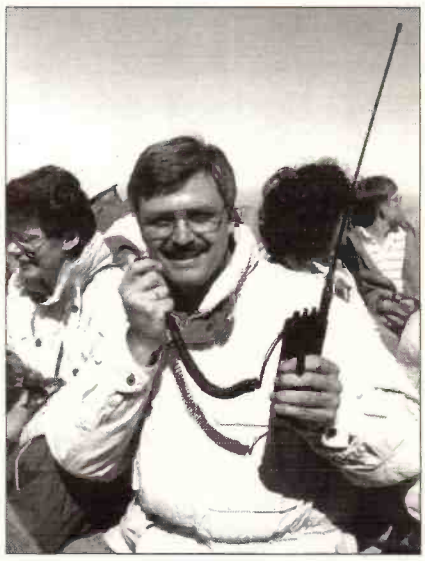
The Lister Turm - Hannover. This magnificent building is situated in a woodland setting about 2km from the city centre. The tower houses the club room for DL0HV, DOK H13, the largest club in the area.



Portable operating is very popular in Germany. Here is Detlef DL1EJD from DOK R22 working on 144 and 430MHz from the top of the Zugspitze - Germany's highest mountain at 2964m. Many operators like Detlef would be interested to get reports of their signals, even when heard via a repeater. Confirmations of such reports are valid for the DLD.

loop or frame antenna.

In searching for new DOKs look out for the main German contests. One good one for DLD-hunters is the Worked all Germany (WAG) as DOK numbers are used as part of the contest exchange. Also listen out for members of the Diplom-Interessen-Gruppe (DiG) who, as keen award-hunters, can be relied on to encourage listeners who send out accurate reports.

QSLing

Listeners interested in collecting QSL cards are always told to 'make your report useful'. Great advice that is impossible to follow! Unlike short wave broadcast stations, who depend on listener feedback, radio amateurs can find out very quickly how their equipment is working and where their signals are going to. It is hard to imagine any circumstance where a listener report received weeks or even months after a contact can ever be of use. What can be done though is to make reports interesting.

Listener reports are unsolicited and to have any chance of being replied to they must be prepared with extra care and attention to detail. Like many other amateurs I am happy to reply to reports that are presented in a way that makes it easy to confirm the details. If this can't be done then there is no option but to reject the card.

My top tips for listeners who send QSLs to amateur stations are:

1. Above all else make it accurate and easy to read. If you can't write legibly, type your card.
2. Make sure that the date/time/band etc are clearly stated. Give the time in UTC (=GMT) and write the month in words e.g 12 May 1992.
3. Take particular care with figures '1' and '7', and letters 'I' and 'J'.
4. Try to make your report interesting. Don't just log a station and rush on to find another. Listen for a while and you might pick up some point of common interest that you can comment on in your report.
5. Tell the station why you want his card. "I would like your card for the DLD award" is far more positive than a general request to "pse QSL".
6. Some of the top listeners have a box or section on their card that an amateur who doesn't have cards can sign to verify the report. This is an excellent idea as long as you remember to ask for the DOK to be confirmed on the card.

Using the Bureau

Bulk handling of QSLs by the bureau spares you the enormous cost of posting cards individually though you do have to accept the inevitable delay in getting replies. However, as both the RSGB and DARC bureaux are well organised and served by reasonably efficient postal services, response time is much less than for QSLing to DX stations on the other side of the world. You can also cut out some of the delay by sending your cards direct to the DARC QSL Bureau at Baunatal.

All major national bureaux regularly handle an enormous number of cards for their members. Figures published by the RSGB and DARC show that they each currently deal with more than three million per year. With so many cards circulating in the system it is not surprising that some go astray, especially as much of the work is done by dedicated volunteers in their spare time.

Follow a few simple rules, and not only will you reduce the workload for bureau staff but you will also help to prevent your cards being among those that get lost. Start by choosing a card of standard size and thickness. Oversize cards are certain to be damaged in transit, and small ones are difficult to sort. Likewise, very thick cards are a nuisance to handle and they add unnecessarily to postal costs. DARC ask that cards are printed on 170 - 220g.s.m. card not smaller than normal postcard size or bigger than DIN A6. The IARU simply recommend standard postcard size.

Next write the addressee's call sign and any other routing information clearly at the top right hand side of the back of the card. Cards should then be sorted the same way up in alphabetical order.

Finally, put your cards in an envelope that is strong enough to survive the rigours of the postal system without it having to be bandaged with a mile of sticky tape. Affix the correct amount of postage, and send the packet on it's way knowing that you have done everything possible to ensure safe delivery of your precious cards.

QSL Direct

Sending your cards direct with an s.a.e. for a reply will usually produce faster results and an improvement in the number of returns. The disadvantage is that it is an expensive business when large numbers of cards are involved. Unless you are lucky enough to be very rich I suggest that you forget direct QSLing until you are near your goal and become impatient for the last few cards. For a reply from Germany one IRC will pay the postage for letters of up to 20gm in an envelope that is not bigger than 235mm x 120mm. If larger envelopes are used two IRCs will cover the postage for 50gm. An alternative to the use of IRCs is to stamp return envelopes with the correct German postage, currently 1.00DM for a standard letter. As this is equivalent to more than 40p (at £1 = DM 2.42) mint German stamps from a dealer are not going to be a lot cheaper than an IRC. However a saving could be made if you have friends or relatives holidaying in Germany who can buy stamps for you locally.

Finale

I hope that the above comments and information will interest listeners who enjoy collecting QSL cards and operating certificates. Whilst the article is about the DLD SWL Award, many of the suggestions are applicable to all QSLing. Take note of the advice given, which is largely common sense anyway, and it will help to increase your QSL return rates.

Happy Hunting. Have fun and enjoy yourself. ■

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Lowe Modemaster

Lowe Electronics have just released a brand new decoding system to supplement their range of receiving systems. Here, Mike Richards puts it through its paces.

The new Modemaster from Lowe Electronics is a software based utility decoding system designed to run on IBM compatible computer systems. Although there are many features to link the decoder to the popular HF-150, the package can run with any good quality short wave receiver. Included in its armoury of modes is FAX, RTTY, NAVTEX, FEC and Morse code. These features combined with on-line help and simple interconnections make it very attractive to the utility listener.

Installation

The hardware demands were quite modest as it could operate with an IBM PC/XT or 80286 or higher. For the display, Modemaster supports a wide range of systems, but you really need EGA or VGA to do the package justice. Installation of the software was very simple thanks to the provision of an INSTALL batch file to automate the process. The software was supplied on both 3.5 and 5.25in floppies, both of which were formatted at the lower densities i.e. 720K and 360K respectively. In order to give full interworking with the HF-150 receiver, you will need the IF-150 interface and store the associated RADIO programs in the same directory as Modemaster.

One of the difficulties encountered by many inexperienced computer users is matching programs to work with their computer hardware. Once you get into the world of Windows and some of the more complex configurations of the modern PC, this can be a potential minefield. Lowe have recognised this and built auto sensing software into the Modemaster. This enables the Modemaster to automatically set itself up for most computer systems. This auto sense feature is also set up to make full use of any high memory that may be available. This gives much faster display and manipulation of FAX pictures. For those that want or need to make fine adjustments, there are a full range of command line switches that can be used to pre-set the way in which the program runs. Modemaster will also run on any of the PC's serial ports from 1 to 4. This is good point as many people run a mouse on serial port 1.

With the software installation complete, the next task was to make the connection to the receiver. This comprised connecting the supplied lead from the computer's serial port to the audio output of the receiver. The input level requirements were around 100mV so it could either be connected to the external speaker jack or the tape output. One particularly good point with this interface was the construction of the serial port connector that enabled another serial connector to be piggy backed. This was particularly handy when using the IF-150 interface with the HF-150 receiver.

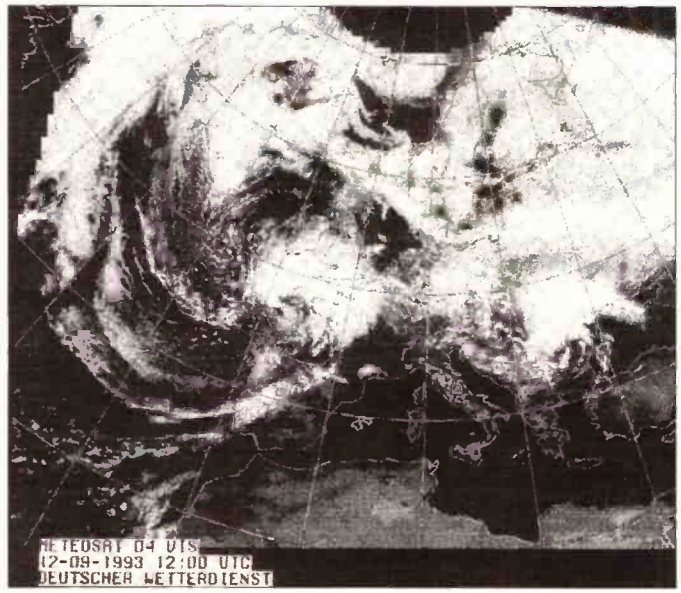
The only other installation setting to be made is the printer selection. The Modemaster supports Epson compatible 9- and 24-pin dot matrix types plus Hewlett Packard Laserjet and Deskjet compatible systems.

On completion of the installation, the comprehensive manual provided clear guidance on the operation. The manual was very well presented in an 85-page A5 ring binder. Incidentally, this binder also had provision for storing the system disks. In addition to providing details about the operation, the manual contained tutorials for most of the modes with some very useful reference data.

Comprehensive FAX

One of the star features of the Modemaster is its handling of h.f. FAX reception. As you can see from the examples in the review, the receive quality is very good indeed. All the standard modes are catered for with drum speeds of 60, 90, 120 and 240 r.p.m. The IOC (Index of Co-operation) range is 288, 352 and 576, which again covers all the common settings. In addition to pre-set speeds and IOCs, the Modemaster includes an auto sensing system. In this mode, the program uses the transmitted start tone and synchronisation pulses to determine the speed and IOC. For most users, this is the preferred method of reception.

To enter the basic FAX reception mode, Input New Picture option is selected from the main menu. You are then presented with a blank screen except for a row of help text along the bottom of the screen. The various receive parameters may be changed by using the function keys indicated by the Help text. As well as the speed and IOC you can also invert and reverse the image. Many listeners have problems matching their FAX decoding programs with the computer's internal system



clocks. The Modemaster handles this very neatly with coarse and fine adjustments that are available whilst receiving the picture. When you leave the input screen and return to the main menu, you are prompted to save the new clock values. This is one of the best timing adjustment systems I've come across.

In order to achieve good quality FAX images, the receiver tuning becomes very critical. This applies particularly when receiving photographs such as the re-broadcast Meteosat images. The Modemaster has an excellent automatic grey scale tracking system. This system is paired with a very effective Miniscope tuning display. When activated, this gives a display at the bottom of the screen with two horizontal lines and a sample of the signal running between the two. In practice the top trace represents white, while the bottom trace shows pure black. To manually optimise the tuning you simply move the top and bottom traces with the function keys so that they just touch the extremes of the incoming signal. One great advantage of this is that good quality FAX images can be received even if your receiver has relatively coarse tuning steps.

Although the manual adjustment is very useful, it's the auto tracking mode that steals the show. Once activated this provides automatic adjustment of the black and white levels. In practice this proved to be extremely effective and gave very consistent results. I found that it could be left to handle virtually all signals and was only fooled by strong adjacent interfering signals. Automatic reception also proved to be very competent, with excellent synchronisation and reliable mode selection.

Once an image had been successfully received, you could save it to disk by using the SAVE option from the main menu. Viewing the saved pictures was another menu option and gave access to a number of advanced features. With the picture loaded and displayed you could perform a number of manipulations to enhance or correct the image. The simplest of these was the ability to lighten or darken the displayed image. This was done very simply by pressing D for darken and B for brighten! If you're using an EGA or VGA display you also have access to a grey scale or colour editor. With this you can set the value for each element of the respective scale.

Whilst in the view mode there was a very powerful zoom mode for examining the image in greater detail. One unusual feature of this was the ability to multi-zoom an image. This meant that you could zoom-in on an image that had already been magnified. Although the detail becomes coarser as you zoom, it can still reveal useful information. Whilst in the view mode you can also rotate, flip and invert the picture to provide the required final picture. Once the manipulations are complete the amended image can be saved to disk.

If you want a print-out of any charts you have two options -

either a direct printout or save the picture as a PCX or GIF file. With the latter option the picture can be processed and printed using a wide range of standard graphics packages. This is particularly useful if you don't have an Epson or Hewlett Packard compatible printer. You can also use this feature to tidy-up images that have suffered interference patterns.

One novel feature was the inclusion of a slide show facility. With this you could assemble a set of images for automatic display one after the other. I found this to be particularly good for dealing with satellite pictures. By creating a slide show of images received over a day or two you could clearly see the way in which the weather systems were moving.

Unattended Reception

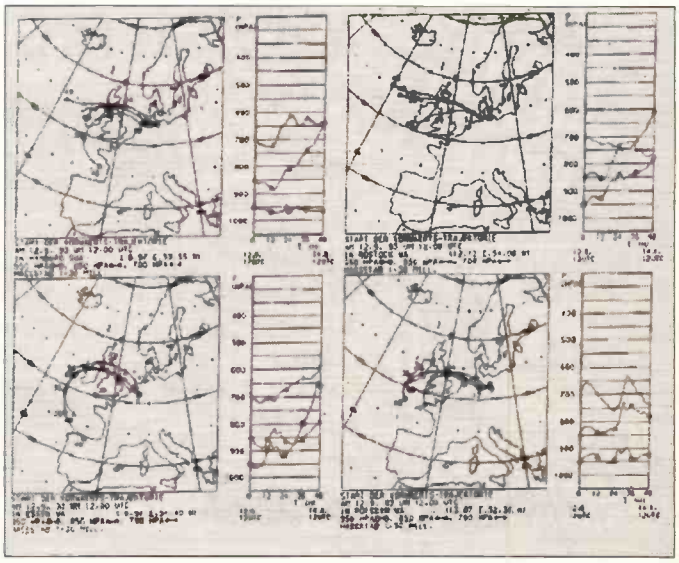
With FAX charts being a rather longwinded way of communicating, it's extremely useful to be able to set-up unattended operation. Modemaster handles this extremely well, particularly if you have an HF-150 receiver and interface. This facility revolves around the use of a specially formatted ASCII file called an Autolist. This is a specific list of filename, times, dates, frequencies and FAX modes. Creation and amendment of the list is done using the in-built autolist editor. Linked with this list is a FAX database that comes set-up with the full frequencies and schedules of most of the current h.f. FAX stations. This database could be used to speed-up the creation of the Autolist. All you had to do was select the required station, frequency and chart type and the information was automatically transferred into the Autolist. When the list was complete, it can be saved using a name of your choice for use later. You can even use the system to produce a general purpose autolist for a specific station by using 'wild cards' in the date and time fields. Another important feature of the FAX database was the facility to include a receiver off-set. Most experienced utility listeners will know that you have to add an off-set to the published station frequencies to obtain the correct audio tones for your decoder. The FAX database can be programmed with this off-set which is automatically transferred to the HF-150 when the station is selected.

To start unattended reception you start with the normal FAX receive mode but press 'Alt' + 'L' to pass control to the autolist. When combined with the HF-150 receiver this gave an extremely effective FAX reception system. During the review I was able to set up complex station changes and schedules and leave the system to get on with it. When using unattended reception the auto grey scale tracking system really comes into its own. You can switch from 800Hz shift h.f. stations to 150Hz shift l.f. stations and back again and the program doesn't falter. Throughout the review, the auto FAX reception proved to be remarkably reliable.

Utilities

In addition to its excellent FAX modes, the Modemaster features a number of other popular utility modes. Perhaps the most common of these is standard RTTY. The Modemaster implementation was very well presented with a full screen display available for the received text. Like it's FAX counterpart, most of the receive adjustments were indicated by a row of help text at the bottom of the screen. With this you can cycle through the standard baud rates of 45, 50, 60, 75, 83 and 100 baud. If you need to add any other speeds these are simply typed into the appropriate line of the ASCII CONFIG file. The tuning scope and auto-tracking features of the FAX mode were very effectively carried through into the RTTY mode. This was supplemented with a baud measurement and setting system. These two features were combined to provide a very useful automatic baud and tuning facility. This will have particular appeal to new comers to utilities who often have problems selecting the right settings for speed and tuning. Although the RTTY mode included a Miniscope tuning indicator I found the automatic tracking function so effective there was hardly any need to bother with manual tuning. To help capture interesting transmissions, the Modemaster includes a comprehensive buffer system. This can be reviewed at any time and dumped to a printer or disk file. By far the best way to operate this is to leave the buffer switched on so that any information is safely tucked away for review later. You don't have to worry about filling your computer's memory as the buffer size is limited with the oldest data being overwritten as the buffer fills.

A competent c.w. mode was also included in the Modemaster's range of facilities. The implementation was very straightforward and incorporated automatic speed tracking and the facility to alter the inter-character spacing. This was very good for tailoring the system to match various sending styles. Tuning in this mode was by manual adjustment of the receiver until a green block at the bottom of the screen was seen to flash in synchronisation with the incoming signal. Although this is perhaps a very simple tuning system it worked very well.



FAX chart produced using Modemaster.

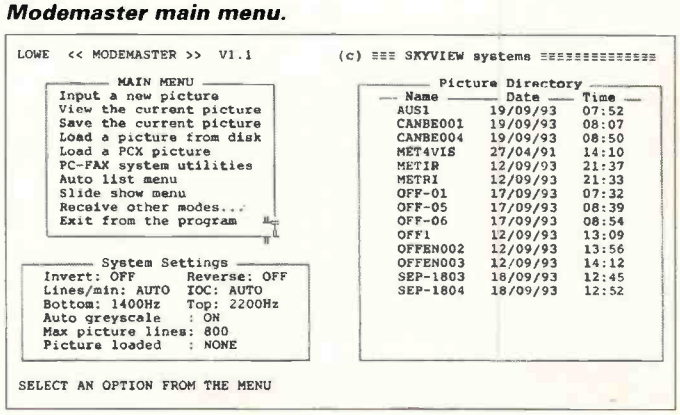
Last of the utility modes was provision for FEC and NAVTEX monitoring. Both these systems use the FEC transmission mode, but the NAVTEX option includes some interesting extras. As the name implies NAVTEX is essentially an automatic information system for mariners. A key part of its operation is the use of special station and message codes. This enables the mariner to select the message types and areas that are of interest and ignore the rest. The Modemaster includes a full range of selection options so the operator can decide exactly what type of information is to be displayed. For the HF-150 user, selecting NAVTEX automatically retuned the receiver to 518kHz with the appropriate frequency offset. The remaining tuning and buffering facilities for both NAVTEX and FEC were much the same as those provided for the RTTY mode.

Summary

The Modemaster is certainly a very capable and well presented decoding system that will, no doubt, be a great success. I was particularly impressed with the automated tuning facilities as they go a long way towards ensuring good results for first time users. The nearest I could get to a criticism was the lack of a SITOR receive mode - I would have thought this should be included in a package of this quality. Perhaps they'll take the hint and produce an upgrade.

The Modemaster really comes to life when it's combined with the excellent Lowe HF-150 receiver. The result of this marriage is an exceptionally neat and effective utility station that can rival the best currently available. For the FAX enthusiast, the facilities for unattended operation are a great time saver and give easy access to pictures that previously required burning considerable amounts of midnight oil! Perhaps the final accolade is that I am about to part with my hard-earned cash and purchase a copy of Modemaster for myself! If you would like to join me, Modemaster costs £159.95 + £3.00 P & P and is available from **Lowe Electronics, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 580800.** Alternatively you could contact any of Lowe Electronics regional branches. My thanks to Lowe Electronics for the loan of the review model. ■

Modemaster main menu.



