiser, 333.05 glideslope, 1121MHz reply both d.m.e.s). Don't confuse the similar callsigns. Deanland has new ICAO locator EGKL. Luton no longer offers Lower Airspace Radar Service, is this because the area radar controller is too busy with other, increased, traffic?

Letters next month from John Chamen, Coctas Krallis, Peter Martin and Garry Smith. All other letters received up to December 13 have been answered. The next three deadlines (for topical information) are February 5, March 12 and April 9. Replies always appear in this column and it is regretted that no direct correspondence is possible.

# Book Profiles

We have five special books to tempt you this month. Remember, you can place your order via 'phone, FAX, E-mail or post.

## Radio & Electronics Cookbook

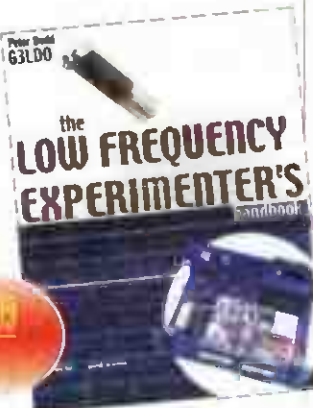
This 'Cookbook' is a unique collection of electronics projects, ideal for all electronics enthusiasts and experimenters.

The projects covered draw on the massive enthusiasm and design know-how of the RSGB. Only a basic acquaintance with electronics construction is assumed, with clear step-by-step instructions and numerous illustrations supplied throughout. The result is a book ideal for d.i.y. enthusiasts and radio amateurs who are seeking to build up their electronics skills and knowledge. The projects are also supported with features on the electronics involved. The circuits themselves provide a wealth of quick, rewarding construction projects ranging from radio receivers and amplifiers to test equipment, a moisture meter, a desk microphone, a water level alarm and Christmas tree l.e.d.s. Available from the SWM Book Store for **£16.99**.

## RADIO & ELECTRONICS COOKBOOK

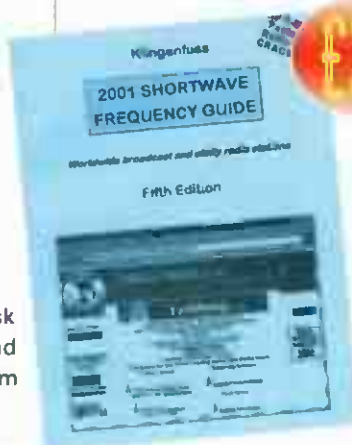
## The Low Frequency Experimenter's Handbook

The Low Frequency Experimenter's Handbook has been written to meet the needs of amateurs and



experimenters who have an interest in low power radio techniques at frequencies below 200kHz. Most of the techniques described are targeted at those using the 136kHz band, but they are also of great interest to readers in New Zealand and Australia with their 183kHz band and the Lowfers in the USA on 180kHz. Covering antennas, propagation, receivers, transmitters, test equipment and special modes, all those interested in exploring the new frontier of the l.f. bands will welcome this invaluable and unique reference book. Order your copy for **£8.99**.

## Klingenfuss 2001 Shortwave Frequency Guide



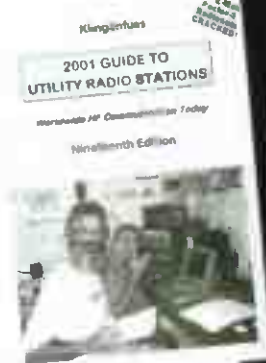
The fifth edition of this frequency guide contains a new, clearly arranged

alphabetical list of stations, user friendly listings in convenient frequency order, 10,200 entries covering all broadcast stations world-wide, 10,900 entries covering all utility stations world-wide and full details on the future of digital modulation broadcast techniques, all in a modern layout for ease of use and quick information access. Order your 2001 copy now for **£23.00**.

## Klingenfuss 2001 Guide To Utility Radio Stations

Now in its 19th edition, this is one of the most comprehensive, reliable

and up-to-date manual containing 10,900 frequencies, 1,900 stations, meteo radiofax, radiotelex and NAVTEX schedules, digital data decoding screenshots, abbreviations, codes, frequency allocations and radio regulations. With 8,600 changes since the previous edition, you'd best get yourself up-to-date and order this 2001 edition now for **£30.00**.



## Klingenfuss 2001/2002 Guide To World-Wide Weather Services

Now in its 20th edition, the 2001/2002 Guide To World-Wide Weather Services covers Internet locations, NAVTEX stations, Radiofax stations, Meteorological data, Satellite images, Weather charts, plus hundreds of sample charts, images and web pages. This book is definitely an essential reference source - so pick up the 'phone and order your 20th edition now for **£23.00**.



# Book Profiles

The books listed have been selected as being of special interest to our readers. They are supplied direct to your door. Many titles are overseas in origin.

# SWM Book Store

## LISTENING GUIDES

### Airband

	Pages	Price
ABC BRITISH AIRPORTS 16th Edition I A Wright	112	£8.99
ABC CIVIL AIRLNER RECOGNITION 6th Edition Peter R. March	128	£9.99
AIR TRAFFIC CONTROL 7th Edition, Graham Duke	112	£8.99
AIRWAVES 2000	134	£9.95
CALLSIGN 2000	168	£9.95
FLIGHT ROUTINGS 2000 Williams	160	£7.95
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# Info in Orbit

What is there left to say about the weather experienced in Britain and western Europe during late autumn 2000, that has not been said by so many people? This month - the start of 2001 - I have included a selection of pictures sent by WXSAT monitors, considered to represent the record-breaking season just ended. Whether the New Year will bring a change from the eternal low pressure systems that have swept in from the Atlantic day after day - we cannot know.

As at mid-December, I have just re-installed my h.r.p.t. dish for the second time in a few weeks. Forecasts of winds reaching 80mph do not help my demeanour, having two large dishes and one deliberately exposed tracking dish outside. During an absence of a few days, winds reached 70mph and my neighbour reported that the system - weighed down with heavy paving slabs - was 'rocking a little', but fortunately no damage occurred.

On 12 December, yet another storm brought more floods and vicious winds across Britain. On that occasion I 'stowed' the dish - pointed it upwards to minimise the exposed cross-section to the wind - something I learnt while being taught how to control the large 'Chilbolton' dish that was installed at Rutherford Appleton Laboratory (Oxfordshire) for the IRAS satellite project in the early 1980s. Never did I expect to be controlling my own 1m dish nearly two decades later!

## The State Of NOAA WXSATs

The failure of NOAA-13 a few years ago was the first in what was to be a series of problems experienced by NOAA WXSATs. NOAA-15 continues to suffer an apparent failure of the AVHRR scan motor and NOAA-16 appears to have a problem with a switch which has had a good record of reliability on previous NOAA WXSATs.

Kevin Hughes kindly forwarded some information he received from NOAA, and this prompted me to contact Wayne Winston, who works within NOAA/NESDIS as a Direct Readout Co-ordinator. His comments on the status of NOAA-15 and NOAA-16 are reproduced below.

"I wouldn't even speculate whether the N-16 a.p.t. will be revived again. The fault has to be isolated and then that component tested/cycled by ground commands, if possible. To analyse these problems remotely can be a frustrating and tedious process. But we've had a surprising number of successes with similar problems.

There are generally no penalties for in-orbit failure. The satellite is built from subsystems supplied by many manufacturers. This is, inherently, a somewhat risky business. Penalties can be assessed for delayed delivery or parts and components not meeting specification. Basically, one tries to address any potential problems before a satellite is launched, while there is a better chance of a suitable remedy.

It is possible to buy commercial insurance for satellites - this is sometimes done for the launch and possible launch failure for commercial communications satellites. But it is very expensive, as it is recognised there are inherent hazards in launching and operating satellites. NOAA does not do this, as there is not a favourable cost-to-benefit ratio.

You just try to build them to be as reliable as possible, and put in redundant systems where possible, or where failure of a system would mean failure of the entire

mission. Obviously, you cannot build with duplicate 'everything' as the satellite would be too expensive and too heavy to launch.

In this particular case, if the fault is found with the r.f. switch, it is one of those 'one-in-a-million' failures. This is a highly reliable, mechanical switch, used in the NOAA series for years without failure.

NOAA-16 is still a success even if there are no further a.p.t. transmissions, as the a.p.t. system is not critical. All the scientific sensors are working and sending back data via the h.r.p.t. and beacon transmissions.

In the case of NOAA-15, you have a much more critical failure of the AVHRR instrument which provides all the imagery data for both h.r.p.t. and a.p.t. This is a major instrument. However, N-15 is still considered operational as all the other instruments continue to work and there is image data from NOAA-12 and NOAA-16. As such, there is no crisis to speedup a replacement launch. The NOAA-17 will be launched next summer.

Work continues on attempting to fix the NOAA-15 AVHRR, and there have been some slightly positive results thus far. We know what the problem is, and a possible way to relieve the symptoms. The impact of possibly restoring the AVHRR to a functioning state has to be weighed against effects on other spacecraft systems and possible loss of other data, however".

## RESURS & METEOR WXSATs

Because of its sun-synchronous orbit, RESURS 01-N4 remains south-bound during early afternoon, providing us with well-illuminated imagery, though with a different spectral content than that from NOAA-16 high resolution images. By mid-January, METEOR 3-5 will have entered the phase of its orbital cycle where it is passing over ground that is receiving poor illumination from the sun - and will therefore be switched off for a few weeks. We can anticipate METEOR 2-21 being re-activated during this period.

## METEOSAT Second Generation (MSG-1)

Europe currently operates METEOSAT-7 as the prime European geostationary WXSAT located at longitude zero and METEOSAT-5 from longitude 62°E. METEOSAT-6 is available as a backup, located at longitude 350° (about 10°W). The first in the new MSG series was originally



Fig. 1: NOAA-16 1355UTC 15 December 2000 h.r.p.t. (RGB 124) colour composite image showing swollen rivers across Britain.



Fig. 2: MSG undergoes spin test - image courtesy EUMETSAT.



Fig. 3: NOAA-15 4 April from Jeremy Royle.



Fig. 4: NOAA-14 Britain 27 May 2000 from Roger Ray.



Fig. 6: NOAA-12 1602UTC 30 October 2000 from Trevor Davies.

planned to be launched in late 2000, but as with many complex projects, delays have inevitably moved this forward. EUMETSAT provides the following update:

"Primarily due to a significant further delay in the development

of the image processing element of the Ground Segment, the launch of *MSG-1* has had to be postponed from the planned date of July 2001. Another factor contributing to the postponement of the launch is the uncertainty about the selection and availability of an Ariane launcher as a result of the shock levels imposed on the satellite and its instruments by the *Ariane-5* launch vehicle.

Until the availability of the Ground Segment can be assured and the launcher issues are resolved, *MSG-1* cannot be launched. The current new planning date for the launch is the end of January 2002. To assure continuity of EUMETSAT satellite services from geostationary orbit, parallel operations between the current *Meteosat* and the *MSG* system are agreed until at least the end of 2003. The on-board fuel of *METEOSAT-7*, which currently provides the operational service from 0° Longitude, is sufficient for this period to be extended if necessary".

## Readers' Images From 2000



Fig. 5: RESURS 01-4 1836UTC 27 October from Tom Gwilym.

During the autumnal rains, I collected various pictures from the different satellites and invited people on the *rig-1* mailing list to send in selected images portraying the season's most significant weather features. The following were amongst those received.

**George Newport** forwarded a picture he received from **Jeremy Royle** showing the cause of some bad weather back in spring 2000.

**Roger Ray** has spent much time processing WXSAT images during 2000, and sent me a selection, including Fig. 4, an h.r.p.t. image showing a late spring storm system to the north-east of Britain.

From Bellevue, Washington, USA, came a picture from **Tom Gwilym** showing a storm off the Washington coast on 27 October 2000. This was expected to be the

first big storm of the season, but in the event, barely materialised. "This image is from the *Resurs 01-N4*

satellite and was taken at 1836UTC. Washington state is somewhere on the lower right of the picture, and the mountains of Alaska are visible at the top with the beginning of the Aleutian Peninsula extending toward the left of the image".

**Trevor Davies G0JIX** sent Fig. 6, an infra-red image taken with a Timestep satellite receiver and interface, running *Prosat* software. "The picture vividly shows the storm leaving the area after causing the worst flooding in this the Shrewsbury area for 40 years".

**David Taylor** is known within WXSAT circles for his development of satellite tracking software (*WXTrack*) and for *SatSignal* - his program that decodes sound files produced by recording weather satellite signals using suitable software. The October-December floods were widespread, but not nationwide.

David reports: "Fortunately in Scotland, we were mostly spared from these floods, but it didn't stop me taking a keen interest in what was happening. **Trevor Cousens G3KXU** has developed a cloud-top temperature algorithm and was performing an amazing amount of manual processing to get his results. At his suggestion, I incorporated his algorithm into my *SatSignal* program so that an estimate of rainfall could be made". Trevor calls his algorithm 'A Working Man's Rain Radar'.

The pass David forwarded is the early morning NOAA-12 pass at 0621UTC from 3 November, 2000. The image indicates that the area of heavy precipitation has moved on to the Continent after dropping its load on the UK. Equipment used was a Paul Hayes QFH, a RIG RX2 receiver, signal recording processed by *SatSignal*.

More information on *SatSignal* is at: [www.satsignal.net](http://www.satsignal.net) Trevor Cousens' Web site is at: [www.weather-images.co.uk](http://www.weather-images.co.uk) Not only Britain contended with storms during autumn 2000, **Joseph Gresham** sent a whole-disc image received from *GOES-E*.

## UFO? No, An Optical Reflection

**John Locker** occasionally receives 'space'-type images containing slightly unusual features that people unfamiliar with scientific perspectives believe show 'proof' of an alien presence near earth. John explained that the image was doing the rounds as 'evidence' of a large craft in orbit around the earth.