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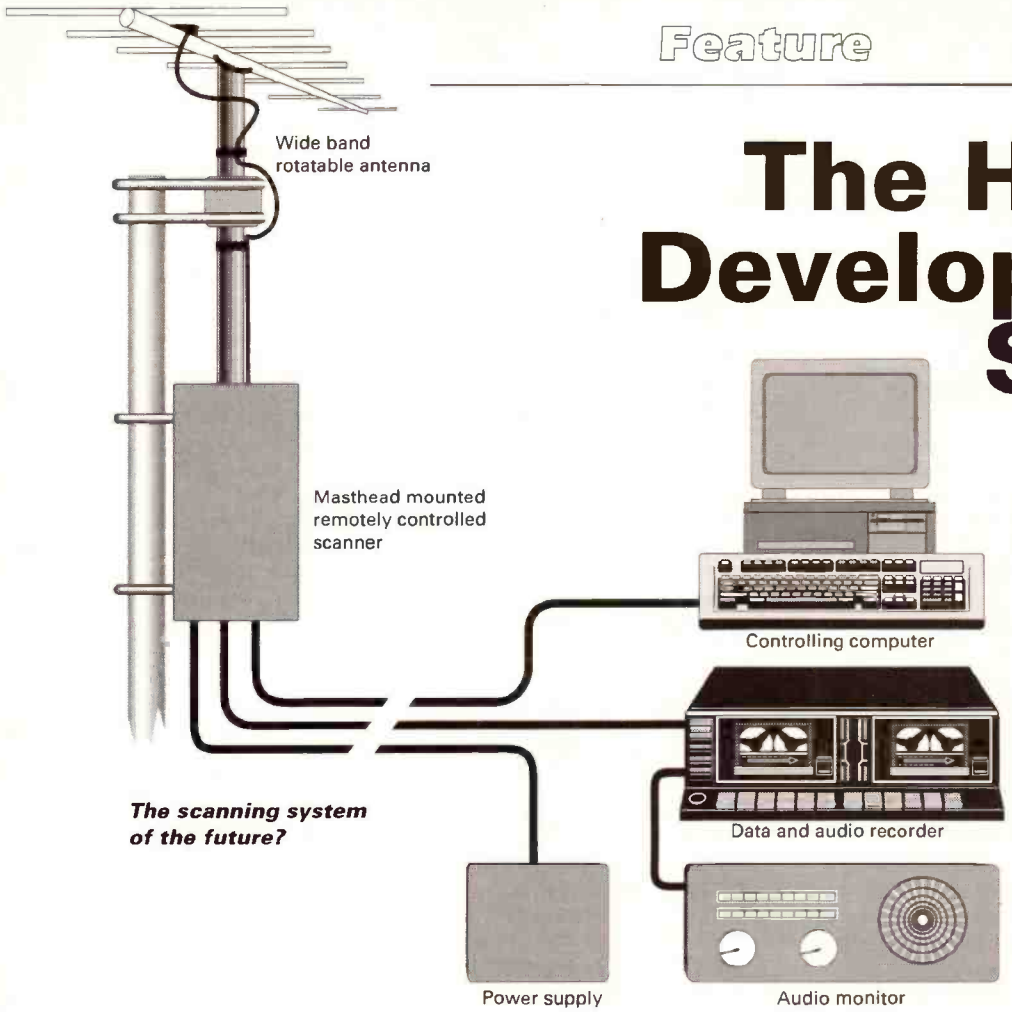
The Historical Development of Scanners



The scanning system of the future?

A dictionary definition of the verb to 'scan' is 'to look at all parts successively...intently or quickly'. From which we may take it that the original scanning system, in the sense that the term is used in radio circles today, was some short wave listener 'intently' tuning his receiver over the amateur or broadcast band and 'looking' at each received signal in 'succession'. Or, then again, asks John C. Belcher, was he?

According to an early RSGB *Amateur Radio Handbook*, a typical s.w.l. in the late 1930s had his 'radio shack' in the third bedroom over the hall in his £1000 semi-detached residence. Seemingly, being in that income bracket, he would likely employ the latest single-signal-superheterodyne h.f. receiver, together with an h.f. pre-selector and crystal calibrator. Hence, with his crystal gate set at minimum bandwidth and correctly phased, with the b.f.o. at optimum, he would at any one time be monitoring a frequency bandwidth of some 200Hz. Effectively dividing up the 10m band into 10 000 separate channels. Assuming, then, that he listened 'intently' to each 'channel' in 'succession' for some 10 seconds, we find that it would take him over 24 hours to scan the whole of the 10m band. An operation hardly warranting the description 'quickly'.

Admittedly, the example given is not a typical one. As a lowly BRS at the time, living in the wilds of Mistletoe Bough country, lacking mains water and mains electricity, my shack was a corner of the window-sill supporting a home-brew t.r.f. s.w. RX. Even so, it would probably have taken me an hour to tune through the 10m band from one end to the other. And if you think you could do this in 10 minutes, then try it tuning from 100kHz to 2MHz! That said, perhaps I'm slow on the uptake, because even today when I take a look at the c.w. end of 40m, I tend to find that, at the end of a 30-minute session, I've only moved up in frequency by about 20kHz.

The problem with this form of scanning, therefore, is that it is slow. A feature that gives rise to yet a further problem. Murphy's Second Law states that if you are listening to a dead part of the band, then all the activity is on frequencies either side of you. And they all go silent as you tune across them!

What is required, it seems, is a system whereby one can monitor the whole of a given band whilst listening to only a small part of it.

The HF Panoramic Receiver

Two developments came into being to change the situation somewhat.

The first of these was the introduction of the **reactance modulator**, whereby the input of a d.c. potential could electronically tune a variable frequency oscillator. Thus effectively eliminating the need for the mechanical rotation of any variable capacitor.

The second development was the introduction of the electrostatic **cathode-ray oscilloscope**, giving a graphical display of two parameters. These usually being any input **voltage** plotted along the Y-axis and **time** represented by the timebase plotted along the X-axis.

By putting these two developments together, one finished up with a sweep-frequency oscillator, used typically in the alignment of receiver i.f. stages. With the oscillator set to the desired intermediate frequency and its output applied to the mixer, the reactance modulator - activated by a potential from the line timebase - would then sweep, or step, the frequency through the i.f. passband. The oscilloscope effectively indicated this frequency along the X-axis. The oscillator output to the mixer, on passing through the i.f. amplifier, would have its amplitude altered in accordance with the i.f. response. The resulting d.c. component obtained from the second detector, when applied to the Y-amplifier of the oscilloscope, would then display on the screen the overall response of the i.f. amplifier. This, therefore, eliminated the need to manually plot the response curve on paper, the whole situation being instantly displayed on the screen after the fashion of the diagrams in the receiver servicing manual.

A slight re-thinking along these lines led, predictably, to the idea of the panoramic receiver - a receiver that gave a visual display of signals either side of the frequency to which the receiver was tuned.

In general terms, the h.f. panoramic receiver put in appearance as an add-on unit to the normal communications receiver. An adaptor, so to speak, or to use its original tradename - Panadaptor.

Connection to the communications receiver was by way of a screened lead from the output of the mixer that sampled the signal at the primary of the first i.f. transformer. The input transformer of the panadaptor mixer circuit was normally

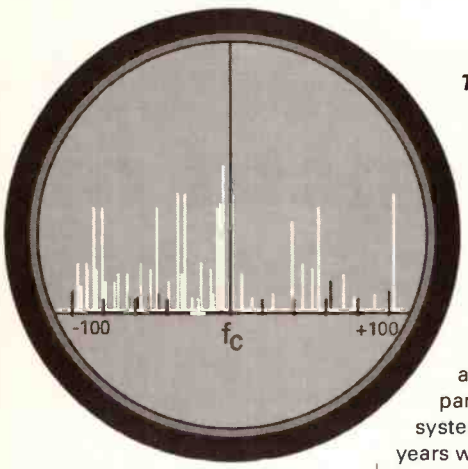


Fig. 1: Typical screen display of a Panadaptor.

overcoupled to equalise its response over a range of some 200kHz. Somewhat greater than the mere 20kHz passband obtaining at the receiver mixer output. The local oscillator of the Panadaptor mixer was then controlled from the c.r.t. timebase after the fashion of the alignment oscillator, tuning the panadaptor mixer over its 200kHz frequency band. The output of the Panadaptor i.f. stages was then applied to the Y-axis of the c.r.t. in the usual manner.

The resulting display on the c.r.t. screen was then a plot of signal strength against frequency. Essentially, a spectrum analysis, or panoramic view, of the radio frequency band monitored. A typical screen display with its viewing graticule is shown in **Fig. 1**.

The importance of this arrangement was that whe reas the audio output of the communications receiver was limited to some ±1.0kHz say, the visual output from the panadaptor extended to ±100kHz. Thus, should a signal poke its head up above the noise level some 75kHz away, one merely tuned the communications receiver until the signal spike coincided with the centre of the screen graticule. At which point, the signal would then appear in the monitoring headphones or loudspeaker.

The popularity of the Panadaptor, in UK amateur circles at least, tended to be overshadowed by the onset of World War II. Thus it never caught on, even during the late 1940s and 1950s.

It did, however, achieve some distinction as a radio monitoring device during the 1940s.

The VHF Panoramic Receiver

One particular application of the panoramic receiving system during the post war years was in the field of radio astronomy - specifically in the u.h.f. bands - in the investigation of solar noise over the radio spectrum 50-500MHz. Ideally, the requirement was for a chart recording plotting frequency scans of solar noise against time. The resultant output was known as a spectroheliogram.

Seemingly, the system employed was but a v.h.f. version of the h.f. Pacific monitoring system. The same limitations being imposed by the v.h.f. receivers' tuned circuits. A more serious problem encountered was that of providing a steerable antenna system covering a 10:1 frequency ratio.

Normally, a solar disturbance results in solar noise being radiated in a discontinuous radio spectrum with time. So, over a period of several minutes, successive traces of the noise spectrum will show differing patterns. In practice, it was discovered that continuous lines of noise appeared on the printouts, and - because of their continuous nature - these were 'identified' as being carrier waves from radio transmissions in the band. What was not appreciated at the time, apparently, was that one of these 'carrier waves' occupied the frequency discovered by the author to be that of a particular spectral line emission!

This, then, underlines the fallacy of taking purely visual displays of radio spectra too much for granted, and failing to properly identify any strange signals that may be present.

The growth of television broadcasting in the UK in the 1950s, predictably brought with it the problem of licence evasion, and the need for effective detection. This led to the introduction of the so-called 'TV Detector Van'.

The early detection systems relied on the reception and location of line timebase radiation from the typical domestic television receiver. The quarry was its second harmonic at some 30kHz, and this imposed serious problems of radio interference from the vehicle's electrical system. The radio receiver employed was a National HRO-M, using a 50-100kHz coil unit modified for reception at 30kHz. Although the radio receiver was itself well screened, the three loop antennas mounted on the roof were open to vehicle interference. Mounted in a horizontal plane their pick-up from the vertically polarised vehicle interference would, of course, be theoretically minimal.

However, as is always found to be the case where mobile reception is concerned - particularly at these frequencies - drastic steps had to be taken to lower the noise level. This led to the rat's nest of suppressed sparking plugs, double screening of all ignition leads, metal shielding of distributor, h.t. coil and dynamo, and general suppression of all electrical auxiliaries! It was said that the mass of earthing and bonding needed provided additional mechanical reinforcement for the chassis and bodywork! As a fitting epitaph, the whole kit and caboodle was a maintenance liability, its final demise bringing many a sigh of relief.

In the early 1960s with the introduction of Band III television broadcasting, a fresh approach to the problem was made. This time attention was focussed on the radiation from the local oscillator of the television set, this being some 35MHz above the channel frequency. This, therefore, called for a v.h.f. receiver covering some 80-130 and 200-270MHz in two bands. What was provided was a panoramic receiver, which enabled mistuned receivers and out-of-service-area reception to be kept under continuous observation. The antenna system, surprisingly simple in design, was a vertical dipole backed by a corner reflector, steerable in azimuth. A delicate touch was the provision of an optical system, after the fashion of a periscope, which enabled the operator to see which house - indeed which room - the antenna was aimed at!

One feature of interest to me at the time was the fact that the spectral line emission, mentioned earlier, was monitored daily with this system in use. According to the operator, indeed, any significant increase in its signal level was certainly to be followed the following day by an announcement that yet another rocket had lifted off from Cape Canaveral! An innocent enough remark in itself, yet it confirmed a similar independent observation made in 1957 - on that occasion involving a transit of Sputnik I.

By its design, the detector vehicle of the 1960s did add one additional factor to scanning history. It combined scanning in azimuth - steering the antenna horizontally - with scanning in frequency.

Ultimately, in the mid-1960s, the Panadaptor of the late 1930s staged a long delayed come-back in professional radio circles, albeit in v.h.f. form.

Eddystone Radio produced two communications receivers covering the v.h.f. and u.h.f. bands up to 500MHz. One notable feature of each of these receivers was the provision of an i.f. output at the rear of the chassis, for some purpose not generally made known. The answer, seemingly, was the additional provision of a panoramic receiver in its own right, covering the frequency range 5-60MHz. By connecting its input to the i.f. output of one or other of the two main receivers, and tuning to the i.f. accordingly, a panoramic receiving system covering the range 5-500MHz became feasible. Albeit, if only in small doses of a few hundred kilohertz!

The Scanning System Today

The development of semi-conductors, and the integrated circuit in particular, meant that electronic circuitry became miniaturised, leading to the 'black box' on a microchip. An important feature of such miniaturisation, of course, being that v.h.f./u.h.f.

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performance exhibited a noticeable improvement.

In the field of frequency generation, the advent of the phase locked loop, controlled by a reference crystal oscillator, together with the programmable frequency divider, introduced the concept of frequency synthesis. An innovation on the lines of a decade frequency box, in effect.

A major contribution was made by further improvements in microprocessor design and dynamic RAM. This, because it offered the possibility of automatic frequency control by means of a computer program, thus displacing the reactance modulator. But this in itself, however, was not the full story.

As we have seen, early h.f. and v.h.f. panoramic receiver design was plagued by the need to manually tune pre-mixer circuitry. This was to minimise image interference, i.f. breakthrough, and so on. The improvement in the performance of semiconductor devices at u.h.f., however, offered an immediate solution to this age-old problem. Simply to put the intermediate frequency way above the signal frequency range. The need for lower frequency i.f. amplification at 10MHz and 455kHz being obtained by double and triple frequency conversion.

Ultimately, then, we have a double-balanced modulator fed directly from the antenna together with a u.h.f. conversion frequency from the frequency synthesiser, followed by a u.h.f. i.f. stage. This preceding a further mixer together with the main i.f. amplifier on a chip, complete with its associated crystal-gate, a.g.c. and squelch circuitry.

Predictably, the microchip scanner was not without its characteristic problems. The double-balanced modulator became over-loaded on strong signals, this producing blocking and cross-modulation. In turn calling for the insertion of hefty amount of attenuation and/or bandpass filters ahead of the first mixer circuit. Frequency synthesis tended to give impure output, particularly when purity of output was traded off for faster re-tuning of frequency. The resulting impurity giving rise to spurious noise and adjacent channel interference.

What, then, is achieved by today's scanning receiver?

AR-3000A Communications receiver

Essentially, it is a device that can be programmed to continuously scan or search over a given fequency band in discrete steps. Upon encountering a frequency where the signal or noise level exceeds the squelch level, it either stops or delays its search. A mixed blessing, this, particularly when desired signals are in the noise below the squelch level, and one that can, paradoxically, be resolved satisfactorily, e.g. c.w. signals.

Putting aside the theoretical issues, what can we expect in practice?

The AOR AR-3000

With new developments in receiver design appearing almost weekly, any design tends to be a compromise, and to some extent already obsolescent. Thus the user accepts that in order to keep abreast of current developments the optional add-on has become a fact of life.

A variation of this is, of course, what might be termed the 'Detroit Deficit'. With this scheme you purchase a motorcar consisting of four wheels and an engine, and then pay over the odds for the 'optional' essentials, such as the driving seat, the wing mirrors and the windscreen-wipers. The marketing strategy being that, lumbered with the basic unit, one is then forced to throw good money after bad to fund the necessary extras.

The same strategy is often employed with the typical scanning receiver. You pay extra for frequency converters, i.f. and a.f. filters, active antennas and RS232 interfaces. These bits and pieces, put together, often cost more than the original basic receiver.

As a welcome contrast, AOR's AR-3000 scanning receiver embodies a full range of options - though this does depend on what AR-3000 one is talking about. Since, with new improvements being incorporated in each production run, the operating manual - such as it is - is virtually guaranteed to be out of date at any given time. For this reason alone, the following comments, though applying to the AR-3000 in my possesion, may not reflect the typical case.

For its small physical size and weight, the AR-3000 contains a whole range of goodies, packed in a multi-layer sandwich of p.c.b.s. Importantly, it gets away from the idea of separate h.f. and v.h.f./u.h.f. receivers, combining the two in one receiver covering the frequency spectrum 100kHz-2GHz. Moreover, the modes customarily used on these frequencies are not overlooked either, provision being made for nearly everything for w.f.m. to c.w. With bandwidth considerations being arranged accordingly. Perhaps only in the extreme case might one consider using an a.f. notch-filter to tidy up a congested part of the band.

Pre-mixer selectivity is provided by switched bandpass filters covering the whole frequency spectrum, complete with GaAsf.e.t. amplifiers. Spurious signal rejection is noticeably poor, however, over the range 1.5-2MHz with blocking from m.w. broadcast stations. Which perhaps calls for either an a.t.u. - ugh! - or better still a 500-1500kHz bandstop filter in the antenna feeder. Noticeably the problem is solved neither by switching out the internal 100kHz-30MHz pre-amp, nor by switching in the attenuator.

By itself, the AR-3000 is a **scanning system** in its own right, covering the range 100kHz-440MHz with its telescopic antenna. Over the h.f. bands an **active antenna** is effectively provided, that is where the 100kHz-30MHz pre-amp comes in. It can be disabled by operating two internal slide switches. The upper frequency limit under these conditions is, of course, determined by the fully closed length of the telescopic antenna - 170mm for 440MHz.

The receiver offers one major improvement over the typical plastics box affair on sale today. On the rear panel is an FCC registration number, implying that it conforms to American EMC regulations. Which is to say it neither radiates excessive r.f.i., nor picks up excessive external r.f.i. No tests have so far been made to confirm this. Sufficient to add that, by placing the AR-3000 'system' some 1.5m from a notorious BBC Master 128 microcomputer, the hash level is at least bearable. What level of noise remaining can be reduced to a very low level by killing the mains-borne interference between the two. I achieved this by fitting ancient Dubilier suppressed 13A mains plugs - using delta-connected capacitors - to both AR-3000 and Master 128.

Should the noise level at a later date be seen to rear its ugly head at low radio frequencies, then I shall hard-wire a 2µF + 2µF capacitor and a pair of 3A 0.1mH chokes in the mains supply to the computer equipment.

Upon connecting up the AR-3000 and plugging it into the mains, the l.c.d. indicates local Tokyo time in hh:mm:ss. On pressing the POWER ON button, if you are as fortunate as I was, Andy of Air Supply will have filled the memory banks with local goodies, and you will hear the confident tones of the Leeds Airport controller bringing an aircraft down on finals! A nice example of customer service, which in my case was well appreciated. Otherwise, it may be necessary

to initially remove any garbage from the l.c.d. in accordance with the instruction manual .

From the above it becomes obvious that the AR-3000 has internal back-up power for the memories and clock circuits. Lowe Electronics suggest that it is a battery back-up with a 5-10 year life span! I personally would have preferred a fat capacitor instead, bearing in mind the outbursts of flame that lithium batteries have been known to cause in Master 128s! Much later, on attempting to get the RS232 interface to work, I joggled the D25 plug only to find the l.c.d. displaying everything, including the fatal warning - BATTERY FAILURE!

Resetting the power, soon restored things to normal and the fault has not occured since. It did however clear all the memory banks of data. More to the point, there has been no sign so far of the dreaded battery failure!

The clock time can be re-set to local standard at will, as can any ALARM or SLEEP times be pre-set to turn the receiver on or off.