One can start with the assumption that there is a logical explanation and then contact organisations more familiar with the analysis of such images. John contacted the University of Wisconsin which processes Pacific images. They replied: "I sent your question to some of our McIDAS experts (McIDAS is a software package for satellite data display and manipulation created here at the University of Wisconsin...very powerful). They have seen this effect before and believe that it is, as you hypothesised, an aberration. It is actually an internal reflection of the sun in the satellite's optics/instrumentation. The sun is just coming over the horizon at that time period, and the instrumentation is capturing it somehow. They were not sure exactly how it happens, but that is what it is from. I looped three images from the last three days at 1532UTC, and the spot is actually moving to the NW at about 0.5° per day. It would be interesting to follow the movement of this spot over a





Fig. 7: NOAA-12 November 0621UTC from David Taylor.

month or a year...to see how it moves in relation to the sun's movement!".

### Internet Site Update

While browsing some of the American site references to live GOES images, I found the RAP site - <http://http.rap.ucar.edu/weather/satellite.html> The Research Applications Program (RAP) has been involved in aviation weather research and technology since 1980, and is the principal division responsible for aviation weather projects for the National Centre for Atmospheric Research (NCAR).

I checked several image selections from those available and all were the latest images in each band, including a colour infra-red, and multi-spectral composite. Further down the web page is a selection of large-scale and regional close-ups provided by other sources, including pictures of Alaska from Environment Canada. For European WXSAT enthusiasts who would like to see more than that offered by METEOSAT-7 re-transmissions, this site has much to offer.

### International Space Station - Shuttle Launch Schedule

The ISS is bright enough to be seen with the naked eye under suitable conditions and the Station's orbit is similar to that of MIR. When the Station passes over not long after sunset, it remains in sunshine and can be identified.

For precise monitoring, use a satellite tracking program updated with the latest Kepler elements. This will derive start and end times for each pass over your location. The Station should be seen within a few degrees of rising over the western horizon, but will only remain visible while it is in sunlight. It will disappear before it reaches the eastern horizon because it passes into the

### Kepler Elements - WXSATs, MIR & Shuttle

A set of files containing recent elements for the WXSATs, AMSATS and others of general interest, together with a large file holding elements for thousands of satellites is available from me, at the address at the head of the page. Please enclose 50p with a PC-formatted disk and stamped envelope. A print-out is included that identifies NASA catalogue numbers for the WXSATs. The disk file is ideal for automatic updating of tracking software.



Fig. 8: GOES-E 1745UTC 6 November 2000 from Joseph Gresham.

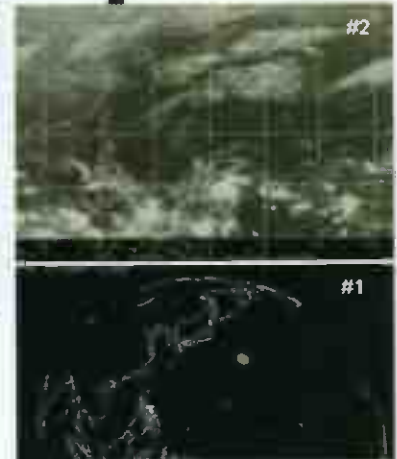


Fig. 9: GMS infra-red and visible images 25 November 1532UTC from John Locker.

earth's shadow.

STS-98 *Atlantis* is scheduled for launch on 18 January 2001 for an 11-day mission carrying the US laboratory for the International Space Station.

STS-102 *Discovery* is scheduled for launch on 15 February 2001 for an 11-day mission carrying the Leonardo Multi-Purpose Logistics Module for the ISS.

A comprehensive listing of all Shuttle flights and payloads for the ISS, together with associated information will be available shortly.



Fig. 10: Research Applications Program (RAP) site.

### Frequencies

- NOAA-12 transmits a.p.t. on 137.50MHz.
- NOAA-14 transmits a.p.t. on 137.62MHz.
- NOAA-15 (137.50MHz) and NOAA-16 (137.62MHz) a.p.t. are in a fault condition.
- NOAAs transmit beacon data on 137.77 or 136.77MHz.
- METEOR 3-5 transmits a.p.t. in sunlight only, on 137.30MHz (see above).
- METEOR 2-21 may be re-activated this month.
- RESURS 01#4 transmits a.p.t. on 137.85MHz.
- OKEAN-O, OKEAN-4 and SICH-1 use 137.40MHz for brief transmissions.
- METEOSAT-7 (geostationary) uses 1691 and 1694.5MHz for WEFAX.
- GOES-8 (western horizon) uses 1691MHz for WEFAX.

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# Propagation Forecasts

## How to use the Propagation Charts

The charts contain three plots. The lower dashed line represents the lowest usable frequency (LUF), or ALF (Absorption Limiting Frequency). The chances of success below this frequency are very slim.

The middle line indicates the optimum working frequency (OWF) with a 90% probability of success for the particular path and time.

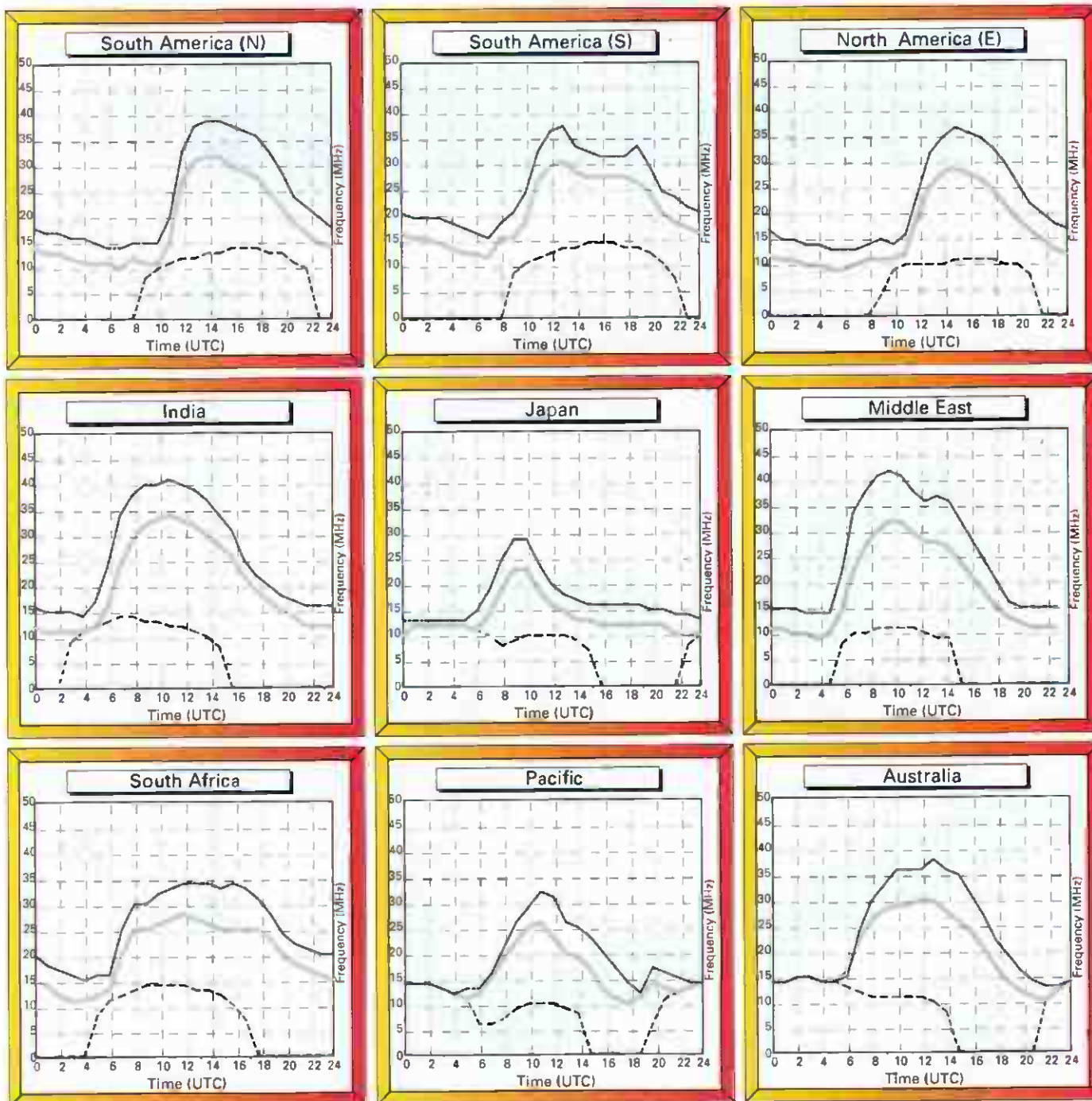
Lastly, the upper dashed line represents the maximum usable frequency (MUF), a 50%