Any measurement of signal strength can only be made relatively. Precision field strength measuring equipment can, perhaps, be relied on to give an absolute measurement relative to 1µV/m. But, at the level of measurement we are concerned with, the only practical measurement is that made with reference to the receiver noise level - which can be any odd value at all.

That said, 50 years ago a system was introduced using S-point units of +6dB from S1 to S9, and above S9 in units of +20dB. In itself this didn't mean very much, but if someone's signal strength dropped by two S-points it did imply a drop of 12dB. Or, if one compared one receiving antenna with another, the relative gain between the two could be estimated.

The introduction of the bargraph and chip would appear to have altered all that, which brings me to the AR-3000s S-meter display and the in-built attenuator.

The manual carefully omits to state the value of the attenuator provided. Common sense, guesswork and guile, cause me to conclude that it must be 20dB. Using this as a reference, I estimate that on the RS232 link, '0' is the noise level reference, from which the letters A, B, C, D, E, F, G, H, J, represent increments of +3dB. Futher increments of +20dB are represented by letters L, N, O, with the letter P >=107dB. Comparing these with the S-meter read-out, S1 is +9dB above the noise level, followed by +3dB increments per S-point up to S7 at +27dB. Finally, increments of +20dB from S7 to S9, at which S9 represents everything over +67dB to above +107dB. (The letters I, K, L apparently being unrelated intermediate values). So if the level of a signal drops from S9 to S8, the answer is not -6dB, but anything between -20dB to -60dB plus.

These figures are passed on to readers only as a general guide, and as a warning not to take the S-meter readings too seriously. In order to make any use of the RS232 output, I personally will resort to calibration using a decade attenuator box design cribbed from the *ARRL Handbook*. And then use it in the antenna input as a fine control of attenuation generally!

This final criticism apart, the AR-3000 appears to fulfill all my present dreams and requirements, and in that sense is a good example of contemporary scanning receiver design. Any final signal processing that may be required in my own case will probably be taken care of by an RX-8 unit connected to the Master 128's user port. If Mrs Christmas remembers to put it on her shopping list, that is!

The Antenna System

Any good radio receiver warrants the use of a good antenna system. An antenna system isolated from domestic radiated and mains-borne interference, which is free from earthing problems.

A design I have used for some years at l.f./m.f./h.f. is my so-called T3WC antenna. The terminated, tilted, twisted, Windom-counterpoise. This has given excellent results in the past, and was recently overhauled during the dry summer months. All insulators were replaced by strings of new ones, sold at the local garden centre as **Nylon Chain** for just 70p per foot.

The v.h.f./u.h.f. antenna is a 70-700MHz discone purchased from Air Supply. That said, even without the h.f. pre-amp in circuit, the AR-3000 appears to be quite happy trundling along onthe end of a piece of wet string. Because, with the discone connected to the BNC socket, h.f. signals and below were received at quite respectable strengths, which makes me wonder whether the bicycle spokes on the discone act effectively as an all-band whip. More astonishingly, the T3WC brought in 144 and 432MHz beacon stations, and weather satellite signals, which could not otherwise be heard in the discone. After the fashion of a v.h.f./u.h.f. Beverage antenna! All of which explains my comment regarding the piece of wet string. In other words, what is required is a lump of metal, well up in the clear, fed by a screened feeder.

The Turnstile Array

About 40 years ago, a colleague of mine asked me to develop for him an omni-directional antenna for 144MHz. Inevitably, I came up with a **turnstile array**. That he must have been highly satisfied with it is seen from the fact that, 15 years later, at his request, I designed a log-peridodic array for Band IV/V TV.

It all came to a head when I started to look into the construction of a dedicated antenna for UoSAT-2, 144MHz and LHC polarised. All the literature appeared to think in terms of a 'crossed dipole' antenna, and many details were published in back copies of *PW* and *SWM*. It also became apparent that these were not in general favour, listeners seemingly preferring simple horizontal dipoles.

Searching through said back copies, it soon became evident that this crossed dipole was my old buddy, the turnstile array, used for either RHC or LHC polarisation depending on the position of the phased element. It was at this point that the reason for its lack of popularity became apparent. In nearly all the published designs, errors were discovered in plenty:

(a) Incorrect phasing harness described

(b) Phasing wrongly connected to give the required handedness of polarisation

(c) Incorrect matching of antenna to feeder.

By far the worst example shown was when a quarter-wave 300Ω line was used to match a folded dipole to 140Ω! Followed by a quarter-wave, 75Ω coaxial cable to match 35Ω to a 50Ω feeder. And I doubt if we can entirely blame the Editor's wordprocessor for those errors.

A word to the wise! To match an antenna impedance, ZA, to a feeder impedance, ZF, use a quarter-wave matching section of impedance, ZM = SQR (ZA*ZF). It's our old friend, the 'geometric mean' once again! By contrast, the half-wave matching section is a 1:1 transformer - the impedance is unchanged.

And my own UoSAT-2 installation? Well in view of the local 144MHz net activity sitting on UoSAT-2s frequency, I shall probably save myself a lot of trouble and finish up with a Sandpiper LHC crossed dipole and reflector!

The Scanning System of the Future

So what can we expect in years to come? A look into my crystal ball suggests something on the lines shown in the heading drawing.

The scanning receiver proper will be mounted in a weather-proof box adjacent to the pole-mounted antenna, fed by a nominal 12V d.c. power cable, together with a 4-core cassette recorder cable and a screened 6-core RS-232 data link.

Without the need for keyboard and control panel, the AR-3000 or its successor will be that much lower in price and with the receiver directly connected to the antenna there will be no need for expensive N-plugs, hardline and Japanese hi-grade coaxial cable.

The signal level measurement in the receiver will follow a sensible logarithmic law, and a continuously variable attenuator under microprocessor control will be provided in the antenna input.

Finally, by that time, it will be the accepted practice for the whole system to be controlled from a personal computer in the radio shack - the computer being suppressed according to stringent EMC regulation. All of which means that we may have to wait for a long time for it to take place! ■

Manual FM/AM Switching Modifications for the PRO-32 Scanner

The information in A. D. Ayres original article, *SWM* August 1992, identifying the relevant components in the scanner was very useful and saved hours of probing and searching, but there were two main things about the modifications that I was not happy with. The need to manually switch a.m. on airband transmissions and the loss of charging facilities if the charge socket was used as an earphone output. Continual removal of the batteries for charging could eventually cause the battery compartment cover to become lose. It didn't take me long to realise that there was one solution for both problems - diodes.

A diode placed across the cut track is shown in **Fig. 1**. This allows +5.4V to flow to the a.m. detector and electronic audio switch when airband is selected, but when a.m. is manually selected, it prevents the +5.4V from reaching D105 and switching on the airband r.f. stage. Thus, although a.m. or f.m. is still manually switched on the other bands, automatic a.m. switching is retained on airband.

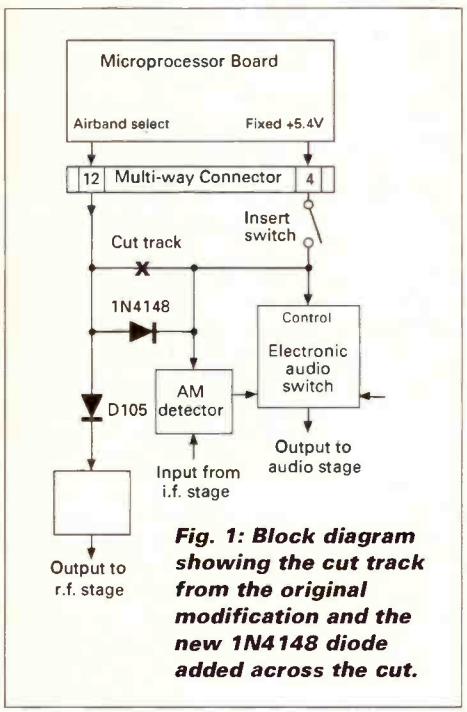


Fig. 1: Block diagram showing the cut track from the original modification and the new 1N4148 diode added across the cut.

Fitting the diode is quite straight forward. Referring to A. D. Ayres' original article, cut the track, move down the track a short way from the cut (i.e. IC202 side) and scrape off the varnish revealing the copper track. Then, with a fine tipped soldering iron, tin the track. Moving away from the cut makes sure both sides of the new joint are securely fixed to the board. Any stress too near the cut might cause the track to lift. The cathode of the diode is soldered to the track and the anode can be soldered directly to pin 12.

The second use of a diode is shown in **Fig. 2**. This allows the NiCads to be recharged even while the scanner is being run from a 9V power supply. However, there are a few important points to note. Only NiCads can be used after this modification, standard or alkaline cells must **NOT** be used if an external 9V power supply is being used. The power supply itself **MUST** be stabilised. This means that the output must be 9V whether or not it is on load. An unstabilised supply will deliver too much voltage to the NiCads and could cause damage. A suitable circuit for providing a stabilised 9V supply using a 7809 regulator is shown in **Fig. 4**. This device will need a small heat sink. I used a piece of 2mm thick aluminium, measuring approximately 40 x 40mm. The BY126 diode is included as protection against reverse polarity when being connected to a power source such as a car battery. The circuit itself can be made up on a small piece of Veroboard and housed in a plastics box.

Incidentally, I found that it was much easier to work on the two sockets if the ground ends of C202 and C203 were temporarily unsoldered allowing the sockets to slip out of the side of the receiver case.

An additional modification to the PRO-32 was to change the method of supplying current to the memory back-up circuit. The handbook for the scanner states that the three silver oxide batteries should be replaced once a year. These cells cost about £1.50 each, making a total expenditure of £4.50 each year. Although cheaper cells can be found, it is advisable, for reliability, to use only good quality replacements. Because I always keep charged NiCads in the scanner, I decided to use power from the NiCads to supply power for memory storage. The extra components needed to drop the voltage from the batteries to the memory back-up circuit can be

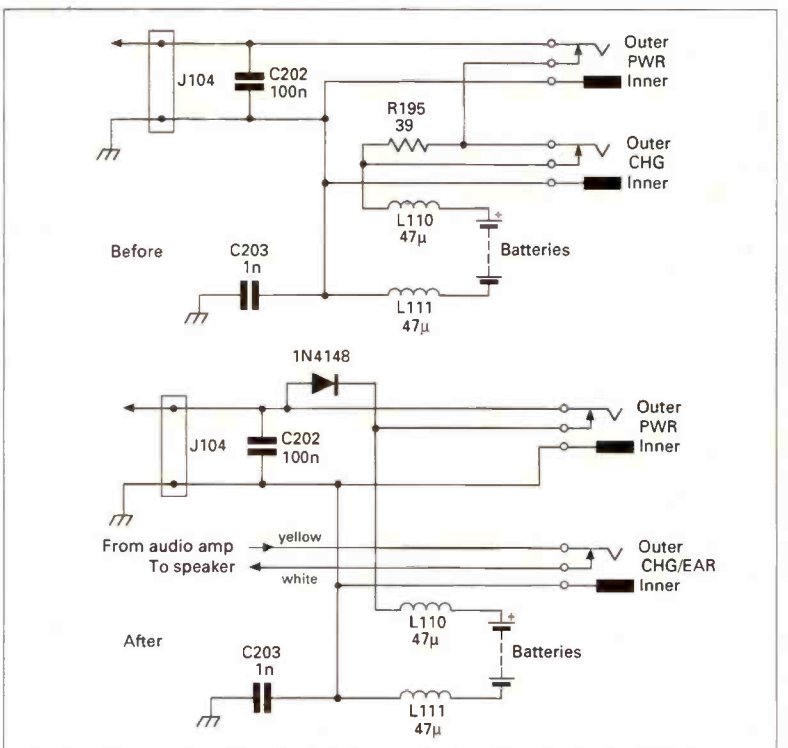


Fig. 2: The second diode allows the NiCads to be charged when running from an external power supply.

A visit to Hamfest at the Flight Refuelling Sports Field, resulted in Peter Julian buying a Realistic PRO-32 scanner. By a very fortunate coincidence a modification to manually switch a.m. and f.m. on this set was also featured in the August '92 edition of SWM. He re-read the article and set about modifying the radio.

seen in **Fig. 6**.

To allow the battery pack to slip into its compartment and the back to fit properly, a fairly fine wire must be used to connect the final back-up battery's positive terminal in the battery compartment to the resistor and diode soldered to the power socket.

To locate the correct back-up battery terminal, slide the cover off the back-up batteries and remove them. Now you have only about 30 minutes in which to work - after that, without power, memory storage will be lost. With the battery end of the set closest to you, one end of the thin wire should be soldered to the far left-hand back-up battery contact. The other end can then be connected to the resistor and diode. These should be sleeved to prevent any short circuit. Now the back can be re-assembled and a piece of adhesive tape stuck over the wire to prevent it from being snagged when the battery pack is replaced. Any voltage measurements on the memory back-up side of the 6.8MΩ resistor should be made with a high impedance f.e.t. or a digital multi-meter since a normal 50kΩ/V moving coil type will load the circuit and give very misreading readings.

Fig. 3: The circuit symbol and physical shape of a typical signal diodes.

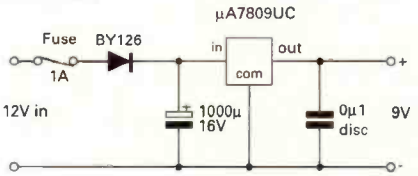


Fig. 4: A stabilised 9V power supply circuit.

Every so often NiCads should be discharged and then given a full charge. This ensures that they will maintain their full capacity. From time to time, therefore, the radio should be run until the LOW BATTERY sign comes on. Even then, with the batteries discharged, there is still enough power to maintain memory back-up for a considerable time.

The good thing about these modifications is that they can be carried out without having to remove any circuit board. Should it ever be necessary to return the set to its original condition, this can be accomplished quite easily.

***Note**: Back issues of the August 1992 issue of SWM are available from the Editorial Offices, priced £2.00 including postage and packing in the UK - **Ed**.* ■

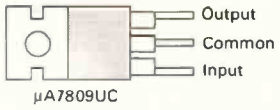


Fig. 5: Pin-out for the µA7809UC voltage regulator

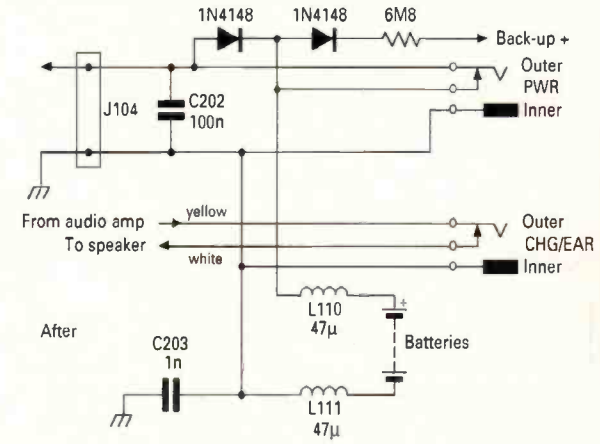


Fig. 6: The extra components needed to drop the voltage for the memory back-up circuit.

Listen With Grandad

by Leon Balen and David Leverett

Black Jaguar BJ200-MkIV Pocket Scanner

Pocket scanners are essentially portable receivers that operate in various frequency bands. This new model covers h.f. to u.h.f. or, more specifically, h.f., v.h.f. low, air, v.h.f. high and u.h.f., offering potentially wide coverage of many services. Lawrence Harris puts the Black Jaguar through its paces.

As a regular user of scanners, I tend to prefer two specific facilities; scanning a selection of known, programmed frequencies on a regular basis, and occasionally searching specific bands for new, active frequencies. This scanner includes both facilities so I have spent some time operating it.

Being small enough to carry anywhere, it is a true pocket scanner, yet avoids using tiny buttons, which can be awkward to use. Weighing in at less than half a kilogram it is very light, so I was able to take it out to try in different locations.

The instruction manual runs to some nine pages of A5, and carries a disconcerting warning at the start! It points out that the built-in nickel cadmium batteries are supplied discharged so must be re-charged for some 10 hours before use. This is no real problem, but it does spoil that 'can't wait to try it out' feeling! If you are desperate, the receiver can be run immediately from the mains using the supplied charger.

Of greater interest were the notes regarding errors in the manual. Some controls have been changed - even removed! Considering that the manual is not a high quality product, I feel that it could have been brought fully up-to-date without the need for significant corrections. The description of the DELAY function is wrong - see later, under 'Features'. Other than these points, the notes are comprehensive and easy to follow.

Appearance

Frankly, it looks very smart, though the helical rubber antenna gives the appearance of a cellular phone! The large front panel contains the majority of the buttons - including digits for setting frequencies, and various options such as MANUAL and AM/FM. More on these later. Also on the front is the speaker grille that merges well with the buttons. A fair-sized l.c.d. screen provides large readable text.

The top of the receiver just about has space for the BNC antenna connector, an earphone socket, volume and squelch controls, and the power switch. An r.f. attenuator is squeezed in as well. The right-hand side of the receiver has a d.c. socket for the charging unit, and a sensibly recessed push-button switch to activate a light for the screen for use at night.

The whole unit gives the impression of a well-built, well-designed receiver. I gave it a full 10-hour charge and then put it through its paces.

Features

Receivers seem to come in either of two categories - they can be loaded with features, some of which may be used rather infrequently, or they may contain just the basics. In my view, this receiver falls in the second category.

Switching on from start (after charging) requires that you enter a frequency, or search band limits yourself - nothing was pre-set. Once frequencies have been entered, they are then available more or less permanently. The specifications shows that 16 channels are available for storing frequencies, each being stored with its channel number. There is no need to start off entering all the frequencies - I decided to let the receiver do some searching first.

The receiver can operate in either of two main modes: scanning stored frequencies, or searching between defined frequency limits. There is no facility to store upper or lower limits of your search band, but it is so simple to set these up that I felt that such a facility was not really required!

The MANUAL button puts the unit into manual mode (from either SCAN or SEARCH modes). Here, channel data is entered, or SEARCH mode can be programmed. There is no SEARCH button as such - this mode starts via the UP or DOWN arrow buttons.

The SCAN button starts the receiver scanning each programmed frequency, and the PRIORITY button forces the microprocessor to check channel 1 more frequently.

The DELAY button can be useful when scanning amateur band frequencies, but should be used with caution. The receiver will always pause on an active channel. After the signal has ceased, scanning of the channels will continue. In SCAN mode, DELAY only affects a selected channel - not the whole group as wrongly described in the manual. If you press DELAY during a SCAN you will only catch whichever channel happens to be active at that precise moment!

The LOCK-OUT button selects individual channels for exclusion from scanning. This is a common feature of scanners and I use mine with much caution! I find it too easy to forget that a frequency has been locked-out, so I rarely use this option. The AM/FM button switches between the respective signal modulations, and would normally be left on FM, except perhaps when using the h.f. band.

The arrow keys are used to either increment (decrement) the channel numbers when in manual mode, or to mark frequencies as being the upper or lower ends of bands when search mode is being programmed (see Searching).

Sound quality was perfectly acceptable from this small receiver, and the single earphone provided adequate listening, also enabling the volume level to be reduced, which can extend the life between charges. A separate 8Ω speaker (not supplied) can be connected to the phone socket.

When the batteries are running low, a warning indicator comes on screen and the speaker is silenced to

minimise power consumption. Data is retained in memory for some time, but re-charging should be undertaken as soon as convenient.

Frequency Entry & Scanning

I suspect the most common use for a portable receiver is for scanning preset frequencies. Channel scanning speed is 10 per second, similar to my base unit. Entering frequencies in the Black Jaguar is simplicity itself. From manual mode a channel is selected from the 16 available. A frequency is entered by typing e.g. 150.0 and pressing ENTER. For a quick try, I programmed a group of frequencies used in the 150MHz band by COSMOS navigation and other satellites. Within twenty minutes or so I heard two of them - COSMOS 2233 active on 150.03MHz and COSMOS 2180 transmitting on 149.94MHz. I should add that these were heard with my external antenna connected to the Black Jaguar.