probability of success for the path and time.

To make use of the charts you must select the chart most closely located to the region containing the station that you wish to hear. By selecting the time chosen for listening on the horizontal axis, the best frequencies for listening can be determined by the values of the intersections of the plots against frequency.

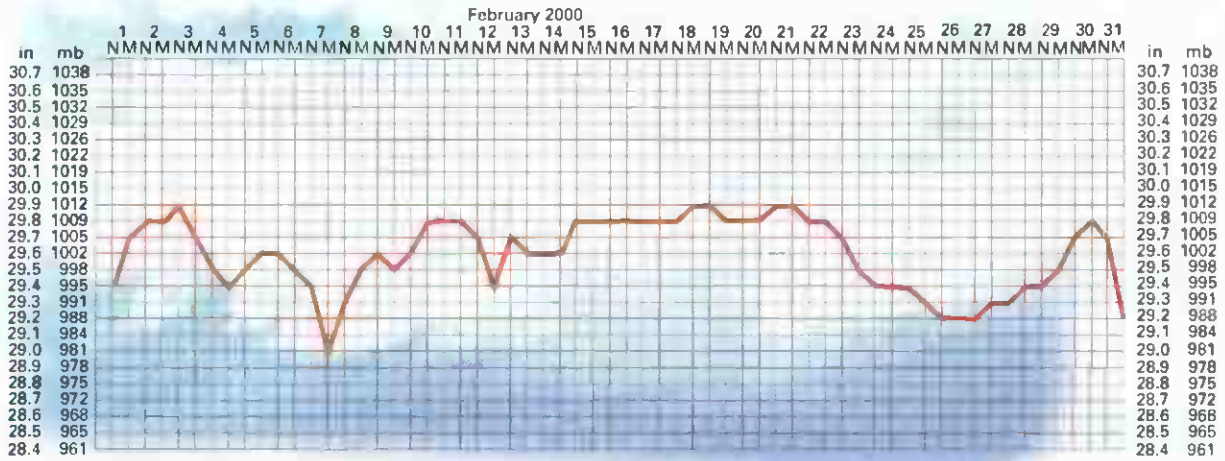
Good luck and happy listening.

February 2001  
Circuits to London



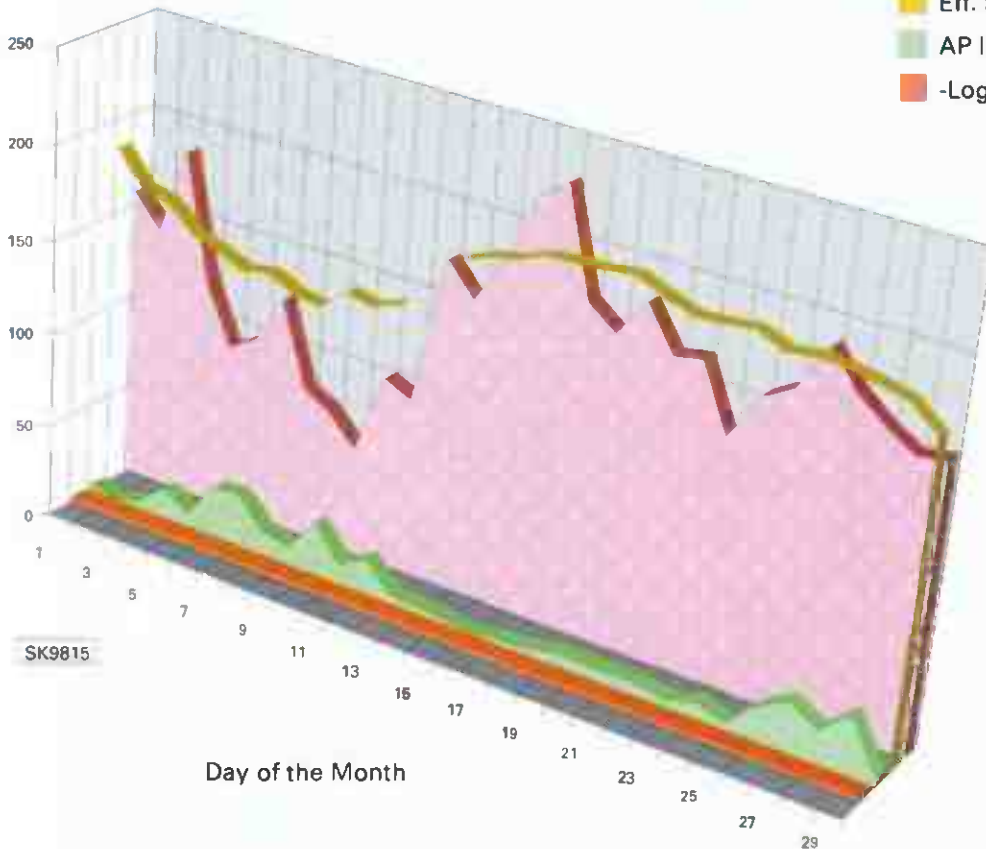
# Propagation Extra

Ron Ham's barometric pressure chart, taken at Storrington, W. Sussex, December 2000.



December Data

- 10.7cm Flux
- Eff. Sunspot No.
- AP Index
- -Log X-Ray



## guide to the chart

The 10.7cm solar radio flux is used as an indicator of the general level of solar activity.

The K and AP indices are measures of geomagnetic activity.

The K index ranges from zero (very quiet) to nine (severely disturbed).

K values of five or greater correspond to geomagnetic storm conditions that can relate to poor propagation conditions.

The AP index ranges from 0 to 400. An AP of 30 is the threshold for geomagnetic storm conditions.

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# Decode



Latest version of Mike's web page.

By the time you read this you should have recovered from Christmas and be well into monitoring the h.f. bands during the long winter nights! Hopefully, I can help you out with a few ideas and software to liven things up a bit.

## Weather Graphics

The first good news is that, as expected, Weather Graphics have released *Digital Atmosphere 2000*, which can be obtained from their web site at: <http://www.weathergraphics.com> As you will have noted from last month's column, this is a great program that can really bring those boring coded weather transmissions to life.

There are a host of new features in the latest version including photo-realistic topography. This makes an amazing difference as you can see by the pictures on this page. The only downside is that photo realistic rendering takes a while to complete and is not really practical if you have a slow PC. It's not that serious a problem because the simple maps render-up very quickly and still give you the info you need.

## Get Connected!

Pervisell have been producing high quality interfaces and distributing radio software for many years and have recently sent me details of their latest range of interfaces. Probably the most important improvement is the inclusion of support for Sound Card based decoding programs. With an excellent mix of good programs available at the moment, it's just a bit frustrating that some use the sound card whilst others need the comparator type interface.

With conventional lead set-ups you have to keep plugging different leads into the line-out jack of your radio to match the program you're running. Pervisell's latest leads include a spare 3.5mm jack lead which is wired into the Comparator interface and is then connected to the line-in jack of your sound card. With one of these leads you can freely change between soundcard and comparator based software without having to touch your lead set-up. This is a

really useful improvement - it might even persuade me to tidy-up the shack a bit!

This sound card lead has been added to their full range of interface leads, so it's worth thinking about an upgrade. For more details contact Pervisell at 8 Temple End, High Wycombe, Bucks HP13 5DR, Tel: (01494) 443033 or visit their web site at: <http://www.pervisell.com>

## Web Update

The latest addition to the web site is a tutorial section. What I've tried to do here is provide links to what, I think, are the best sites for detailed information about a variety of modes, systems, etc. To start with, I've added a PACTOR tutorial. Please let me know what you think and help me by letting me know of any sites that you find particularly helpful.

## PACTOR Primer

One of the most rapidly developing systems on the h.f. bands is the use of h.f. E-mail. In this brief primer I'll take you through an outline of the transmission system behind it.

Let's start by taking a look at why anyone would want to use h.f. for E-mail in the first place. If you take a look at the places where this is popular, you will find that its remote areas of the globe where 'phone coverage is pretty scarce. So without a 'phone you don't get internet connected.

One of the great things about h.f. radio is you can get just about anywhere in the world from just about anywhere! This is why h.f. was the mainstay of maritime communications for so long. Whilst satellite based systems have largely taken over maritime radio, they're not really practical in the rainforests of South America or the African bush!

Satellite systems are also extremely expensive to both buy and run. From this you can see that some form of h.f. based E-mail system starts to look quite attractive. With a converted amateur radio transceiver and a simple antenna you have the basics of a world-wide communications system. All you need is some way of connecting your computer to your Service Provider so you can exchange E-mails. This is where PACTOR comes into its own.

From the early days of Morse code there has been constant technical development to find the best way to send data over the h.f. bands. The problem is that the h.f. bands are constantly varying their transmission properties and can impose some pretty spectacular distortion to signals as they pass through the ionosphere.

The PACTOR system owes its origins and its name to both AMTOR and Packet radio. Whilst Packet radio is an excellent radio data transmission system, it's not really robust enough to be used reliably on the h.f. bands. AMTOR and SITOR are wonderfully robust and ideal for h.f., but the systems overall data rate is painfully slow at 50 baud.

To give you an example of its resilience, I used to use AMTOR to make regular contacts with a fellow amateur in Brazil. Once I'd made the initial contact I could usually turn the transmit power down to just a couple of watts and still maintain error free contact.

The secret was in the way the AMTOR code effectively locked the two stations together using a sort of electronic handshake. Here's a very much-simplified version of what happened in a typical contact.

- 1) The message to be sent is divided into blocks with just three characters in each block.
- 2) The first three characters are sent and the transmitting station then switches back to receive to await an acknowledgement.

- 3) At the receiving end the three characters are received and checked to see that they comply with the rules for AMTOR characters (the right combination of Mark & Spaces). If all is ok, the receiving end sends the acknowledgement. If any of the characters fails to meet the AMTOR rules a repeat request is sent.
- 4) On receiving an acknowledgement the next three characters are sent. However, if a repeat request was received, the last three characters are re-sent.
- 5) If the transmitting station doesn't receive an acknowledgement or repeat request it will assume synchronisation has been lost and will start sending sync signals in an attempt to re-establish the link.

As you can see, AMTOR provides very comprehensive interlocking of the two stations and does a very good job of reducing errors. The great thing about the system is all the error checking and repeating is done automatically and requires absolutely no intervention from the operator.

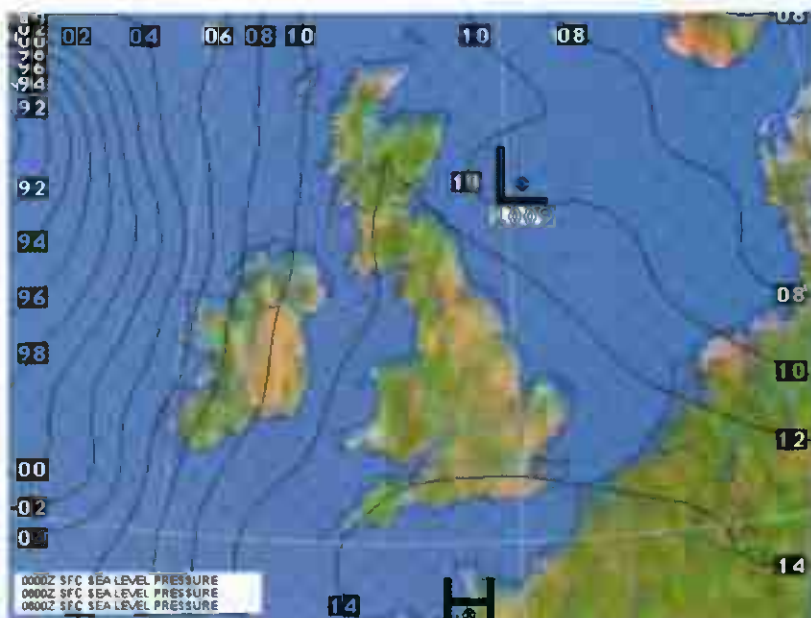
So what of PACTOR? Well, all the best attributes of AMTOR have been retained and both stations lock together and have their own fully automated method to ask for repeats of lost or damaged information. Probably the most important change is the use of a much longer block of information in each transmission.

Rather than the three characters used for AMTOR, PACTOR uses 96 bits when sending at 100 baud or 192 bits at 200 baud. In fact, this speed change is another important addition. The speed change is driven automatically so that, if the band conditions are good, the system can double its speed.