Searching

The specifications show that the scanner covers five bands. With so much of the radio spectrum to monitor I felt spoilt for choice. I find the amateur bands to have considerable interest so I checked my copy of *Scanners* by Peter Rouse and decided to search the 432 to 440MHz section.

Entering band limits must be done in the correct sequence; the upper limit followed by the lower limit. Before entering these limits, a channel number is selected by pressing MANUAL. This will be indicating the last channel used. The reason for basing your search band on a specific channel is that should you subsequently wish to store a frequency found during SEARCH, this is done with one key press (ENTER), the frequency then being stored in the selected channel. Of course, you can do a SEARCH from any channel without actually using or changing its contents.

From MANUAL mode enter the upper frequency, 440 in this instance, and press the

DOWN ARROW key. Yes, I was puzzled as well! Next, enter the lower frequency, 432, and press the UP ARROW key. As this is completed, searching starts from the lower frequency. If you try to enter the limits in the wrong sequence, or enter an 'illegal' frequency (one outside receiver band limits) an ERROR message greets you.

One mildly annoying feature here was the inability to correct an erroneous entry. Should you type 433 (instead of 432), you cannot backspace or cancel - you have to register the number and then repeat the process using the correct input. Entering band limits is so easy that I quickly stopped feeling puzzled about the omission of band limits storage.

Using the SEARCH facility and the supplied antenna, I left the scanner operating. Within a few minutes the unit locked on to an amateur operator who turned out to be based in Cornwall at a town about 65km away. She was a girl of 14 years of age, who subsequently described in excellent technical detail the antenna she was using, and the nature of the exams recently taken to obtain her transmitting licence! The equipment she was using belonged to her father. Apparently, she had a number of friends who were also working towards their licences.

The importance of this chat was that it enabled me to check out the routine monitoring capabilities of the receiver. The young lady was contacted by a number of holidaying amateurs, all using portable rigs and who helpfully described their transmitters. Their low power transmissions were received perfectly. All these tests were done using the supplied helical antenna, from my basement, at ground level.

Continuing the scan of the 432MHz band, the unit also locked onto a FAX transmission and several other utilities, all coming in loud and clear. I connected up the external antenna that is mounted about five metres high. This brought in the same results, surprising me slightly because I had expected an improved performance from the external antenna.

While doing several frequency searches, I noted that the squelch needed to be set for optimum response. It is adjusted in the conventional manner, the extremes being fully closed and fully open. Occasionally it halted on a persistent carrier and had to be released by pressing the UP key, to re-commence searching or scanning.

If a signal is found during searching, the receiver pauses. To store this frequency, you just press ENTER, and the channel number currently displayed is updated. This new frequency can be overwritten at any future time as required.

In search mode you can activate the DELAY key. This forces the receiver to pause longer on suspect signals. Otherwise the receiver tended to pause too briefly. In this mode, DELAY operates correctly. The manual recommends using short (one MHz) band sweeps while in SEARCH mode, to minimise the chances of missing brief transmissions. In general, this point may be valid for sections of air band where conversations are often very brief.

Sensitivity

The figure of 0.5µV quoted for most of the bands compares with the similar figures quoted for my base scanner - a rather larger model! Using the same external antenna I obtained similar results with the Black Jaguar.

The frequency coverage of the receiver is somewhat greater than implied by the published specifications. The broadcast f.m. band is not officially covered by the Black Jaguar, probably due to the vastly incresed bandwidth requirements, but some stations could still be heard.

Conclusions

The receiver is so easy to use, that my initial reservations about its few facilities, e.g. only 16 memories and an inability to store band limits (unlike my base receiver) melted away when I realised just how easy it is to operate. It takes me longer to remember which number band I want to search on my base receiver than it does to program the Black Jaguar fresh each time!

The manual is easy to use, but really does need some sections re-writing.

For people wanting to carry a portable receiver to monitor their favourite bands while on holiday or from other locations, this is a very convenient unit to take. The space occupied by this receiver is extraordinarily small, even including the charging unit.

My thanks to **Nevada Communications, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (0705) 662145** for the loan of the portable receiver, which costs £239.00. ■

Specifications

Frequency Ranges:	
HF	26-29.995MHz in 5kHz steps
VHF low	60-88MHz in 5kHz steps
Air & VHF Mid	115-178MHz in 5kHz steps
VHF high	210-260MHz
UHF	410-520MHz
Included	single earphone, mains charger (for built-in NiCads), carrying case.
Memories	16

Propagation

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

Last month, I showed you inside the projection box used by the South Downs Astronomical Society for observing sunspots. This time you will see it attached to their refractor telescope in **Fig. 1**, just as Joan and I saw it in action at their observatory on Trundle Hill, near Goodwood, on July 11. The user stands with his back to the sun and, by moving the telescope on its mount, positions the sun's image on the paper screen in the base of the box. The solar rays pass through the object glass at the top of the telescope and enter the box via the eye-piece at the bottom.

Arrangements similar to this are used by our contributors **Ron Livesey** (Edinburgh), **Patrick Moore** (Selsey) and **Ted Waring** (Bristol) and I know that each one of these, and all experienced astronomers, will remind you, as I often do, that it is **DANGEROUS TO LOOK DIRECTLY AT THE SUN**.

Solar Reports

In July, Ron Livesey located three active areas on the sun's disc on days 3, 6, 16, 19, 21, 23, 24 & 29 and four on the 17th, 19th & 28th. Despite the handicap of varying cloud cover, **Cmdr Henry Hatfield** (Sevenoaks), using his spectroheliosope, located a small sunspot group, nine filaments and eight small quiescent prominences on the 8th, one large spot, 9fs, a 'hedgerow' prominence on the ENE limb and a small qp on the 12th, 1grp, 15fs and seven small qps on the 14th, 2grps, 19fs and 11 small qps on the 17th, 2grps, 13fs, four small qps on the 22nd and 1grp, some active plages between the group and a large spot, 15fs, two small qps and a very long thin filament in the SW quadrant at 1037 on August 10.

Patrick Moore kindly sent a drawing, **Fig. 2**, of the sunspot groups, one on each limb, that he projected at 1530 on August 12. Ted Waring reports that he counted six sunspots on the 4th, 12 on the 12th and 10 on the 23rd.

Auroral

Ron Livesey, the auroral co-ordinator for the British Astronomical Association, received reports of aurora described as 'quiet arc' and 'rayed arc' for the overnight period on July 8/9, 'ray bundles' on 18/19, 19/20, 27/28 & 28/29 and 'active forms' on 9/10, 10/11 & 18/19 from observers in Ireland, North Dakota and Scotland. Ron would welcome your visual and/or radio-auroral reports at Flat 1/2, East Parkside, Edinburgh EH16 5XJ.

Magnetic

The variety of magnetometers used by **John Fletcher** (Tuffley), **Andy Hollis** (Marton), **Karl Lewis** (Saltash), Ron Livesey, **David Pettitt** (Carlisle) and **Tom Rackham** (Goostrey), between them, recorded disturbances to the earth's magnetic field on July 2-4, 7-11, 20, 21, 24, 27 & 29. **Tony Hopwood** (Upton-on-Severn) and Andy Hollis telephoned Ron Livesey to say that their instruments were disturbed on the 8th and 9th respectively. This tied up with the aurora observed from Banff on the 8th and Co. Tipperary on the 9th. Ron added, "these disturbances correlated with an aligned coronal hole suitably placed with respect to the earth".

Propagation Beacons

First, my thanks to **Gordon Foote** (Didcot), Henry Hatfield, **Ian McDermid** (Comrie), **Ted Owen** (Maldon), Ted Waring, **Ern Warwick** (Plymouth) and **Ford White** (Portland), for their 28MHz beacon logs from which I obtained the information to compile the monthly chart in **Fig. 3**. Ian added DL8MFJ on 28.189MHz and PI7ETE on 28.302MHz to the log this time and reports that the beacons he heard on August 20 were all very weak. Gordon Foote said, "there were periods of no beacons, followed by one or two days when 5 or 6 Europeans were very clear".

Band II

Like most of us in southern England, the Cheshire area was overcast when **Dave Coggins** wanted to see the Persieds meteor shower. However, Dave did see a couple around 0230 and when he checked Band II he heard a number of 'pings' of reflected signals from stations in France, Germany and Scandinavia at the lower end of the band.

Among the stations heard by **Tim Bucknall** (Cheshire), while visiting parts of the Czech Republic in late July, was the BBC World Service on three v.h.f. band frequencies, Voice Of America (Europe) on 98.1MHz and 'ZFM' (a branch of AFN) from Germany on 98.7MHz. Back home and during a Sporadic-E opening on August 30, Tim found Italian and Spanish stations at the bottom and top ends of the band respectively.

Associated Data

More reports about propagation in Bands I, III, IV & V, including a chart showing the changes in atmospheric pressure for the period July 26 to August 25, can be seen in my 'Television' column elsewhere in this issue.

Fig. 2: Sunspots plotted by Patrick Moore on August 12.

Fig. 1: The South Downs Astronomical Society's refractor telescope.

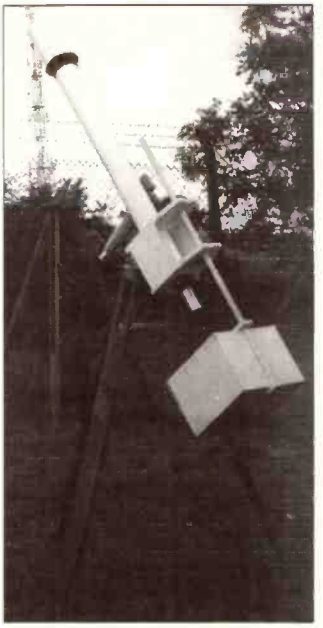


Fig. 3: The 28MHz beacon chart.

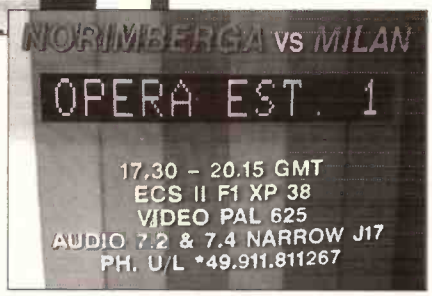
	July										August																	
Beacon	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
CT0APO		X		X			X	X						X			X				X						X	X	X	X	X
OF0AAB									X					X			X				X					X	X	X	X		X
OF0THD																											X		X		X
OK0TEN					X				X						X					X	X					X	X	X	X	X	X
DL0IGI	X			X	X	X			X			X	X	X	X			X	X	X	X	X				X	X	X	X	X	X
DL8MFJ																											X				
EA3JA	X	X	X	X	X	X	X		X		X			X	X					X	X					X	X	X			
HG5GEW	X	X	X	X	X				X			X	X	X	X	X		X	X		X	X					X	X	X	X	X
IK1PCB	X					X			X		X	X		X	X					X	X	X		X		X	X		X	X	X
IY4M	X	X		X	X				X		X	X								X	X	X				X	X	X	X	X	X
LA5TEN				X					X					X							X					X	X	X	X	X	X
OH2TEN				X	X		X	X	X					X			X	X	X	X	X		X				X	X	X		X
OH9TEN									X					X							X										X
OK0EG																											X				
PI7BQC																												X			X
PI7ETE																					X							X			X
PT7BCN				X																											
SK5TEN		X			X			X	X					X	X		X			X	X		X			X	X	X	X	X	X
SV3AQR							X		X						X			X									X		X	X	X
S55ZRS	X		X	X	X						X	X		X	X												X	X	X	X	X
ZS1LA									X											X	X										X
ZS6PW																									X	X	X	X	X	X	X
5B4CY							X					X							X	X	X					X	X		X	X	X

Satellite TV

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

Fig. 1: Can any reader identify this catch on Eutelsat II F1 13°E? From John Locker.

Fig. 2: Prior to a football match! from John Locker.



The Echosphere SR-50 manual receiver has become a popular 'DXers' satellite receiver albeit with a few shortcomings inherent in a budget receiver. I am hopeful of obtaining a replacement tuner head (i.f.) with a better image rejection figure shortly and the possibilities of a 70MHz bandpass with a bandwidth of around 26-27MHz is also being sought to reduce the receiver noise level particularly on picture content - even with a strong signal present.

Several readers have noticed a tuning drift with these receivers after some months of use. If this problem is being experienced there may be no need for alarm, the fault is most likely within the tuning pot housing itself. The spindle seems to partially seize up and tuning becomes vaguely 'jerky'. The fault is easily remedied - remove the tuning pot by gripping the knob and pulling it at right angles away from the receiver. The knob once pulled off exposes the splined spindle. Slightly elevate the front of the receiver and squirt the base of the spindle carefully with a silicone spray. This should penetrate the housing and end the problem. Alternatively a few drops of '3 in 1' penetrating oil at the base of the spindle will be sufficient to ease the spindle. Replace the knob ensuring the calibration line is positioned as before. Rapid manipulation of the tuning knob will gradually ease the problem away.

I'm receiving an encouraging - and increasing - amount of readers' mail from Bristol to Bangkok! Of help to readers of *SWM* that are unsure of accurately aligning a tracking dish in the Bristol/Somerset area, **Dave Andrews** in Bristol (0454) 778887 is willing to install any Ku or C Band satellite system and to ensure its accurate Clarke Belt coverage. Dave professionally commissions satellite systems but more important to our readers, Dave's a DXer as well using fairly small dishes for both C and Ku band and widely experienced in current satellite receivers and their application to our hobby. He uses a 1.8m Alcoa petal dish for his C and Ku band satellite reception, a photograph of his feed system shows a Chaparral Corotor 2 feed with a Swedish Microwave 0.8dB noise tripled LNB for Ku band, a 30K Drake C Band LNB and mechanical polariser.

Leaving our shores into Thailand and **Alan Smith** writes of a concern that Rupert Murdoch has bought a controlling interest in Hong Kong's Star TV which may precipitate Star into encryption (and relating subscriber fees) prior to the promised 1995. Other than GMA (Philipines) and more recently TV3 Malaysia most TV in the region is unscrambled ie free to air. Alan's also seen ChinaSat 1 move from 87 to 115°E though with the same transponder line-up.

Globe-hopping back to Israel, **Eli Shavit** comments that the IBA's Israel-3 should start up next year and available only by satellite on Intelsat 512 (1°W spot beam) with a programme offering in many languages. The new Channel 2 service that is a franchise operation with 3 contractors sharing Intelsat 512 downlink facilities should have started November 1, but Eli reckons that goverment operational requirements may result in a later opening date.

Figs. 3 & 4: The complete church service included burnt-in time code to prevent programme piracy.

And back to St. Albans, Herts with **Paul Field** recently trading in his trusty Amstrad SRX200 and buying a Cambridge RD480 receiver. Recently Paul tried receiving other stations using the dish on the ground and propping it on packing, chairs, etc., to aim at various points across the sky. Many satellite transponders were received such as 'Marconi-Polo' (RTP Portugal); Norway's TVN and the Reuters news feed distribution network on Eutelsat II F1 at 13°E Paul makes the point that even with basic equipment it is possible to receive lots of downlink transponders and its worth readers having a go!

The Israeli-PLO peace talks produced flurries of excitement during the 2nd week of September, I noticed four outgoing feeds from Israel simultaneously on the 13th at 2300 hours, the Intelsat 601 27 West 'Atlantic Express' was fired up with two-ways from the 'States into Europe. Odd to see a couple of signals using Sound in Syncs (SIS) and with normal subcarier audio as well! The staff at JCS - Jerusalem Capital Studios were on overtime that night! Over the period most satellites from Kopernikus 28°E through to Intelsat 601 27°W carried news inserts/feeds in Ku band at various times over September 12-14.

A line from **Berry Habekotte**, Holland. He says the RTP Internacional service has now transferred from Eutelsat II F3 16°E to II F2 at 10°E 11.660GHz vertical. Hands up all those that can identify the following 'UKI 31 M/CLO' seen on a live ITN news link over Eutelsat II F3 16°E on September 23 at lunchtime! Had me guessing until the shape of Bobby Charlton appeared with a backdrop of an upmarket marina and high mountains. Not Hong Kong but Monte Carlo and a 2-way into the ITN news discussing the chances of Manchester as the venue for the year 2000 Olympics.

Another Shuttle mission provided beautiful pictures of the earth from space together with the high drama of in-orbit docking - live - though with aerospace developments in recent times the remarkable views tend now to be accepted as the norm.

Orbital News

From October 1 TV Polonia will be transmitted to the USA via the TDRS satellite at 41°W for reception in Denver, an eight hour time delayed transmission will then be uplinked via Galaxy 3 at C Band - and scrambled. Subscription fees will be $12 for cable and $5 for direct home (dish) reception. A million subscriptions are expected within three months, derived from the 17 million Poles living in North America. TV Polonia will commission her own earth station in Poland October 1 to replace the 'SNG POL-1' facility now used.

Keep a look out for new EBU identifications with the Eurovision control centre in Brussels closing down and the new switching centre now operational in Geneva, Switzerland. The old ident EVC has now ceased - check for EVC-G.

MTV Europe are illuminating across Europe over Eutelsat II F1 13°E at 11.658GHz horizontal and transfers to the 'Hot Bird' II F5 also 13°E when it launches next May. A further high power satellite is planned for 13°E - 'Hot Bird Plus' and will be totally TV transmissions acting as a rival to Astra.

If any readers are considering a subscription to any promised, shortly to arrive porn channel it will be wise to delay until the service can be confirmed. 'TV-X', 'After 12 Europe' and 'Channel 69' are all suggested to be launching late '93 and a company operating an international smart card exchange operation from a Gibraltar address does not have the permission of the authorities on the 'Rock'.

And finally the dear old Olympus satellite at 18°W has been switched off for ever. Life ceased on August 26. Enthusiasts may recall that in 1992 control was lost and she went into an orbital trip around the Earth, eventually being re-captured and returned to her old parking slot. A bird with spirit, she will be missed!

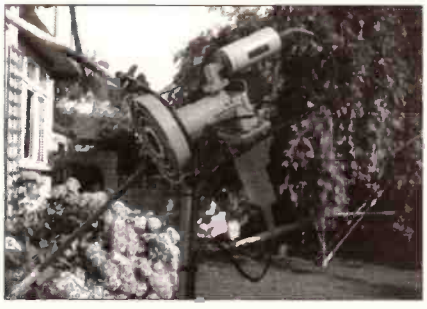


Fig. 5: Dave Andrew's satellite feed system on his 1.8m dish. The small cylinder atop is Swedish Microwave's low noise Ku triple band LNB. Below the large rectangular block at right angles to the the feed tube is the C Band (4GHz) LNB and the small box to the rear is the mechanical polariser.

DXTV Round-up

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

A number of our readers, like **R.S. Taylor** (Stourbridge), want to know in plain English, what DXTV is all about? so that's a good way to start this time.

Briefly, long distance (DX) television pictures are only received in the UK when some form of atmospheric disorder takes place to considerably increase the normal range of their transmissions. In other words the signal, depending upon its frequency, is bent, ducted, deflected or reflected away from its accepted path by a natural disturbance that may only be present for a short period.

Frequencies

There are two main types of disturbance, one, known as Sporadic-E, which upsets signals in Band I (40-70MHz) and the other, called a tropospheric opening, extends the range of signals in the v.h.f. Band III (175-230MHz) and the u.h.f. Bands IV (471-608MHz) and V (615-856MHz). There are exceptions to every rule but, speaking generally, signals below 100MHz are enhanced by Sporadic-E and above by the prevailing condition of the troposphere. Sporadic-E occurs randomly, during daylight hours, between mid-April and mid-September, with peaks in June and July. A tropospheric opening may happen at anytime when the weather has been fine and settled and a high atmospheric pressure system is on the move.

I think it's fair to say that the random nature of these events and the video from unexpected sources, appearing on the screen, is the real fun of TVDXing. In addition there is the scientific side of studying these forms of radio-propagation for the dedicated observer.