To really help speed-up the flow of data, PACTOR includes its own data compression system. I won't go into the full detail, but a technique called Huffman encoding is used to process the data and try and compress it.

A simple example might be a long string of zeros - these could be replaced by a couple of bytes to indicate the number of zeros. As long as its unwrapped at the other end, you just get a faster transmission rate.

The actual transmission system used for PACTOR is very similar to RTTY and other systems with simple Frequency Shift Keying where the transmitted carrier just shifts between two fixed frequencies. The standard for PACTOR is a 200Hz shift.



### Coming Of Age

The original PACTOR system was very successful and has spawned a more sophisticated version known as PACTOR-II and developed by Special Communication Systems. This uses all the same principles as the original PACTOR and the transmissions even start-up in original mode.

However, once the connection has been made, the link changes over to Digital Phase Shift Keying and PACTOR-II protocols. This provides a much more reliable transmission system and incorporates some additional data compression.

Perhaps most significant is the use of a dedicated 32-bit processor to handle the complex signal encoding and compression systems. The net result is an h.f. data transmission system that's capable of sending data at speeds in excess of 1200 bits per second.

Whilst there are various decoders around for the original PACTOR, receiving PACTOR-II requires a specialist decoder, which currently is rather expensive at around \$649. Checking-out the Klingenfuss site shows that Wavecom have cracked the PACTOR-II protocols, but as yet I'm not aware of any software, only decoders. If

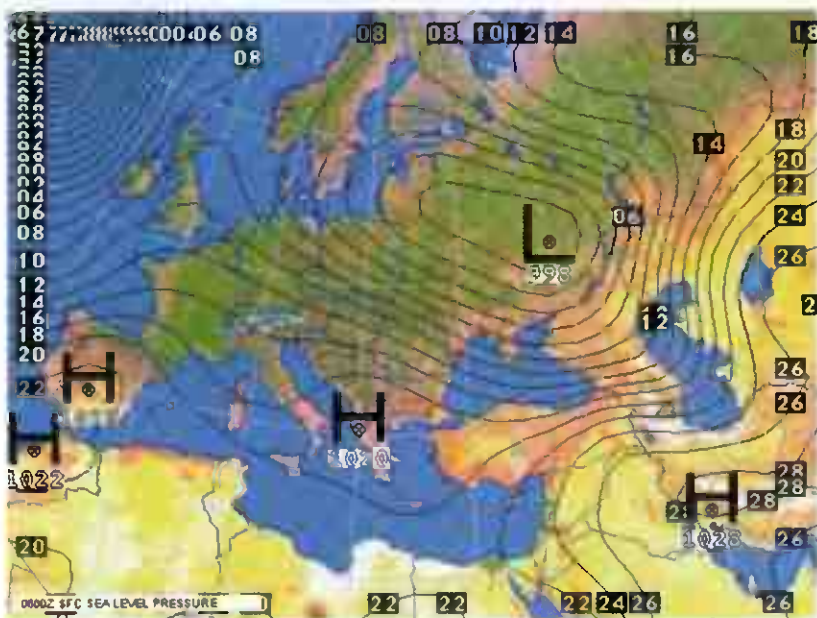
anyone out there knows different, please drop me a line.

It's the development of this reliable and relatively high-speed data link that has made h.f. E-mail a commercial reality. Whilst I'm sure many of you would like to be able to take a listen, that would currently take a fairly heavy investment in a PACTOR-II terminal, I don't doubt that someone will develop a monitoring package in the near future.

If you would like more information on the commercial system take a look at the SCS site for starters. They can be found at:  
<http://www.scs-ptc.com/>

Photo-realistic plot of the UK using Digital Atmosphere.

Digital Atmosphere plot of Europe.



■ PAUL ESSERY GW3KFE, PO BOX 4, NEWTOWN, POWYS SY16 1ZZ

# Amateur Bands

Last time out, I was chuntering-on about using simple receivers. Given that a single valve or f.e.t. gives us the same sensitivity as a 'black box' the difference is that to get results with the simple set-up we must learn skills. Those skills aren't used so much with a 'black box', but they are still needed. Watch an expert extract a loggable signal from what the novice couldn't even begin to untangle, then you'll know what I mean.

Talking of noises, back in the 40s and 50s our receivers needed to be able to reach the incoming natural noise above about 10MHz. Nowadays, manmade noise swamps everything up to above 30MHz and needs suppression at source. Perhaps we can persuade the nice Editor to run a series on this neglected topic?

I've been to Aberystwyth hospital for more blood. An exercise in patience...one drop every fifty seconds, about five drops to a millilitre and about a litre to go in.

'J' had suffered something which left his speech seriously impaired, slowed his thoughts and reactions and, worse, paralysed all his right side. Two nurses to move him from bed to chair, right hand lying inert in his lap. A score or more books on the windowsill unused. I guessed him to be about twenty years younger than me. If my eyes saw right, his wife brought in a validation document from the RA, raising thoughts in my tiny mind that he might be an amateur.

We use both hands for most things and we are usually 'handed'. 'J' could use a spoon on his dessert, but couldn't keep the dish still. Taking that lesson to amateur radio, if that happened to me, I'd at least be able to use my c.w. keyer and scrap pad lefthanded, though I guess Galina would have to make a fair copy log.

What about a 'B' licensee? His hobby has gone if he can't copy the c.w. and send it, with whatever hand is still useful.

As for keeping things still, I was a bit surprised that 'J' hadn't got a bit of 'Slip-not' under his dishes - wonderful stuff, stopped all my problems with 'walking' keys and things sliding about in the car. I'm sure the physio Dept down below would have had some.

How glad I am that I learned to write and send Morse with either hand. I understand now why the late G2DC was in tears after his stroke. I learned it to win a bet was all.

## Letters

First to be opened was the envelope containing the International Listeners Association magazine *Just Listening*. Interestingly enough, while there were lots of familiar names in the various non-amateur sections, the amateur bands list contained none, and GW4OXB's editorial remarks that 144 and 432MHz are almost unused in his neck of the woods - it's the same here. Membership of ILA costs a 'fiver' a year in UK - the address is **1 Jersey Street, Hafod, Swansea SA1 2HF, E-mail: worldradio@madasafish.com**

Next, **Harry Richards** in Barton-on-Humber comes back on my recent comments. Apparently, ILR chose to site their m.w. transmitter on the banks of the Humber and the local know-alls said it 'wouldn't get out'. In reality, man-made ground systems just aren't in the same league as Mother Nature - sure we can put out lots of half-wave radials to reduce loss of power, but we really are looking for our 'good ground' to reach out many wavelengths from the antenna, and for that nature must help.

The **Goodhalls** in Oxford next. Peter duly went into

Oxford Radcliffe Hospital at 0730 on November 28th and had the corneal graft on his left eye. Assuming it all goes well - and we'll know by next time - then Peter will have sight in that eye, and sometime in 2001 he will go in again for t'other eye to be done. Meantime, looking at the list I guess most are Peter's hearings logged by father Paul - Peter has always had the knack of picking out the good 'uns!

Two letters from **Colin Dean** in Barnsley this time, trying to confuse me, hi. 28MHz: BV5BG, CP6XE, C6AFV, DU3BBY, EK6OTA, E30TA, FP/N8KR, FR5FD, FS/AH8DX, FY5FY, HL5FUA, JT1BV, J28LP, J28VS, NP2KW, OD5/OK1MU, PJ2MI, PZ5JR, P43E, TG9NX, VP5/LA4DCA, VR2MY, V47KP, XT2DE, XT2OW, YB0A, ZL1COR, ZL4PD, 5A1A, 5C8M (=CN), 5R8FL, 7Q7CE, 8N2000, 8P9HW, 9J2BO and 9K2/XE1KK.

In the second one he adds AP2/G0EUV, CP6XE, D44AC, EK6OTA, EX2T, EY8CQ, FG5DH, FH5CB, J28VS, KL7MH, NH6YK, NP2KW, OY1A, P40P, P43E, SY2A (Mt Athos), T3AET, TS7V (3V in disguise), T77M, UN8LW, VO2NS, VP9/W9AEB, VU2XD, WP2Z, YC0JIO, ZF2MU, 3E1DX, 5A1A and 5T5U. Picking on 21MHz to save space, we find EK8WY, E23AQ, OH0JTU, VK3VOF, VQ9GB, XE1YQQ, YC4SLC, 1B1/OE5GML 9K2RA and 9V1WW.

That '1B1' rates about as highly as the clowns signing 1SL1 from 'Sealand' - akin to the worth of a nine-bob note and piratical into the bargain.

Next we have a letter from **Ted Trowell** (Minster, Isle of Sheppey) who is a c.w. merchant. He tried Top Band and found VK6VZ, plus OY3QN and TS7N, while 3.5MHz picked out EA8/DL3AO and 5C8M. A morning on 7MHz yielded FM/G3TXF and an evening TS7N, A61AJ and 7X4AN.

10MHz gave DS4CNB, A52DX, 5H3RK, ZL2AGY, FY/DL5CF, 5C8M, FR5FD, EP2MKO, OX3NUK, J79GU (via DL5XAT), J75KG, 3DA0NL, 8P9FX, HF0POL, FM/G3TXF, CX3AL, JW/DJ3KR, FP/AC8W, T88TU, and XQ0C. Skipping to 28MHz we find ZL2AL, 7X4AN, BD5HAG, VU2VLH, JY9NX, HZ1AB, P3A, A45XR, 3B8/DL7DF, ZP5KO, PQ2Q, JX7DFA, 9Y4NW, PY6AN, HK5YC, ZF2RV and XE2MX.

## Coming Events

For several months, Yannick F6FYD will be in Mauritania. R1ANC and R1AND will be in Antarctica until February. You may have noticed more activity from Aaland OH0. A population of 25000 supports 30 licensed amateurs.

FO0CLA is on Tuamotu for eight months from December 6, with a possible side trip to Rurutu. The Swiss group report they are promised both licence and landing permit for Agalega in May.

## Q-Codes & Antennas

In both cases you can remember G2DYM. Richard publishes a complete listing of Q codes, priced at £8.50 plus £1.50 P&P. The G2DYM range of antennas are well known and have been so for years now, and Richard's 'E' range of traps look good for those who wish to home-brew. G2DYM is at **Uplowman, Tiverton, Devon EX16 7PH** and his telephone number **(01398) 361215** after 1800.

## Ending

That's it for another month. Input as always to reach me by the first of the month addressed to **Box 4 Newtown, Powys SY16 1ZZ**. Also, how about some more contributors/contributions?



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Mast diameter 30-50mm can be fitted  
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### ARA 60

#### Technical performance

Frequency range 40kHz-60MHz (full performance) 60-120MHz  
2-3dB less gain

Output impedance 50-75 ohm coaxial  
Connector to Rx PL type delivered as standard. Other standards can be fitted on request

Gain 10dB +/-0.2dBs  
Intercept Point +50dBm IP 3rd order (10MHz/12V)

DC power supply 11.5-13 volt DC at 80mA typ. (230V/12V DC stabilised mains adaptor is supplied with the antenna)

Mast diameter 30-50mm can be fitted  
Dimensions 115cm total length. Antenna tube 50mm x 160mm  
Ideal for base stations



### ARA 2000

#### Technical performance

Frequency range 50-2000MHz  
Output impedance 50-75 ohms coaxial

Gain 19dB -1000MHz  
18dB -1400MHz  
16dB -2000MHz

Noise figure 1.5-2dB -1000MHz  
1.8-2.5dB -1500MHz  
2.5-4dB -2000MHz

3rd order IP +35dB typical  
Output impedance 50-75 ohms coaxial  
Connector standards N type connector at the antenna. BNC male connector to the receiver

Power supply 12V DC at 160mA DC. Power supply for 230V AC is delivered comes with the antenna

Dimensions Length 450mm.  
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# Attention-123!

## ENIGMA 2000

By the time you read this it will be 2001 and yet in this age of super-efficient data transmission, Numbers Stations are still with us. In our last column, we briefly mentioned a new group, ENIGMA 2000, which is carrying on much of ENIGMA's work. ENIGMA 2000 publishes an interesting bi-monthly newsletter on their website, whose address is <http://reachus.at/enigma>

ENIGMA (1) can still be contacted at the above mailing address. Although we are no longer a membership organisation, all logs and contributions are still very welcome. Important information and analysis will be published and/or shared with ENIGMA 2000, for distribution on the Internet.

## What Are Repeat Sequences?

A recent Internet discussion again shows a lack of understanding of the meaning of Repeat Sequences. In this case, it concerns the very active Cuban Intelligence networks M8 and V2A. Their transmissions all include three 150 5-figure group messages (either in 'cut-numbers' Morse or a Spanish female announcer). Each message is associated with a 5-figure header, which is not of a random nature. The first four figures, themselves not entirely random, can be loosely termed a message indicator - they are associated with a particular message. The last figure is the Repeat Indicator, but this has no connection with Repeat Sequence.

The Repeat Sequence is a station's routine method of sending repeats. Several stations, including M8 and V2A, send repeats routinely one hour later on a different frequency. In these transmissions, all three messages (and their headers) are the same as in the first transmission. However, messages often need to be sent over a longer period than this. When this is necessary, subsequent transmissions (each repeated an hour later) are consecutively numbered by using the Repeat Indicator.

The first transmission and scheduled Repeat Sequence of any message will always have 1 as the 5th figure of the header. If this message is carried over to the next day, it will be numbered 2, etc. MIs up to 3 are common, but 4 and above become increasingly rare. Of the three messages in any transmission, one, two or all messages may or may not have been carried over in this way.

Many stations operate various types of Repeat Sequence, but no others number their messages in this particular way. For further information, please see our ENIGMA Booklet, which is invaluable for the understanding of Numbers Stations and their habits, and is available from the above address at £7.50 for both sections, including postage.