Equipment

Basically, you require a TV receiver that has three tuning ranges covering, Bands I and III and the u.h.f. band. Furthermore, depending on how serious you are, a suitable array of rotatable Yagi antennas would be an advantage. It is unlikely that you will see DX pictures every day, in fact you may go weeks with nothing but receiver noise on the screen. However, when there is an opening, there can be a lot to see. For instance back in 1986, while an intense Sporadic-E was in progress, I saw news-reports of a Chess tournament being played in the Russia, **Figs. 1, 2, & 3**. But readers, don't spend a lot of money until you are sure that you want this mode of reception added to the capability of your station.

Advice

I suggest that you first write to HS Publications, 7 Epping Close, Derby DE3 4HR and get Simon Hamer's book, *DX-TV For Beginners*, which is about £3.95 plus 85p post. Both HS proprietors, Keith Hamer and Garry Smith, are TVDXers and can offer further advice and possibly supply the equipment you require. Suitable sets and antennas are also available from Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset. BH12 2EH. Their catalogue will cost you £1 and the proprietor, David Martin, is also a DXer and he too offers guidance to his customers.

Band I

Good examples of summer TVDXing are the following regular reader's logs and the end-of season reports from **Richard Bell** (Melton Mowbray) and **Owen Jones** (Blurton). In June, the peak month of the 1993 Sporadic-E activity, Richard logged some DX in Band I on days 1, 4, 5, 7, 12, 13, 16, 17, 21 & 22 and a variety of signals, mainly from Spain, between the 9th and 11th. At various times spread between those days he received pictures from Czechoslovakia, Italy (RAI-Uno), Norway (NRK), Poland (TVP1), Spain (TVE1) and Sweden (Kanal1 Sverige). Among the programmes he saw, many of which DXers soon get to recognise, were Disney cartoons, *Colarin Colorado, Hillbilly Highway, Magyver, Miami Vice, Startrek: The Next Generation, Teledaiaro* and of course news, sport and weather forecasts. The sound of some programmes was still in English with 'local' sub-titles and, in addition to clocks and idents, he saw a logo 'TbK', **Fig. 4**, from an unknown source. I copied Richard's sketch of 'TbK' using the Paintbrush section of Windows 3.1 on my Packard Bell computer. Any ideas readers?

From May 12 to August 20, Owen had similar results to Richard. Owen's country list included the Commonwealth of Independent States (CIS), Czechoslovakia, Finland, Hungary, Iceland, Italy, Norway, Spain and Sweden. Among the captions he saw were Bech, Borstag, Bratislava, EPP, HOBOCTN, Kanal 1 Sverige, MCA, MSN, MTV 2, NTA, 1 PYTA, Punke 5, RAI-Uno, RTE, Slonia TV; Studio Maribor, STV, Teledario, TK TV Clax, TVE, TVS and YLE. In addition to various adverts, clocks and test-cards, the programmes he saw from these countries were cartoons, canoeing, comedy, cycling, hockey, football news and weather.

At 1218 on May 24 and 1610 on the 27th, **Lt. Col. Rana Roy** (Meerut, India) received Arabic pictures, **Figs. 5 & 6** respectively from unidentified sources. He also reported Sporadic-E openings on June 3, when he received pictures from Dubai TV on Ch. E2 and from Abu Dhabi on Ch. E3. He saw Dubai again, between 1400 and 1700, on days 7 to 11 and the CIS colour bars and logo, on Ch. R1, on

Fig. 1: Russia.

Fig. 2: Russia.

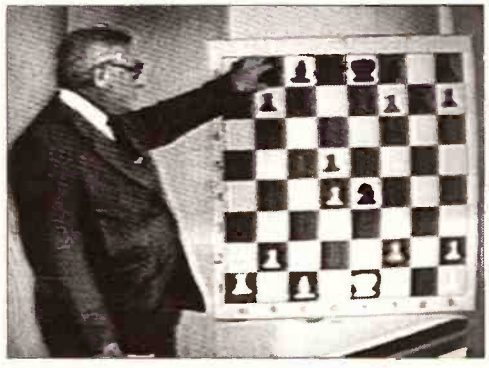


Fig. 3: Russia.

Fig. 4: Unknown logo.

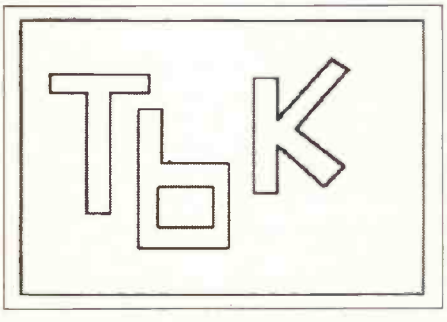


Fig. 5: Arabic picture.

Fig. 6: Arabic picture.

the 23rd, 25th, 26th & 27th. During similar openings on July 12, 14, 15 & 17, Rana saw programmes in Arabic, Chinese, English and Russian from Abu Dhabi, Dubai TV, Chinese TV and the CIS.

Toward the end of the 1993 season, in August, **John Woodcock** (Basingstoke) received pictures from Italy (RAI) on the 8th, 15th & 21st and from Spain and Poland on the 21st & 22nd respectively. At 1216 on the 21st RAI was transmitting a film about China and at 1043 on the 22nd John saw an hour of children dancing, with Russian type sound and commentary and, what looked like, Poland's TVP1 ident. in the top right-hand corner of the frame.

Bob Brooks (Great Sutton) had a good haul of DX during the Sporadic-E openings that he noted on August 1, 2, 8-16, 20-24 & 25. Spread through those days he saw a variety of captions, idents, logos, programmes and test-cards from stations in the CIS (formerly USSR), Czechoslovakia (CST & Bruno), Denmark (DR Danmark), Finland (YLE), Iceland (RUV Island), Italy (RAI-Uno), Norway (NRK and the regional Melhus), Poland (TVP), Portugal (RTP), Romania (TVR), Spain (TVE1 & the regionals Aitania & Madrid) and Sweden (SVT). Among the programmes he saw were athletics, cartoons, concert, cycle-racing, films, football, golf, inventors, *Murder She Wrote*, news, singing, weather and, possibly from Hungary (MTV), *Wheel Of Fortune*.

During the Sporadic-E events on the 14th, 22nd, 24th, 25th & 26th, Simon Hamer received pictures from Albania (RTSH) on Ch. IC (82.25MHz), the CIS (OK-1), Czechoslovakia (CST/ST Bratislava & CTV-2) and Poland (TVP) on Chs. R1 (49.75MHz) and R2 (59.25MHz), Denmark (DR), Iceland (RUV), Norway (NRK), Portugal (RTP) and Spain (TVE1 & 2) spread among Chs. E2 (48.25MHz), 3 (55.25MHz) and 4 (62.25MHz) and Italy (RAI-Uno) on Chs. Ia (53.75MHz)and Ib (62.25MHz), in Band I. The opening on the 22nd was intense enough for Simon to see Poland as high as Ch. R3 (77.25MHz) in Band II and unidentified 525-line transmissions on Chs. A2 (55.25MHz) and A3 (61.25MHz).

On the 30th, **Michael Larsson** (Cheadle Hulme), using a D100 converter copied strong colour pictures from Finland, Italy, Norway, Spain and Sweden. "All signals were really strong," said Michael and added that between 1120 and 1215 video from Finland, Spain and Sweden were fighting for predominance on the screen. Earlier in the month, from the 23rd to the 27th, he saw adverts for Bounty and Mars, the logo '1' and news from the CIS,as well as chat shows and films from Italy, adverts cartoons, news and films from Spain and test-cards from Finland and Sweden.

Meteors

"On the night of the 'Persieds' I got fed up standing in the garden looking for breaks in the rain clouds," wrote John Woodcock, who soon went back inside, switched his DXTV receiver to Band I and was rewarded with a few 'pings' of very good pictures, of 2-3 seconds duration, bouncing of the ionised trails left by the burning meteor particles. Simon Hamer identified bursts of pictures from Norway on Ch. E5 (175.25MHz) in Band III at 1321 on the 13th and the CIS/OK-1 at 1823, on Ch. R1. We too were disappointed because the skies were overcast throughout the event and there seemed no chance of a break.

Satellite TV

While moving his satellite dish antenna around, during August, **John Scott** (Edinburgh) received a signal with POLSAT, **Fig. 7**, in the centre of some bars and he would like to know the origin.

Weather

"We have had very hot weather this year and very heavy rains flooding most of North India and NE. India. Delhi is also flooded. The flooding was so severe that all trains to Punjab and Jammu were cancelled indefinitely on July 12," wrote **Rana Roy**. John Woodcock reports very heavy and thundery conditions at midday on August 21. Although I only recorded 1.0in of rain throughout the month, compared with 4.08in in August 1992, the main amounts of 0.45 and 0.40in fell on the 12th and 22nd respectively, just right to mess up our observations of the Persieds.

The atmospheric pressure readings for the period July 26 to August 25 inclusive, **Fig. 13**, were recorded at noon and midnight on the Short & Mason barograph installed at my home in Sussex.

Tropospheric

While tropospheric conditions were good on August 17, Simon Hamer received pictures from Belgium, Denmark, Eire, France, Germany, Holland, Norway and Sweden in Band III and the u.h.f. bands and, although **David Glendy** (Arbroath) found 'little DX in August' he too logged u.h.f. pictures from Belgium and the Netherlands on the 17th.

SSTV

Despite fading signals on some days in August that can ruin the build up of slow-scan television pictures, **John Scott** (Glasgow) received strong calling captions from stations in England, **Fig. 8**, Germany, **Fig. 9** and Spain **Fig.10**, plus end of QSO captions from Austria, **Fig.11** and France, **Fig.12**, in the 14MHz band.

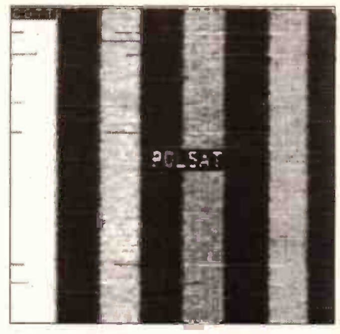


Fig. 7: Unknown origin.

Fig. 8: SSTV.

Fig. 9: SSTV.

Fig. 10: SSTV.

Fig. 11: SSTV.

Fig. 12: SSTV.

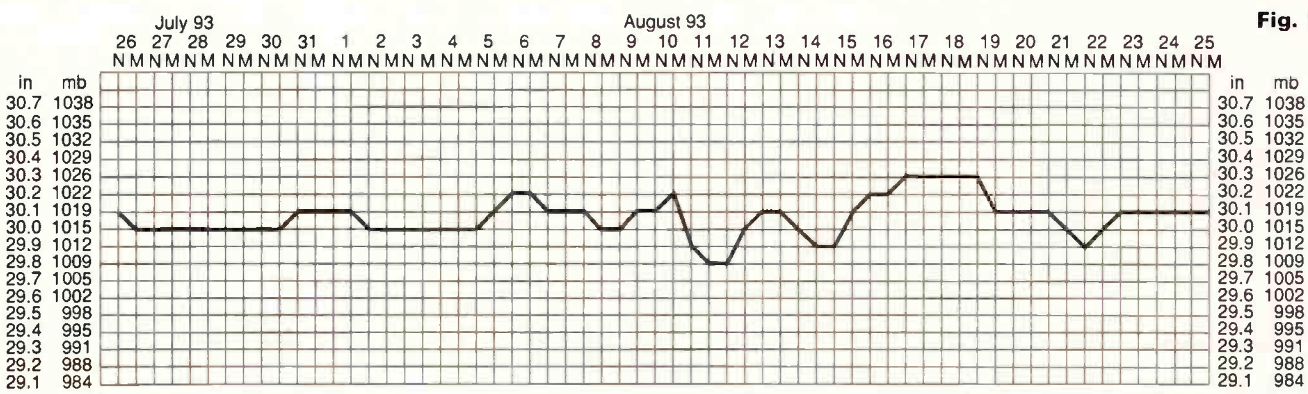


Fig. 13

Bandscan

America
By Gerry L. Dexter

Trans World Radio's Chuck Roswell, shown here with his wife Barbara, formerly with the Bonaire station, will move to TWR Monaco.

Several years ago the Christian Science Church began a major expansion of its media efforts, well beyond its world-famous newspaper *The Christian Science Monitor*. The new additions included a news magazine, a nightly television news programme and a world-wide short wave broadcast service over three large short wave installations. Tens of millions of dollars were spent on the expansion. More, it turned out, than the Church's declining revenues could support. Thus, the last couple of years have seen these efforts cutback or discontinued. The latest example is the decision to sell WCSN, the Monitor's short wave station in Maine.

Short wave operations will be 'consolidated' at the Monitor's WSHB in South Carolina, where another high power transmitter and antenna will be added once WCSN is sold. No buyer for WCSN has yet been found. WSHB will provide coverage for Europe and Africa and KHBI, Saipan, will continue serving Asia. The Monitor's programming alignment has also been changed and now includes some features from the American Public Radio network. The former two hour program block has been cut back to just one.

WWCR in Nashville, Tennessee, totally destroyed by fire last spring, is now back at full operating strength, having added a third 100kW transmitter. The station was within days of putting its third transmitter on the air when the fire broke out. Incidentally if you were on WWCR's mailing list and haven't contacted them since the fire, you need to write to them again to get back on their list since all the flames took all of their records, including program logs. Write to Adam Lock Sr., Program Director, WWCR, 1300 WWCR Avenue, Nashville, TN 37218, USA and be sure to mark the envelope 'Personal'. WWCR carries President Clinton's weekly radio talk on Saturdays at 1145 & 2230UTC and Sundays at 1245UTC, all on 15.685MHz.

The Christian Science Monitor's 500kW short wave station WCSN, Scotts Corner, Maine is for sale.

I'm still waiting for the short wave appearance of Radio Miami International, which is still trying to pull together the many elements required to get a station on the air. They are still saying they should be active anytime now so keep checking their assigned frequency of 9.955MHz for test broadcasts.

Meanwhile their affiliated station, Radio Copan International in Tegucigalpa, Honduras, has begun its short wave career. The planned 1000W output took the air with just 100W on 15.675MHz and signal strengths in the US were poor. The initial schedule is daily except Sundays from 1400-1500, 1745-1900 & 2100-2230UTC. Reception reports can be sent to Radio Miami International at PO Box 526852, Miami, FL 33152, USA or direct to the station at Apartado Postal 955, Tegucigalpa, Honduras.

The Clinton administration has approved the launch of Radio Free Serbia, aimed at undermining the Milosevic government by breaking its grip on local media content. Like Radio Free Afghanistan, Radio Free Serbia will use the facilities of Radio Free Europe/Radio Liberty and will probably be on the air before the end of the year.

Central American Notes

Radio Rica, the Nicaraguan short wave station that was active briefly on 4.920MHz has supposedly given up tropical band broadcasting and is limiting its efforts to the local f.m. band. Radio Miskut, one of the former Nicaraguan anti-Sandinista clandestine stations now considered a legitimate broadcaster, is being heard on 5.770MHz up until sign off around 0030UTC (although it sometimes runs until as late as 0200UTC). The last hour is reported to be in English and includes country/western recordings.

The Radio Exterior de Espana Costa Rica relay now broadcasts to North America, Tuesday to Saturday at 0100-0400UTC on 9.630MHz, Monday to Friday at 1100-1400UTC on 11.880MHz and 1800-0000UTC on 17.890MHz. Also 1300-0100UTC Saturdays and Sundays on 17.890MHz. Despite REE's history as a good QSLer I've yet to see any verifications for REE via Costa Rica.

A semi-official government station is due on the air from the Dominican Republic. Radio TV Dominican, active on short wave quite a few years back, is due to return to short wave with a 20kW transmitter operating on 5.980MHz. It was due to open during the summer but, at the time of writing this, has not yet been heard from. The address is listed as Apartado 965, Santo Domingo. Another Dominican station said to be planning a return to short wave is Radio Norte, with 1kW on 4.800MHz.

An interesting new medium wave outlet is Radio Vision Christiana International operating on 530kHz with 50W from the Turks and Caicos Islands. The program content is a relay of WWRV, a Pentacostal Hispanic station located in Patterson, New Jersey, picked up off a satellite. Apparently Radio Vision does have a licence to operate on short wave but does not plan to do so.

Trans World Radio, Bonaire is now gone from short wave for good. Chuck Roswell, who hosted the popular *Bonaire Wavelength* programme is relocating to TWR-Monaco, effective January 1. Incidentally, HCJB is carrying four hours of TWR programming in Portugese daily, produced by TWR's Brazilian office, and also half an hour in German from TWR-Monaco.

South American News

Short wave signals from Paraguay are few and far between so any news of a possible new station is always welcome. In this case, it's word that Radio La Voz del Chaco Paraguayo plans to add short wave to its 610kHz medium wave from the town of Filadelfia. The power will be in the range of 5 to 10kW and the frequency somewhere around 4.900MHz. The station is operated by a Mennonite mission and much of the programming will be in German to serve Mennonite communities the station's medium wave signal cannot reach.

The Colombian RCN (Radio Cadena Nacional) network plans to reactivate 6.160MHz from Bogota, using 50kW around the clock. Also reactivated is Radio Santa Fe, 4.965MHz, although this one has a long history of being active briefly and then disappearing for a couple of years, only to repeat the cycle. The government's Radio Nacional de Colombia has appeared on 9.655MHz and is being heard during the evening hours in North America. Radio Meoldia was active briefly on 6.045MHz. This is another of those Latin American stations that operates inconsistantly on short wave. One must make a habit of checking the frequency during every listening session in hope that it may show. Meantime, clandestine radio fans continue to keep an ear on Radio Patria Libre that continues its approximate 0030 to 0110UTC schedule, operating most recently in the area around 5.840MHz. An 'answering' station, El Pueblo Responde, (the people respond) is also active during that time period on frequencies close to Patria Libre.

If you wish to catch signals from Uruguayan short wave station Radio Monte Carlo on 9.595MHz you'll have to monitor that channel on a regular basis. Word is that activity by this station is very irregular. It's listed for operation between 2330 and 0300UTC with just 1.5kW. The station is also reported on 6.140MHz, occasionally active around 1100UTC.

QSL collectors who might still need replies from Venezuelan stations Radio Mundial, Radio Continente or La Voz de Carabobo, all of which are now off short wave, might try sending follow-ups in care of Manuel Rodriguez Lenza, PO Box 65675, Caracas 1066-A, Venezuela. He says that he can secure QSLs from any of these stations but requests two International Reply Coupons to help with return postage.

Radio Apinte, the only short wave station in Surinam, has moved to 4.990 from 5 005MHz variable in order to escape interference. Never mind that 4.990MHz is also a channel occupied by various other Latin American broadcasters.

Many North American DXers are hearing Radio Malargue from Argentina on 6.160MHz to 0000UTC. This will be much more difficult, however, if Radio Cadena Nacional in Colombia, mentioned above, reactivates on this frequency.

These stations from Chile are putting in occasional appearances in the 49m band. Radio Santa Maria on 6.030MHz, Radio Esperanza on 6.090MHz and Radio Patagonia Chilena on 6.080MHz. All frequencies vary by a fraction or more.

SSB Utility Listening

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

One of the more successful 'holiday' airlines is Britannia Airways, based at Luton Airport just north of London. The airline has recently established their own h.f. facilities for their aircraft to pass company messages to their 'flight ops' department. *Monitoring Times* reported recently that they have three frequencies available: 6.556MHz, 10.021MHz and 11.363MHz; most activity is reported to be on the last frequency. This tends to agree with several of your letters, as quite a few people have reported hearing numerous flights passing messages on 11.363MHz. The same three frequencies are also used by Monarch Airlines, also based at Luton, although it seems likely that the facilities are shared by both airlines, rather than having two almost identical set-ups.

Portishead Radio used to be used by both airlines for passing company messages; does anyone know when the new facilities started operating? I have QSL address details available if required - send me a stamped s.a.e. with a copy of your own loggings, and I'll send you their QSL address details.

Emily

As I write these words, 'Hurricane Emily' is just approaching the Atlantic coast of the United States. Several high frequencies are active with traffic concerning the hurricane, and both NOAA (National Oceanographic & Atmospheric Admin) WP-3D Orion aircraft (callsigns are 'NOAA 42' and 'NOAA 43') are flying around the storms - and even flying through the eye of the hurricane! There are also several USAF WC-130 Hercules aircraft airborne, using their familiar 'Gull' callsigns.

Strangely, the NOAA aircraft were being handled by the USAF GHFS facility at MacDill on the Gulf Coast of Florida, who were making numerous phone-patches to the NOAA headquarters in Miami - normally they talk direct to their 'Miami Monitor' station. Some of their phone-patches are fairly routine, but others pass details of the storm as it tracks towards the coastline. For this evening's listening, 'NOAA 42' started off with MacDill on 11.176MHz, and they QSYed to NOAA frequency 'Foxtrot'; this was found (by **Keith Elgin**) as 10.015MHz, although MacDill did mention that frequency 'Echo' was 8.876MHz. The full set of NOAA frequencies (all in MHz) are as follows: 3.407, 5.562, 6.673, 8.875, 10.015, 13.267 and 21.937. The NOAA primary frequency is 13.267 and their secondary is 5.562. NOAA are in the process of moving from Miami to a new headquarters at MacDill AFB.

Your Letters

Ian Lockwoods question regarding 'HR's has prompted a number of letters, many with the correct answer, and also some with alternatives. **John MacNaughton** offers 'hotel reservation', while **Richard Stanley** earns the 'brownie points' for reporting that 'HR's are in fact 'human remains'. The latter seems more obvious when the crew mentions 'the morgue' in the same sentence as how many 'HR's they are carrying. Richard asks for an 'in-depth' article on Numbers Stations and Single Letter Beacons (SLB's) - no problem, I'll do one at lunchtime tomorrow! Seriously though, I will try to make contact with the 'Laughing Cavalier' and 'Bulgarian Betty' to see if they will tell me all their secrets - if you don't hear from me again, you know that I've been 'got'.

Looking back through some of your earlier letters to Peter Rouse, I came across one from **Peter Midgley**; he says that he is interested in 'number stations', and wants to get together with others to form a 'listening group'. He has compiled a newsletter called *ENIGMA* (very apt). I have a copy of the first issue, and it covers a large number of different types of number stations, with details of their format, observations and active frequencies. Obviously, Peter would like to hear from other people who share an interest in this fascinating subject; he can be contacted via: ENIGMA, c/o Andy Cadier, Off the Record, 28 Romney Avenue, Folkestone, Kent CT20 3QL.

Ron Galliers writes with a theory regarding US Navy aircraft callsigns. He suggests that the character part of the callsign (e.g., the 'LP' in the callsign 'Navy LP491') is a code designator for their operational base. Well, that's a good guess, and not too far from how it really works. Almost all the US Navy and US Marine Corps units are assigned a two-letter tail-code, as well as a squadron designation. Several squadrons usually share a Naval Air Station, but they will each have separate tail-codes and designations. All the squadrons are numbered, and have a prefix which explains their purpose, e.g. VP-49 is the 49th

maritime patrol squadron, VR-48 is the 48th transport squadron. Most of these squadrons use their tail-code and squadron number as part of their flight callsign, for example, callsign 'LP491' is used by a P-3 maritime patrol aircraft operated by the VP-49 squadron that is assigned the tail-code 'LP'; the final digit '1' indicates either this is the first callsign used that day, or the individual aircraft code within the squadron.

There are many exceptions to this rule, as several squadrons (notable, the US Marine Corps) use code words (eg, 'Titan', 'Otis'), and some use the squadron tailcode with an ever increasing number (eg, 'JM 562' for one flight and 'JM 563' for the next flight). Ron's theory is correct, in a roundabout way; from the callsign you can work-out the squadron, which leads you to their base (with the right reference books).

Unfortunately, a full list of such tail-codes, squadrons and bases would fill about three pages of the magazine. Also, the US Navy is going through a period of change at the moment, so any listing would be out of date almost immediately.

Andy Middleton asks that I put more 'raw data' into the column, and sacrifice some of the presentation for an increase in information. Well, I could always fill a page each month with numbers and leave you to work out what they mean, but I would prefer to give some more background to some of the things that you hear. Also, 'listening' is not just about 'frequencies'; what about receivers, antennas, other station equipment, books, charts and diagrams, callsigns, how the professionals use s.s.b. short wave, when to listen, etc. Many of these can be answered by reading some of the numerous books available, but many need hours of patient research to find out a 'snippet' of information which can then be shared (hopefully with me and the readers of this column) and help to get the overall picture. Another of Andy's suggestions is to make the print size smaller so that more information can be squeezed into one page - I have resisted this idea because, for a subject as complicated as s.s.b. utility signals, everything needs to be explained clearly.

Clubs And Societies

Andy also asks about any British clubs or societies specifically for this area of short wave listening. Well, I don't know of any, and since the letters I receive tend to come from all over the country, I would expect that any such club is likely to be mainly magazine or news-sheet orientated. Do you know of any clubs or groups in the UK that are targeted at s.s.b. utility listeners, or even cover this area?

I Want To Know

One of the benefits of writing this column is that I am able to ask my own questions! Does anyone know who uses the callsign 'MPD'. They were heard operating on 11.178MHz on a Saturday morning, talking to another station who's callsign ended '01'. They were discussing some 'grey boxes' fitted to an aircraft, and were discussing some form of computer communications between the two stations. They also mentioned a third station joining them, and then all three would 'QSY to the higher frequency in 30 minutes time'. Both operators were English, and may even have been 'military', but their conversation was very casual (very unlike the military). I know that almost all the 'M' series callsigns are used by the military, and that the RAF Meteorologic Research Flight have been heard on this frequency, but can anyone confirm exactly who 'MPD' is, and what is their 'higher frequency'?

Amateur Bands Round-up

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

Almost every month, people come up with problems either of identification or of 'fractured English'. Perhaps a word or two for newcomers wouldn't come amiss. Old-timers, please bear with us for a moment!

Amateur callsigns have various formats. The front part - the 'prefix' - tells you which country the station is in. The back part is the 'suffix' of one, two or three letters and is the callsign proper. There may be modifiers in front or at rear of our prefix-plus-suffix, but we'll deal with these in a tick. The 'classical' shape for a prefix gives one or two letters and a number; GW3 KFE for example, or WA8 ZZZ. The former shows that I am resident in the Welsh part of the overall UK area. If I go over the border I become G3KFE, to Scotland GM3KFE and so on.

Our WA8ZZZ is an American (First letter W, K, A, or N.), the second letter indicates his licence class. The digit used to say he lived in the eighth call area but now merely tells us that was where he lived when he was first licensed; a variation such as a two letter prefix, a number, and one or two letter suffix tells us this particular Yank is a higher grade of licence.

Then came prefixes of the form number-letter-number such as 9J2 for Zambia, followed by the call letters; for example 9J2KP. The latest variation is a prefix comprising a single letter followed by two numbers - for example Z23JO. Hereabouts take care - Z23JO is in Zimbabwe, while Z32JO would be Macedonia!

In the old USSR, the 'prefix' function extended further; for example UB5C OS is from Cherkassy in Ukraine; UA3B AA Moscow City, UA3D AA Moscow oblast. This system seems at the moment to be largely holding good. An oblast, by the way, is akin to a county.

Finally, we might find something tacked on to the beginning or end of a seemingly complete callsign by way of a /. For example, OY/GW3KFE, or GW3KFE/MM, or GW3KFE/W6. The first and last of these indicate a change of location: for the first one I'm in a CEPT-licence country (Faroe Is), for the last I'm in California on a 'reciprocal license.' The middle one simply tells you something about my style. If I'm signing /P I would be a portable station, maybe on a Field Day or from a hotel; in some countries we might use a number instead of P - for example W6AM/2 would be W6AM portable in the second call area. /M, I might be in a car, in a boat on inland waterways, or walking. /MM implies I'm on a ship on the high seas, while /MA means the ship is lying at anchor. Finally, in America, one can operate /AM - Aeronautical Mobile.

Now, language. Most amateur communication is in English. However it can be distorted by accent, bad keying - 'Martian Morse' - selective fading, QRM or whatever. Listen carefully, and stick around the frequency until you are SURE. Remember in the callsign exchange, an operator sends his own call LAST - so if you hear 'UB5COS, GW3KFE', but miss the bit in the middle you know you are hearing GW3KFE rather than UB5COS, who would have said GW3KFE, UB5COS.

Don't forget slang, either. For example, 7MHz is often referred to as Forty and 70MHz as Four Metres. It is unlikely you would hear an amateur talk about 40MHz when he meant 40 metres, but it is awfully easy to transcribe it so!

Finally, do get hold of a Prefix List; Geoff Watts is your man, at 62 Belmore Road, Norwich. At about thirty bob a go there is no better bargain in Amateur Radio. Actually, Geoff has four lists available, so for six pounds you can have the lot. Done on single sides of paper they fit nicely under a glass desk-top; or in the double-sided form you can stow 'em in a drawer. If you write him to enquire, include an s.a.e.

Reports

Our first one this time is from **Geoff Crowley** in Hafnarfjordur, Iceland. Geoff listened for 1 hour one day to WA8QFE/AM on 14.316MHz while flying to USA from eastern Europe in a cargo plane. Seemingly WA8QFE makes the trip regularly and is on the air most trips. Another interesting one was a CR5, using a Field Day set-up with the antenna mounted atop a crane. Yet a third was just outside our band and signing RBIG rather than RB1G; the first contact was in Russian, not unexpectedly, but it was followed by one in English in a relaxed 'amateur' manner. Possibly a Ukrainian version of the American MARS? TF3EJ on RTTY was decoded on Eighty, plus K1VWL, KF2LN, KB2HK, WA2IZN, PY7AJI, VE6ZT, and c.w. came in from Europeans.

Sideband gave on 7MHz ZL4BO, PY2LW, ON4TH, on 14MHz K5GHB, VK5MF, WA8QFE, NR9Z, ZL3MM, on 18MHz RU1A(Cards to KC1WY); a CR5, 4L5A and an a.m. signal YC3GS on 21MHz. Alas, Geoff is set to move from Iceland, although the destination was not firm at the time of writing. I hope Geoff will continue listening at his new QTH and continue sending reports - It gives yours truly a much better 'window on the world' as well!

Next we have **Mark Malone** in Great Harwood, Lancashire who, like Geoff Crowley, has a Datong AD270 active antenna; in Mark's case buckled to a DX302 receiver. This month Mark has covered all the continents. On 7MHz the odd short spell gave Europeans, but on 14MHz - where almost all listening took place - after stripping out the smaller fry of Europeans, Mark logged 4J4GK (Malyj Vysotskji Is), W2HCW, 9K2DJ, 9K2ZZ, WA3HUP, A92BE, 5B4LP, VE2CQ, K1ODB, WW1V, UM8DX, NK2H, YV5ANF, KD9CN, YV5ENI, 4K3WQ (Anarctica), CR5ANO, WA2JVM, W2HCW, WB4QLK, 9K2DI, RA9OW, KE2WY, VO1ST, W1BFA, K2NVW, A41LO, AB4Q, LU6AMW, OO4RO for a Special-Event job in Belgium, 9K2YA, OD5VT, ZB2SU, ZA1B, ZF6ABM, VE1PT, W1DCC and K4AIM. Finally a quick sniff on 21MHz showed 4O1V and T77M (San Marino).

Harry Richards writes from Barton-on-Humber, and notes, reference his previous report that the UB5 was UB5BBC, which would put him in Ternopol oblast. Other calls noted included UA3TZ, a questionable D3DITS and DC2BBW; in a later note, Harry mentions listening between 1100 and 1230UTC on 14.222 to a group including KC2QJ, VO1NP over there, and G0SNP, G0SPS GI4TUE and a break-in station GB8WG. Harry wonders whether this is all correct, but there seems no reason to fret; the Yanks usually begin to surface around noon on a normal day, and are then with us pretty well until the band closes. Finally, he has logged VE7ATP, W4NDJ, W6JER, W6NZX and KA1OZJ.

Gerald Bramwell up in Swinton heard Anton, UB5COS using the GW3KFE call to work IK2GAU on August 5, 2252UTC. Anton enjoyed his UK stay, but is now back in UB5-land. Gerald takes it down in s.s.b, c.w, RTTY, or f.m. to choice and covers the bands 30MHz down. On Top Band, for example we find ON4ACG on the key, while on Eighty most of Europe was covered by the first three modes, including C31SD for a rarity, plus all the other continents too. 7MHz saw these modes in use again, with ZB2JL notable, plus all continents.

At 14MHz we see a higher proportion of RTTY with most of the world represented, while c.w. stations were not too numerous. Up again to 18MHz where the ARRL's official station W1AW was copied on RTTY and all continents save Australasia copied while on 24MHz we see G0FDA on f.m. plus EA9AJ; as for 28MHz, Nix!

Mark Borthwick is in Hawick in the Scots Borders country and sticks to sideband. On 7MHz he noted GM0OMV/P in Shetland, GU3EJL on Alderney, GB4CIJ, GB2KA, GB4MNR and HK2JFF. Cranking the switch to 14MHz was the route to SU1CS, LU5DL, 9K2JC, 5B4ADA, 5B4WB, 5B4KH, YV5AAX, JY5DL, JY3ZH, SV0IE, 4X1FQ, 4X4BR, 4Z4BS, 4Z1AC, W9IV, N4/OA4OS, W2ONV, KU1X, WB2JZK, WA2HMU, W3WZU, 9H1AF, 9H4R, 9H4B, 9H1EL, TT8OBO, VE3XN, VE2WQ, VE1JBC, 7X2OG, OD5VT, OD5PL, OD5YT, KH6WU, VU2RAK, VU2GMU, VU2LNB/MM(Port Dumai, Sumatra), EJA2EU, UW9UP, 5N0MVE, TR8JH, PT7WA, UJ8JMM, and various smaller fish. Up again to 18MHz for CN8MK, PT7DX, SVs, G4GUI/MM off Guinea-Bissau, Z21CS, OX1FX, 4X1MO, strings of Japanese stations, YB0HML, G4KKJ/MM off Corsica's W Coast, PJ8AD, ZB2JL, 9M2DM, ET3MC, VE7IM, VE2FLE, AA4R, WB0RSH, EA8AMT, C91AI, ZS6BKR, 5Z4JD and J28RD. Finally, 21MHz, for EF8CMW (Canary Is), EA8LS, HL5AWS, HL2KAT, YC8PU, 6O0A (Somalia), 4U1ITU, JA3BOA, JA9BOH, JA2KSI, JA6CDH, JK6SEW, 4Z5DG, 4X4HQ, 9K2UB, 9K2DI, T77M, J28RD, J28CN, W4ZC, OD5PM, 7Q7ZZ, ZS6NK, ET3YU, 9M2DM and SU1CEC.

So there it is for another month. As ever, letters to arrive at the above address by the beginning of the month.

Datong AD 270 Active Antenna

Airband

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

One of the benefits of holding a flight R/T licence is that, with the appropriate additional bit of paper, I can also operate an Air/Ground station. That's exactly what I did at the Woburn Moth Rally. For two short periods before and after the display flying, I relieved the chief operator who would not otherwise have had a break! The purpose of Air/Ground is to provide information which the pilot requests so as to ensure the safe conduct of the flight.

As at most small aerodromes, the operator is not strictly speaking a controller since no clearances can be issued and the pilot is not obliged to take orders from the ground. If a pilot is 'Ready for departure', and the operator can see that the runway and immediate airspace is clear, then the reply would be 'Take off at your discretion'. If pilots ignore you - that's up to them! Some aircraft are non-radio and red or green signal lamps then serve as a rudimentary form of communication.

Hardware

So now we know the secrets of ground-based transmitters! All is revealed by **Peter Longhurst G3ZVI** (South Devon) who works for Garex Electronics. His company built the Oxford a.t.i.s. transmitters. Designing an a.m. transmitter to handle 100% duty cycles without failure was challenging. The transmitters are paired and run 4W into a dipole at 15m above ground. Each month the two transmitters swap jobs - one becomes operational, the other goes on standby.

Another duplicate system built by the company is the air traffic control transceiver at the Silverstone race course. If one system fails, the backup is switched in automatically. So now you know.

Low-Level

From Dyfed, **Huw Davies** sees both transatlantic flights (on their way to/from the Track System) and military low-level operations. In combat, flying would take place at 600kt (about Mach 0.91) within 125ft of the ground, but for practice purposes the limits are 450kt and no nearer than 250ft to anything (surface, building, etc.) and during sensible hours. Due to the restrictions imposed by existing controlled airspace, major conurbations and so-on, there are only relatively few areas available for low flying outside regulated airspace. Future CAA airspace restriction charts are expected to show the major flows through the 'bottlenecks' that inevitably result from these constraints.

The predictable low height can actually be an advantage in terms of safety. Flights above 2000ft in uncontrolled airspace are not likely to conflict with low-level military operations. Prevention of confliction (below 2000ft) is by the usual see-and-avoid procedure adopted in unregulated airspace. Unavoidable occupation of the lower height bands (such as for crop spraying or photographic surveys) can be reported to the military by the Civil Aircraft Notification Procedure which involves telephoning LATCC.

Your Aeronautical Experiences

Good to hear from satisfied customer **John MacNaughton** (Hereford) who likes the style of the column and feels that I am like a monthly visitor. If you want to see my Museum as you suggest, John, then readers are invited to ring the number given at the end of the column (not after 2200 local please).

Being under the routes to the mid-Wales practise ranges, John experiences F-15, F-111 and A-10 formations. He also visited some RAF bases during his time with the Royal Observer Corps and it was then that John noted the stud number tuning system. Some military airborne radios are only required to tune to a limited set of channels, each frequency then being known by (and selected as) a simple number - the stud. Unfortunately, these vary from one application to another and so it is not possible to give a definite rule that any chosen number equates to a particular frequency in all cases.

John was lucky enough to get some trips in Shawbury Wessex helicopters and Lyneham Hercules. On one trip he experienced the tactical final approach: level at 1500ft above the surface (too high to be hit by small arms fired from the ground) until close to the runway. Then the nose is pitched hard down and, in simple terms, aimed at the threshold! Of course, it is necessary to level out as the ground looms up - but Hercules are able to land relatively flat, i.e. with only a slight flare.

A few weeks ago I visited Stevenage for work and was surprised to see low-level westerly approaches being made by airliners in landing configuration.

Jet Provost of 6 FTS at Mildenhall Air FZte 1993. The Editor remembers these well from his days at English Electric Aviation, Luton. *Photo Chris Mlynek.*

Tipsy Nipper 3 at the PFA Rally, Wroughton, 1993. *Photo Chris Mlynek.*

Too many (and too big) for Hatfield; too low to be downwind for Stansted. A look at the topo chart revealed what should have been obvious: I was under the extended centreline of 26 at Luton!

Roy Merrall (Dunstable) found the Daventry v.o.r. (DTY, 116.4MHz) and to prove it has sent me a photo of the beacon taken from a nearby road. The antenna is also shown on the Ordnance map but, when plotted, there is a slight position error. When working on Ordnance maps it is important to remember that the lat/long lines do not run parallel to the National Grid. A long straight-edge must be placed across the entire span of the map, so as to join the corresponding latitude or longitude graduations on opposite edges. Also, published information only gives beacon positions to the nearest tenth of a minute; greater accuracy is possible on an Ordnance map, hence giving the impression of a position error. Whereas not all beacons are shown as masts, many are depicted as a tiny square structure at the end of an access path.

Roy has noticed some anomalous allocations. Why is the Cranfield Locator/Outer Marker (CIT, 850kHz) so far out from the more common 270-400kHz band? Another example is Stornoway (see below). I assume that the CAA and Radiocommunications Agency have mutually agreed these frequencies to be acceptable, and that the choice of frequency prevents interference with other facilities.