Often a message is repeated, within the same transmission, as a standard part of its format. Not all stations operate repeat sequences, not all carry over messages. A few may even send a message only once. Message periods may vary from once only to many months. M23s 0800 and 1400 schedule is still sending its daily null message SN (579) and has been doing so for years now, without a single message being sent!

## Another Record Broken

The longest message recorded, of 431 groups, has been broken by a member of the same Russian family (Family Ia). On 24th November, an E6 transmission lasting over 1.5 hours began at 2100 (and ending at 2234) on 6.780MHz, contained a single message (DK 436) of 517 groups. Imagine copying that lot down! This was repeated on a lower frequency at 2200, and this time the call lasted an extra 32 minutes, making the whole transmission 2 hours and 6 minutes long. This is interesting for the prolonged call was necessary as it gave the recipient three minutes to retune, before the repeated message began. All those groups laboriously copied down by the recipient/s would then have been checked again! It seems that whatever the length of message, the repeat sequence always begins one hour later. The schedule concerned, 915, also sent a very long message in May - 336 groups.

Family Ib has been busy sending long messages too, for in October, G7s transmissions included messages of 257 and 261 groups.

## 'Cherry Ripe' E3A

M16s ('Government Communication Bureau') has changed the schedule of

some of its Far Eastern service transmissions, they are now as follows:

UTC	MHz
2200	77777//24.644
2300	18864//21.866
0000	18864//21.866
0100	77777//21.866

Perhaps somebody could find the missing frequencies. Here's the entire list of known E3A frequencies:

7.484, 8.230, 9.263, 10.452, 12.056, 15.624, 17.499, 18.864, 19.884, 20.474, 21.866, 22.108, 23.461, 24.644

Some of these are very high, but recently Russian Numbers Stations have been heard operating in the 23MHz region.

## 'Lincolnshire Poacher' E3

GCBs European and Middle Eastern Service schedule has remained stable, but Axel in Germany has listed a week's recent headers, which may be of interest to those who are unacquainted with E3s habits. It operates a 14-day message period and the following section commences on Monday 15th November:-

UTC	Mon	Tues	Wed	Thur	Fri	Sat	Sun
1200	*58421	58421	58421	58421	58421	58421	58421
1300	+37064	37064	37064	37064	37064	37064	37064
1400	65776	10753	39221	72354	58421*	94803	22383
1500	22383	65776	10753	39221	72354	58421*	44250
1600	44250	22383	65776	10753	39221	72354	94803
1700	94803	44250	22383	65776	10753	39221	58421*
1800	58421*	94803	44250	22383	65776	10753	72354
1900	72354	37064-	94803	37064+	22383	65776	37064+
2000	37064+	58421*	37064+	44250	37064-	22383	39221
2100	39221	72354	58421*	94803	44250	65776	10753
2200	10753	39221	72354	58421*	94803	44250	65776

Bold headers represent their first appearance in the schedules. Note that 1200 and 1300 time-slots send the same message each day (identified here by \* and +), which at other times are slotted into the sliding schedules used by the remaining eight headers.

## The 'Slot Machine'

Although not a Numbers Station, this is certainly an unexplained oddity. It operates continuously 24 hours a day on 6.417//6.4451//8.588//8.7035MHz all in parallel. I have heard it on the two higher frequencies, but generally it is reported from USA and seems to be coming from Japan, China or Russia.

From the frequencies used, it would appear to be some kind of maritime data mode. It makes a series of 'chopping/beeping' noises and has two 'states of operation', one being more rhythmic than the other. Spectrum analysis suggests a kind of multi-tone p.s.k. employing a continuous 11Hz on/off keying. The six unevenly-spaced tones repeat a seven second musically-sounding cycle. This consists of an 800Hz tone followed by two offset 160Hz tones, then the three remaining tones, then a jumbled up steady chorus! Every few minutes this all stops and is replaced by a louder hiss! Has anybody got any ideas?

Many more oddities still abound on the h.f. bands. The ever-present 'faders' which we mentioned some time ago are almost as great a mystery now as they were then. All we know is that some of them emanate from the h.f. compound at USAF Mildenhall, and that the other US or NATO bases around Europe will certainly be involved. We hope that you will be able to monitor the output of their nearest h.f. transmitting sites and tell us what you hear. As d.f. work is hampered by lack of coordination, and as simple loop antennas are next to useless for serious work, this is the only reliable way to locate transmissions, and its not difficult to come up with results.

The mysteries will remain, if no-one makes any effort to solve them.

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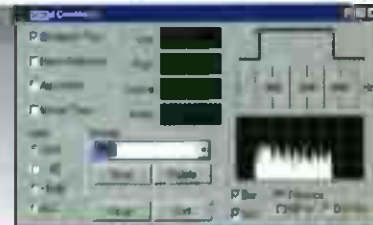
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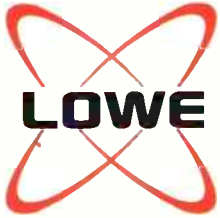
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All external connections needed are available on the rear panel, and the receiver can be run from internal batteries or an external 12V DC power source. It is ready for an active antenna, with a DC feed already available at the antenna socket.

Ordering Information Product Code: HF-350

**Low Price £375.00**

Carriage: £10.00  
by Courier



## MVT7100

**In our view...simply the best!**

This is the scanner of choice for many of our serious users. If a radio is transmitting and you are close enough you will hear it on the MVT7100. Superb for monitoring military and civil airband channels - also allows you to listen to ground crews and base security. Its shortwave coverage with SSB offers opportunities for monitoring Shanwick and the trans-Atlantic routes!

- LSB/USB/AM/WBFM/NBFM Reception
- 1000 memory channels
- High sensitivity
- Signal Strength Meter
- Illuminated keypad
- High speed search & scan functions
- User friendly
- Battery save function
- Priority function
- Individual power/volume and
- Tuning dial
- Channel pass function on memory



Ordering Information  
Product Code: MVT7100

**Low Price £229.00**

Carriage: £10.00 by Courier

Ordering Information  
Product Code: IC-R2E

**Low Price £149.00**

Carriage: £10.00 by Courier

## IC-R2

Our lowest priced full coverage scanner also happens to be our smallest! The frequency coverage is from 0.495MHz to 1309.995MHz with NO GAPS making it ideal for monitoring military airband channels.

Ordering Information  
Product Code: MVT-7300

**Low Price £289.00**

Carriage: £10.00 by Courier



- Full coverage from 531kHz to 1320MHz
- Wide FM
- Narrow FM, AM
- Narrow AM, LSB and USB
- 8.33kHz channel steps are correctly implemented
- 1000 memories
- Supplied with belt clip, wrist loop, flexible antenna.
- Optional accessories include NiMh batteries at

£8.95 and matching charger at £9.95

Low Electronics Ltd  
Chesterfield Road  
Matlock  
Derbyshire  
DE4 5LE

Tel: (01629) 580800  
Fax: (01629) 580020  
E-mail: [info@lowe.co.uk](mailto:info@lowe.co.uk)  
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Send us four first-class stamps for our latest full colour catalogue, full of receivers, antennas, books, accessories, nightvision and GPS receivers and more!