Frequency and Operational News

The ever-useful GASIL from the CAA reports the following changes in the 8/93 edition. At Brough, Approach/Tower have been withdrawn on 118.225, 130.55MHz having been downgraded to Air/Ground. The Farnborough Air/Ground has been withdrawn on 130.05MHz. New beacons are: Burnham n.d.b. (BUR, 421kHz) which replaces the Burnham v.o.r.; Islay d.m.e. (ISY, paired with 109.95MHz); and Stornoway d.m.e./n.d.b. (ISR/ISV paired with 110.9MHz and SAY, 669.5kHz).

Swinderby Aerodrome Traffic Zone has been withdrawn. Following up last month's news, Deenethorpe now has Air/Ground on 120.275 and 123.6, but initial calls are taken by Cottesmore on 130.2MHz - so says AIC 111/1993, also from the CAA.

John MacNaughton reminds us that the North Atlantic air-to-air talk-back frequency is 131.8MHz. This stops the unofficial tendency to pick 123.45 which is actually allocated elsewhere. In the Caribbean, the correct channel is 130.55MHz.

To ease the passage of flights crossing congested European airspace, a new network of upper trunk routes is being formed. To start with, all are above FL300. These enable a more direct track to be taken by suitably equipped

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Scanning

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

Regular readers will remember I featured the subject of cycle racing communications in last February's column. Most of the information was supplied by **Tom Bruce** of Ayrshire who is a keen cycle race official. Tom has written to me again with an update on events that have occurred during this season. Most major events require considerable use of radio communications between teams and marshals, most of which utilise short term hire frequencies in the 159 - 163MHz p.m.r. band. One of the most interesting facts that he mentions was the increasing number of scanners in evidence at this years events, including some fitted in foreign team service cars. At events such as the Kelloggs Professional Tour of Britain and the Leeds World Cup race, the organisers were providing race officials with lists of radio channels, frequencies and their intended use during the events.

As an example, eight channels were in use during the Leeds World Cup event including two repeater stations, one of which was a form of commentary service intended to keep the press and competitors up to date with the action. Tom noted that this was also being monitored by a fair number of the volunteer marshals supervising the race. It is interesting that the police in attendance did not seem to object to the use of scanning receivers, although I suspect that it would be difficult to prosecute if the race organisers had effectively given their permission for people to monitor race communications by issuing the frequency list. It may also be quite a different story if people were found to be monitoring police frequencies.

Tom points out that the use of scanning receivers by race officials is a fairly positive aspect of the hobby and had proved to be useful on several occasions during the events, especially for the exchange of information and the briefing of marshals along the route. I wonder if any other sporting events will follow suit and permit the monitoring of radio communications? My thanks to Tom for his interesting letter.

Optoelectronics R10

I have now been able to properly evaluate the Optoelectronics R10 communications Interceptor I mentioned in the September column. The unit is rather unusual in that it will quickly lock on to any strong f.m. signal in the vicinity and does not require any tuning. The manufacturers claim that its main uses include communication monitoring, maintenance of radio systems and counter surveillance operations i.e. detecting bugs. It will also allow you to listen to any local f.m. transmissions, which under ideal circumstances could be up to 1km away. This sounds ideal for use at events such as the cycle races mentioned previously, but how well does it work in practice?

Well the unit does receive f.m. transmissions very well, all sorts of signals, on all sorts of frequencies. I tried using the R10 at home with an external base station antenna, in the car with a roof mounted antenna and as a hand-held with a modified 'personal stereo earphone' antenna. The first thing that struck me was just how many transmitters were in use in an average urban area - particularly paging service base stations. This rapidly became a major annoyance as the digital data bursts tended to sound much louder than any other voice traffic making constant adjustment of the volume control necessary. Adjustment of the squelch control reduced the sensitivity of the unit considerably and a compromise setting could usually be found that would allow monitoring of very local transmissions without interruptions from other sources.

The unit did work well as a modulation monitor when testing CB and amateur radio transceivers and I was able to locate a low-power radio transmitter (5mW) especially hidden as a test by one of my colleagues. In conclusion the unit works well, but is only really suited to certain applications. If Optoelectronics ever design a MK 2 version specifically for the scanning market, I would like to see some form of automatic volume control circuit and a delay before the unit retunes to another frequency once a transmission ceases. A bit more audio and a reduction in the level of the 'click' which occurs when the squelch opens would also be welcomed. If the unit was combined with a frequency counter I would be very interested.

Radio Deaf Aids

Way back in January last year I mentioned the use of radio deaf aids. **Mike Davis** of Surrey wrote to me regarding his experiences using a radio microphone to teach the hearing impaired. He says that in addition to the 174MHz band, 49 - 50MHz is also occasionally used and some manufacturers are now considering producing equipment for operation in the 478 - 590MHz band. The output power of most transmitters is in the region of 2mW and the antenna usually consists of either 0.5m of dangling wire or in some cases the lead of the lapel microphone.

He comments that if you do come across transmissions from radio microphones being used for this purpose it is not a good idea to send reports to the users. Most teachers forget that conversations are not private when the microphone is switched on and this can sometimes cause embarrassment.

About three years ago, when a local newspaper reporter visited the school, he informed the head that he thought the premises were being bugged. Apparently a local short wave listener had received transmissions from a teacher telling someone to put his coat on - needless to say the story didn't make the front page. My thanks to Mike for passing on this information.

Antennas

The subject of antennas feature fairly regularly in the letters I receive. The most popular question usually being which type would I recommend. **Bob Taylor** of Stourbridge and **Terry Campbell** of Morayshire are both wondering what type to buy so I hope the following will be of help. A lot depends upon what frequency bands you are interested in, where you do the majority of your listening and how much space you have available. If you want the best antenna system possible then a selection of rotatable, high-gain Yagi antennas operating on different frequencies and mounted on a 20m high tower may be the solution, but your neighbours might think differently. A slightly less obtrusive solution may be a rotatable log-periodic antenna mounted on your chimney.

If you just want a simple omni-directional antenna then something like the Nevada Scanmaster Base model may be suitable. This consists of a thin vertical tube about 1m long with four small radial elements at the base and is claimed to operate over the range 500kHz to 1500MHz with reduced performance below 25MHz. It also has the ability to be used for transmit on the 144 and 430MHz amateur bands, which may be of interest if you hold an amateur licence.

Most antennas of this type are based on a vertical element with various matching networks fitted at suitable points along its length. This can result in dips in the response at various odd frequencies if the antenna has not been designed properly. However it is possible to achieve good performance across a very wide frequency range, particularly at u.h.f. where the element can be designed to provide additional gain.

Active antennas are another possibility if you have problems with space. Most active antennas are based on the loaded vertical design I mentioned previously with the addition of a low noise pre-amplifier. This boosts the level of received signals and provides a more consistent 50Ω impedance match for your scanner. The internal pre-amplifier makes it less important to use good quality coaxial cable between the antenna and the receiver and would allow you to use a TV antenna splitter to feed more than one receiver.

One drawback of active antennas or pre-amplifiers is their tendency to cause overloading from strong signals. This is a particular problem in urban areas where it is almost certain that you will be near to a transmitter of one form or another - usually a paging service base station. As a general rule I would not advise using an active antenna if you live in a city and intend to use it with a continuous coverage hand-held scanner. This is because these particular models are primarily designed for use with the compact antennas they are supplied with. They will usually work satisfactorily with a larger external antenna providing there are not too many strong signals present, however once an additional pre-amplifier is added they tend to overload. It is worth noting that base station scanners such as the AOR AR3000/1, Icom IC-R9000/7000/7100 and Tandy PRO 2004/5/6 have additional filtering in the r.f. stages that helps to minimise this sort of problem.

You may have noticed that I have not mentioned one of the most popular antennas used by scanner owners - the discone. I must admit that I have never been that impressed with any of the designs I have tried, particularly at u.h.f. where I find it is useful to have a bit more gain than a discone can provide. Some manufacturers have tried to improve the performance at the low and high frequency limits by adding additional vertical elements on top of the antenna. Although this can make an improvement it does mean that you have a lot of metal in the sky, which can be rather unsightly. For my money I would rather spend a bit more and have a rotatable log-periodic that can

Scanning

provide a huge improvement in performance for about the same degree of visual impact. One other consideration is that amongst the scanning related stories published in the national press during the past year, at least one anti-scanning article has specifically described a discone antenna and suggested that it can only be used for eavesdropping on telephone conversations - so be warned.

Other points to consider when installing an antenna are to mount it with its elements vertical, preferably outside, as high as practicable and as far away from other antennas as possible. Use the lowest loss coaxial cable you can afford and make sure all connections are tight and water-proof.

If you can not mount an antenna outside, or live in a flat you could consider using the roof space. Try and mount the antenna as high a possible within the available space and keep it as far away as possible from any mains wiring or existing antennas. I use some antennas mounted in my roof space and obtain reasonable results up to a few hundred megahertz unless it is raining. This is due to water saturating the roof tiles and increasing their attenuation to incoming signals. One other problem I found, particularly at low v.h.f. was the amount of noise and 'hash' radiated by domestic appliances, particularly those fitted with microprocessor control units. I reduced this problem by lining the floor of the roof space with wire 'chicken' mesh fencing and connecting it to a low impedance earth point. You could use aluminium foil equally well but you will have to make sure that overlapping sheets make good connection with each other. Bringing the edges together and folding them over a few times usually does the trick.

I am currently experimenting with a few new designs for home construction that I hope I will be able to include in a future issue. Until then, if you have any helpful hints or experiences with antennas why not share them with other readers.

And Finally

Where was **Fig. 2** in the July 93 column? You may well ask - and many of you have! So, to reduce my photocopying bill and to save you postage, it is included this month. Sorry about the omission - but the original drawing is still out there somewhere.

That's all this month don't forget you can write, FAX or leave a message on the Answerphone (0703) 262246 if you have any earth shattering news that you want to share. Until next month - Good Listening.

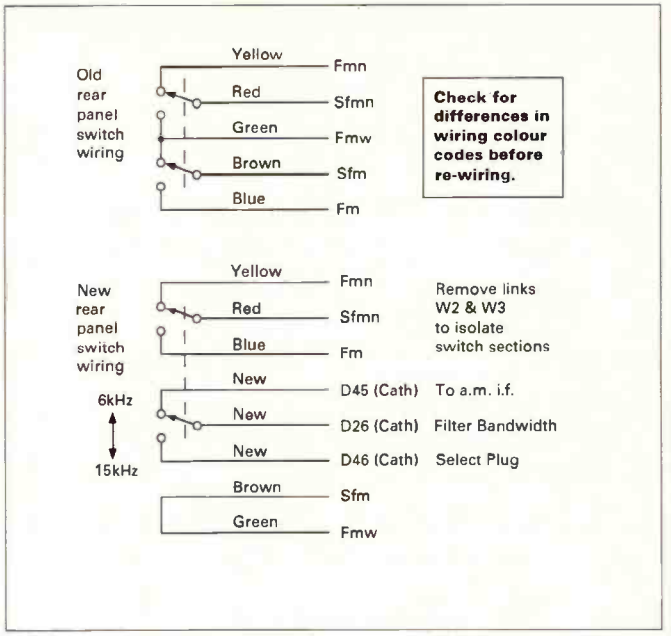


Fig.1: Icom ICR-7000 Filter Switch modification. This is the drawing that was omitted from the July 93 'Scanning' column.

Airband

Continued from page 53

aircraft, and pan-European coordination should make the routes appear 'seamless' in operation. These, and an overflow route connecting the northern Continent with the North Atlantic Track System, probably explain the observations of Tim Christian (North Walsham). He has spotted intense east-west high altitude traffic overhead when the weather is clear enough to see contrails (who needs radar?). If you would be interested in joining an enthusiasts' group in north Norfolk then contact Tim direct on (0692) 403230.

Follow-Ups

All too often I have had to report the closure of long-established aerodromes for what appears to be short-term gain. I am pleased to hear that Panshanger, Hertfordshire, is to re-open on what sounds like a limited basis at first. I wish them all the best and hope that activity develops there.

More cheerful news comes from **Peter Wade** (Sevenoaks) on the subject of Redhill (which happens to be home of the Tiger Club). Proposed developments include a hard runway and taxiways, supporting terminal, hotel and car parks, and a motorway link. Passenger throughput would thus be able to increase. The locals have objected, of course. Peter notes the expansion of Biggin Hill, with its new i.l.s. and the start of Love Air's scheduled Le Touquet service. Perhaps, with Stansted's movements not increasing as hoped for, Biggin could be in contention as No. 3 London airport after all?

Despite what it said last month under Information Sources, the Fenland n.d.b. has a range of 15nm. The quoted range of 15mm would not have been very useful!

Taylor Monoplane at the PFA Rally, Wroughton, 1993.
Photo Chris Mlynek.

Pass Your Message

Finally, a couple of messages to some readers. Thanks to **A. Reader** (Bristol) for the copies of *Airbus News*. No connection with the British Aerospace factory down there, I suppose. Apologies to **Dieter G0PER** (London) who reads this column via the *QTI Talking Newspaper*. I tried to join in the 144MHz RAIBC net on August 20, but he couldn't hear me.

The next three deadlines (for topical information) are November 5, December 3 and January 14. Replies always appear in this column and it is regretted that no direct correspondence is possible. All letters to Airband, c/o The Godfrey Manning Aircraft Museum, 63 The Drive, Edgware, Middlesex, HA8 8PS. Genuinely urgent information/enquiries: 081-958 5113.

Abbreviations

AIC	Aeronautical Information Circular
a.m.	amplitude modulation
a.t.i.s.	automatic terminal information service
CAA	Civil Aviation Authority
d.m.e.	distance measuring equipment
FL	flight level
ft	feet
GASIL	General Aviation Safety Information Leaflet
i.l.s.	instrument landing system
kHz	kilohertz
kt	knots
LATCC	London Air Traffic Control Centre
m	metres
MHz	megahertz
mm	millimetres
n.d.b.	non-directional beacon
nm	nautical miles
RAIBC	Radio Amateur Invalid and Blind Club
R/T	radiotelephony
v.o.r.	very high frequency omni-directional radio range
W	watts

Info in Orbit

Lawrence Harris
5 Burnham Park Road, Peverell, Plymouth, Devon PI3 5QB

When I returned to monitoring satellites several years ago, (following a break of a few years), I contacted a number of people during my search for various Kepler elements. Since that time we have seen a revolution in communications. I now retain Keplers for not only all of the WXSATS, but also for several other satellite groups - see the end of this column for more details. Also included here is information about the future encryption of METEOSAT data.

I had a call from Channel Four television the other week; they wanted help with the preparation of a programme on satellite data decoding. After some discussion they decided to make arrangements for my dish and hardware to be collected and taken up north for use during the programme. I provided them with some names of other likely participants. A few days later they rang back to tell me that one of my suggestions (a fellow *SWM* contributor) 'has a bigger dish' so they were going to use him instead!

NOAA 13

The WXSAT scene hotted up from mid-August following the launch of NOAA 13, and the subsequent launch of METEOR 2-21 on August 31. Within a week or two, correspondents were sending in print-outs. A selection are shown here - look now because NOAA 13 is unlikely to be operational again - see later in this column.

Initial transmissions from newly launched NOAA WXSATs usually display two visible-light images, as seen in **Fig. 1** sent in by **Stephen Lowe** of Billingshurst. Stephen did not actually know of the launch but picked up transmissions on August 15 and kindly sent me some prints. He noticed the lack of transmissions from NOAA 13 after only a few day's operations. I had assumed that this was caused by the clash with NOAA 11.

Other side-by-side images were received from **Mark Pepper** of Camberley - see **Fig. 4**, taken on August 18 at 1310UTC, and from **Roger Ray** of Telford - see **Fig. 5**. A separate print of one of the channels is shown in **Fig. 2**, also from Stephen Lowe. One of the last images - received on August 21 by Julian Woolvin of Liverpool is shown in **Fig. 3.** My thanks to these contributors for such quick work.

Current WXSATS

Having spent nearly all day at the computer - with the scanner operating in the background - at 1544UTC on September 1, I heard the noisy tones of a METEOR a.p.t. signal transmitting on 137.40MHz. It has been many months since we saw any activity on this frequency. Feeding it into the framestore I was surprised to find the data was asynchronous - that is, it was evidently from one of the older series two WXSATs, which use picture data modulated on to a non-stable 2.4kHz sub-carrier. More recent series three CIS WXSATs (METEORs 3-4 and 3-5) have a stable sub-carrier, from which computers and framestores can produce a steady image.

I recorded the signal on cassette and saved the decoded image for an attempt to analyse the satellite track. My first impression was that it seemed to be close to the predicted track of METEOR 2-16 (southbound and over to the east), but was probably METEOR 2-21. As expected, it returned for the following southbound pass at about 1733UTC, switching off abruptly as it approached the terminator. This sequence was repeated at 1905UTC.

Land identification was not easy, but cloud formations could be recognised using pictures from METEOSAT (what a busy evening!). The new METEOR was likely to be the replacement for METEOR 2-16, but without Kepler elements, I was uncertain that we were actually looking at a new METEOR.

Recent elements for METEOR 2-16 gave a fairly comparable track, though not perfect. Later I obtained elements for METEOR 2-21 from the Dartcom BBS. The track predicted by these elements did not compare at all with my recorded data so I remained uncertain. A number of people rang me to query the identity of the new signal so I mentioned the options.

I contacted a couple of people who have been closely involved in monitoring the Russian satellite scene for longer than I have - **Bob Christy** (who provided me with current elements for 2-16), and **Peter Wakelin**, who commented that the Mean Motion parameter (the number of orbits per 24 hour period) might be in error. Checking this proved worthwhile, so I waited a few more days before obtaining a further set of Kepler elements which proved accurate, enabling final confirmation of METEOR 2-21.

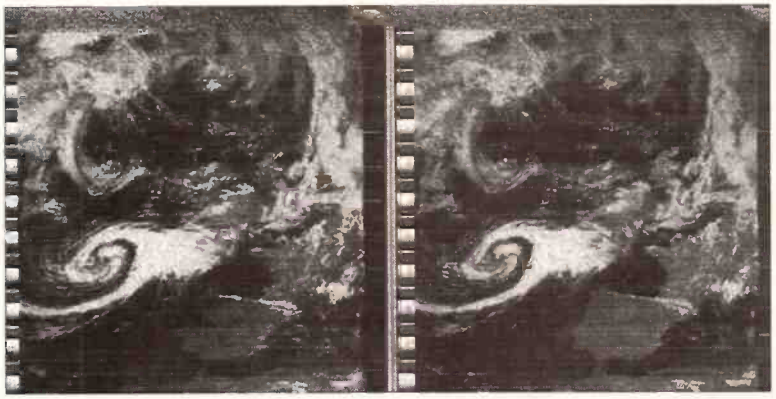
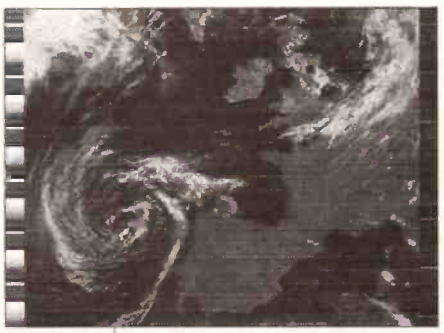


Fig. 1: (above) NOAA-13 15 August and Fig. 2: (below) NOAA-13 16 August from Stephen Lowe.



Noisy Signal

I suspect that there is a fault with the transmission of data from 2-21 judging by the variability of the received signal. I see many nulls, even when the satellite is at a high elevation.

Meanwhile METEOR 3-3 ended a long run of night-time infra-red transmissions when, during nights in early September, it started to transmit only phasing bars without any picture. Later in September even these stopped. It is travelling close to the terminator so sunlight becomes weak, imposing power constraints.

When it became evident that NOAA 13 was probably lost, NOAA 9 was turned back on - once more we had four NOAA WXSATs transmitting. Meanwhile, I was surprised to see NOAA 12 transmitting two infra-red images during the morning pass on September 14 instead of the usual visible and i.r. This apparent anomaly was also spotted by an American monitor who notified NOAA (the organisation that operates their WXSATs). Perhaps others noticed this anomalous operation?

NOAA 13 and Mars Observer 1

The NOAA 13 WXSAT was originally scheduled for launch many months ago, but the discovery of a faulty crystal oscillator caused a delay at the end of June. The problem was traced to a failed transistor, of which there are two in each part of the 'redundant' circuits - that is, the back-up circuit had the same weakness. It was then realised that these transistors were also being used in the Mars Observer probe - then only 55 days away from Mars orbit when this discovery was made.

The failure on NOAA 13 happened while the WXSAT was still operational; the solar arrays continued to deliver normal power but the batteries were not being charged properly, so from August 21 the controllers could only watch the voltages and currents drop.

Following this failure, the launch of NOAA 14 has been brought forward to early 1994, pending the availability of a launch vehicle. My thanks to NASA for providing this information.

NOAA Beacons

All NOAA WXSATS use one of two frequencies for transmitting beacons - either 136.77 or 137.77MHz (and listed most months under frequencies at the end of this column). Their telemetry is split-phase, phase-modulated v.h.f. data, and carries satellite housekeeping information - such as battery voltages and current levels. Other data is also included, and all are processed by the TIROS Information Processor, so is commonly referred to as TIP data.

Some subsidiary experiment measurements are included in the TIP data, and the transmitter output is 1W (compared to about 5 for the a.p.t. telemetry). Polarisation for a.p.t. is right-circular (except for the Chinese FENGYUN WXSAT currently non-operational), but the TIP signal is linearly polarised, meaning that most scanners will be able to hear the beacons without using a specialist antenna.

Try monitoring the beacons from

NOAAs 9 and 10 when their a.p.t. telemetry is switched off. Sometimes I hear it - sometimes they are apparently not transmitting.

NOAA Resolution

Some correspondents have asked for specific details of the resolution of images transmitted by the NOAA WXSATs. In fact it depends! The NOAAs use two transmission formats - high resolution picture transmissions (h.r.p.t.) use raw sensor data from the advanced very high resolution radiometer (AVHRR), after correction for satellite attitude and other factors. The automatic picture transmission (a.p.t.) format, is derived from h.r.p.t. data.

NOAA quote a resolution for the AVHRR sensors of 1.1km at the nadir. The a.p.t. imagery has a quoted resolution of 4km. In each case this resolution refers to the middle of the image scan immediately below the satellite - referred to as the sub-satellite point.

Interference on NOAA Pictures

My pictures from NOAA 10 and 12 (which both transmit on 137.50MHz), have occasionally suffered some interference, showing up as wavy sections of image. This is not normally very severe, but on August 27 while monitoring NOAA 12, the interference started again, so I checked one of my satellite tracking programs that has a large database, and that I keep reasonably up-to-date. Most of the satellites shown as being above my horizon could be ruled out because they operate on different frequencies.

One quickly came to light - FREJA 1, a Swedish auroral satellite launched on 6 October 1992, which, on checking through some records, is listed as using ... 137.50Mz! FREJA has an orbital inclination of 63° and period of 109 minutes, so it will coincide with NOAAs 10 and 12 occasionally. The best way that I can describe its signal is that it sounds like a flutter!

Encryption

Primary Data from METEOSAT will be encrypted in due course, starting with tests in early 1994, and continuing until routine encryption occurs after 1995. Manufacturers of PDUS equipment were informed of this change during 1992, to enable the appropriate decryption key units to be built.

WEFAX transmissions will remain un-encrypted for the present. Discussions are currently taking place to design a new digital Low Rate Image Transmission (LRIT) format, likely to be agreed within a year. This will probably be used by the METEOSAT Second Generation (MSG) Programme, starting around the year 2000.

Charges

EUMETSAT are the international body concerned with the operation of METEOSAT. Charging policy for the reception of analogue (WEFAX) and Primary Data (PDUS) is the responsibility of the appropriate national body which for us, is the Meteorological Office. I have received a response to earlier enquiries requesting clarification.

The reply appears to give cause for concern to everyone presently receiving METEOSAT data. It states that "the organisation (EUMETSAT) is rightly anxious that beneficiaries will be those who contribute to the programmes...", and further describes the intention to "recover some of the costs...". The view of the organisation is that educational (and similar non-commercial) interests should be restricted to low resolution imagery. "Encryption of METEOSAT HR imagery and products is expected to (be) implemented fully in 1995".

Readers of this column might wish to write to the Met Office to make known their views on this policy. I have written, expressing concern. I personally feel that it is unlikely that the sum total of payments for such decryption facilities can amount to any significant portion of the costs of running the METEOSAT programme. I feel that these plans (for METEOSAT encryption) represent a major step backwards. Others may feel differently. Letters can be addressed to Martin Allwright, Enquiries Officer, Meteorological Office, London Road, Bracknell, Berkshire RG12 2SZ.

It is worth remembering that the Americans operate an 'open skies' policy, in which data from their geostationary and polar WXSATS is transmitted un-encrypted. 'Info in Orbit' will publish further details as information becomes available.

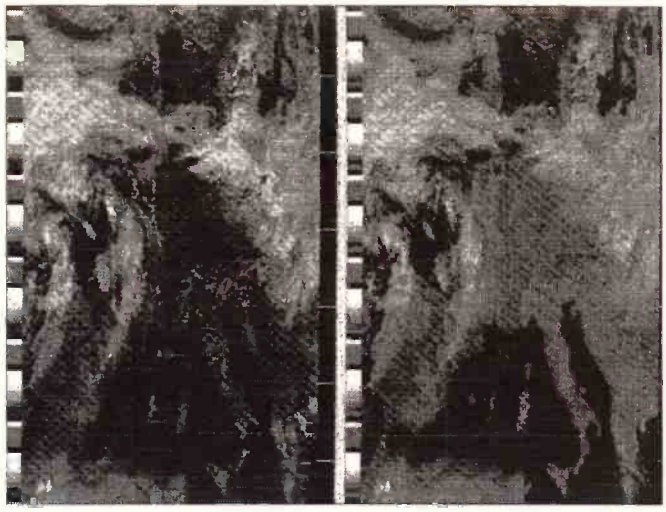


Fig. 3: NOAA-13 21 August from Julian Woolvin.

Future Launches

The Shuttle programme continues with launches scheduled for November and December, the latter mission including maintenance for the Hubble Space Telescope. METEOR 3-6 has a current launch date in early October but may slip.

WXSAT BBS

Last month I mentioned three BBSs that carry items of interest to WXSAT monitors, namely the Dartcom, RIG and Timestep BBS. I was interested to check the origin of Timestep's elements because of their unusual introductory message. In fact I now understand that they obtain raw measurements from Goddard which they process themselves - before the official release; this results in their data being available earlier than NASA's. I have been given permission to distribute it.

Starbase 1 BBS

I recently found out about the STARBASE-1 BBS, available on 071-733 3992, using standard BBS modem settings. It is essentially devoted to astronomy and space, carrying a wealth of files and recent information from NASA and ESA projects, and includes a large file of Kepler elements.

After logging on, you may wish to download the operating manual first; select KEY DOWNLOADS from the Main Menu, and you have a choice of downloading the compressed manual (in Zipped or similar format), or the raw data.

The Kepler element file can be found (phew!) by selecting MESSAGES (from the Main Menu), then ASTRO, then option Y (USENET gateway into space news), then make your choice by perhaps listing new files and selecting the most recent Kepler list of those presented to you.

There was so much space news that I was sad that I could not afford the phone time to collect more of the data. Registration for this non-profit-making BBS is currently about £15, but its sysop points out that many files are freely downloadable. I uploaded a current list of all WXSAT operations. My thanks to its system operator Nick Stevens.

Letters

Andy Freeman of Wallasey received his first WXSAT picture a few months ago, using a Cirkit receiver. He can only pick up NOAA transmissions on 137.62MHz but plans to fit further crystals to extend the scope of the receiver. The Cirkit receiver was originally designed many years ago, and is supplied in kit form - I remember building one myself, with help from the local Information Technology Centre. An excellent way to start.

Summer saw several more recruits to the WXSAT scene, including **Trevor Goldsworthy G4BHD** of Camborne, who uses a 486PC running the PC-GOES software. Trevor also uses a Cirkit receiver and crossed-dipole, and has found the system to be 'pretty immune' from paging interference,

CONTINUED ON PAGE 67

Fig. 4: NOAA-13 18 August from Mark Pepper.

Decode

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

The important change to note for this month is the new **address** shown at the head of the column. Having completed my dealings with the estate agents I've taken a PO Box to handle letters to the column. This shouldn't introduce any delays as Elaine checks the box several times each week. I'm hoping to be able to provide a much improved service to readers now that Elaine is home to help me. As part of this plan, I will be putting together a series of fact sheets to help me answer some of the more common problems.

Directly linked to the change of address is a new station set-up designed to make frequency list monitoring very much more convenient. At the heart of the new station is a DAN for Windows IBM compatible computer with 486DX processor, Local Bus and a healthy 2Mb of disk cache. On the receive side, I've changed over to the Lowe HF-150 receiver that feeds the PC via a Datong FL-3 active filter system. On the decoding front, I'm fortunate to have access to a number of systems including, the Lowe Modemaster, Code-3, JVFAX and the PC HFFAX/SWL/SSTV range of systems. As the station and computer system have now moved indoors, I also had to rethink my printer system. The old Panasonic KXP1124 was very good, but extremely noisy, so I now have one of the excellent Canon BJ-300 bubblejet printers. Not only does the 360d.p.i. resolution give excellent quality, but it's very nearly silent in operation.

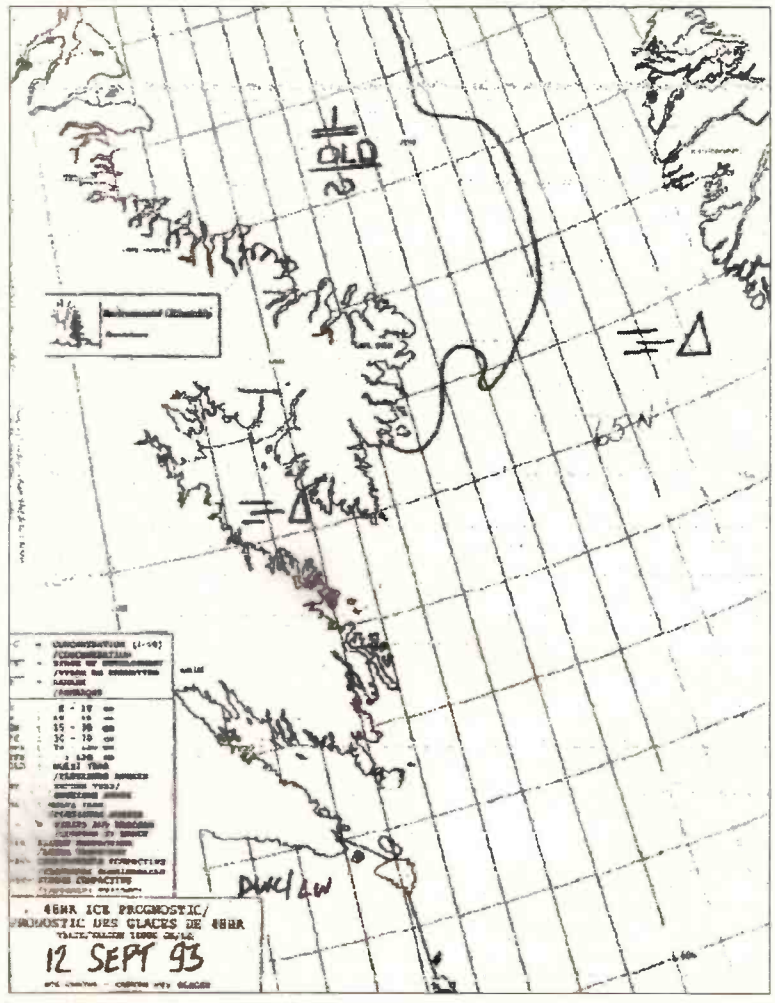
When setting-up the station, my only worry was that of the dreaded computer interference. Especially as the HF-150 is actually touching the side of the computer! You can imagine my delight when I turned-on the system a found there was virtually no noise from the computer. I can only put this down to excellent screening on both the computer and receiver systems. I really thought I would suffer some mains-borne interference from the switch mode power supplies, particularly as both the radio and computer are running from the same extension lead!! Perhaps I'm just lucky! To complete the station description, the antenna is a G5RV fed by around 50m of coaxial cable. I suspect it's this latter feature that goes a long way to keeping the interference under control.

Ted Jones of Enfield reports on an interesting press broadcast that appeared on September 13 at around 1400UTC using 7.7071MHz. The mode used was standard SITOR A, 100 baud and 170Hz shift. From Ted's monitoring, it seems that the transmission is an Irish press report of some kind - possibly directed to a ship. If you have any more details on this, please write and let me know.

A station broadcasting weather reports for Yugoslavia has caught the attention of **David Pluse** of Wooler Northumberland. Although the station was thought to be Rota in Spain it is listed in Klingenfuss as USAF Croughton (AJE) with a frequency of 5.2333MHz. The station uses 75 baud 400Hz shift and mainly sends SYNOPTIC reports with just a few plain language messages interleaved. Incidentally, David's station comprises a Sangean ATS-803A receiver that feeds a 48K Spectrum computer running RAMS IV software from J & P Electronics.

Day Watson has been burning the midnight oil searching out a few stations that still send press pictures over h.f. FAX. His endeavours have borne fruit with a couple of reliable transmissions from Buenos Aries. He's not too sure who the is the originating agency, as the two active frequencies are listed as DyN and Associated Press. If you'd like to have a go, you will need to tune to either 5.7775 or 9.2414MHz at around 2 a.m. Those of you with automated FAX systems can stop gloating, as these stations tend not to send start and stop tones so you'll have to revert to manual operation! Although I haven't tried of late, I used to get very good results from AP on 18.093MHz during the early evening.

Les Crossan of Wallsend uses a Sangean ATS-803A receiver feeding a 486DX33 computer running the new Lowe Modemaster decoder for his utility listening. One of his more popular station is the Canadian Forces station at Halifax transmitting RTTY and FAX on 10.536MHz. For those readers that like to QSL with utilities Les reports that Halifax are very generous with their returned information. The latest address I have is: Canadian Forces Meteorological Operational Centre, Meterology and Oceanography, Senior Staff Officer, Maritime Headquaters, FMO Halifax, CFB, HALIFAX, NS B3K 2X0, Canada.



Halifax Ice Chart. CFH 120/576, 2301UTC, 10.536MHz.

Satellite Decoding

Don't get too excited, I'm not yet ready to print anything on this subject however, I do want to remind readers to send any information they may come across. I'm really looking for information from anyone who has successfully decoded utility stations that are operating using sub-carriers on TV satellites. From the letters I've already received from readers, one of the main areas of interest appears to be FAXed press pictures. If you can help, please write to the **new** address at the head of the column.

DX FAX Reception

One or two readers have written to me asking how is it possible to receive long distance FAX images when they have so many problems with strong local stations. The secret is in the timing! When you have spent some time studying radio reception you will soon learn that one of the keys to successful listening is a sound knowledge of propagation. From this you soon learn that all regular users of the h.f. spectrum spend a lot of time and effort determining the best frequency to use for any given communication link. The problems is that the propagation conditions are continually changing and are difficult to predict with accuracy.

However, there are one or two tricks that can produce very repeatable results. The one I'll cover here is commonly known as 'Grey-lining'. The name is really very appropriate as it relies on the enhanced propagation that exists between parts of the globe that are in the transition between day and night. If you have access to a computer, you will find that there are a selection of public domain programs that help to predict where these enhanced paths will occur. One of the most common examples of this phenomenon is the excellent communications that often exist between the UK and Australia in the early morning. For the FAX enthusiast you will normally find that Canberra Met comes in quite well most mornings. I've included an example of a chart I received recently from this station. Do you have any good examples of grey line paths? If you can help, please drop me a line with as much detail as possible.

FAX Interference

Dr Wood of Ledbury writes asking about interference problems with h.f. FAX reception. Whilst he manages very good results from UK based stations such as Northwood

he has had little success when trying to receive many of the European stations. The problem he suffers manifests itself as horizontal streaking of the chart and broken lines. To help understand and identify this interference let's start with a short refresher of how the FAX image is transmitted.

At the transmitting station, the image to be sent is wrapped around a rotating drum the speed of which aligns to one of the standard rates, e.g. 60, 90, 120 or 240 r.p.m. The image is then scanned by an optical sensor that works its way along the image. The scan speed of the sensor is directly liked to the drum speed and is defined by the Index Of Co-operation (IOC). As the sensor passes over the drum it generates an electrical signal that's directly proportional to the density of the image with black and white being the two extremes. This signal is then fed to the transmitter where it controls the transmitted frequency. In a typical h.f. FAX transmitter the frequency difference between black and white would by just 800Hz. From this you can see that the FAX decoding system is looking at the audio output of the receiver for a frequency change of just 800Hz to change from black to white.

The other point we need to appreciate is that with a drum speed of 120 r.p.m. and an IOC of 576 a typical weather chart will require around 800 revolutions for the optical scanner to move over the entire image. A quick sum shows that, after making allowances for the synchronisation pulses, this image would take around seven minutes to send. Perhaps more importantly each revolution or image line takes half a second to send.

The point I'm trying to make is that the whole process is really quite slow. One of the advantages of this pedestrian pace is that FAX transmissions are relative immune to random burst type interference. This is because the short duration of this type of interference would only result in a small dot appearing in the received image. This quite different to the experience with RTTY where this type of interference causes wrong characters to be printed.

The down side of the FAX transmission system is that any steady state interference e.g. a heterodyning carrier can completely destroy the image. Returning to Dr Wood's problem the horizontal lining and gaps in the line indicates a weak signal. When a signal is too weak you will find that the decoder has great difficulty differentiating between the wanted signal and the background noise. As a result the noise will occasionally take over from the wanted signal as it inevitably suffers fading.

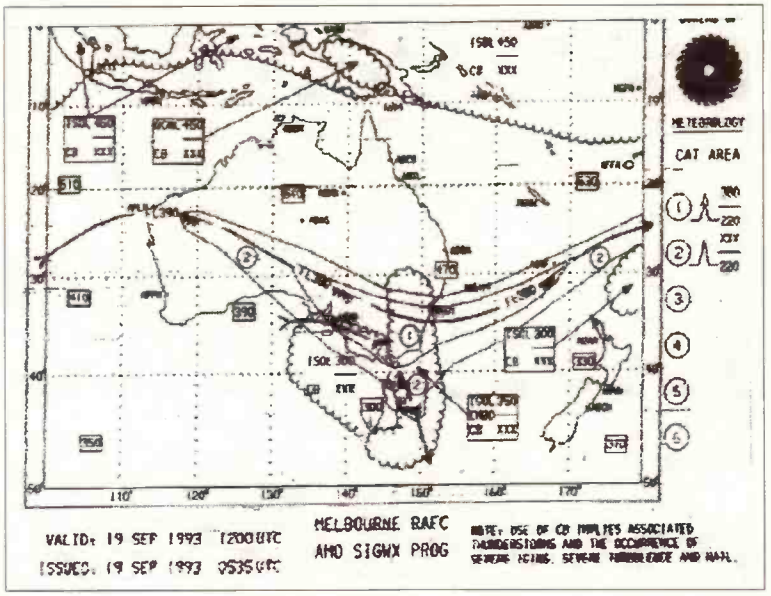
Utility Recordings

Ted Jones of Enfield has set himself up with a very comprehensive utility monitoring station. The receivers available include a JRC NRD 535, Icom 735 and Sony 2001D each of which can be fed with either a G5RV or Butternut vertical antennas. The decoding equipment is equally sophisticated featuring the Hoka Code-3, AEA PK232 and the top of the range Universal M-8000 that I reviewed recently.

Incidentally, the Icom receiver and Universal decoder were a present from his wife - now there's a good example for you!! The down side of all this is his location which is just 3m above sea level and overlooked by an electrified railway system. Not daunted by this Ted has managed some very good results. However, the point of his letter was to ask if there was anyone selling tape recordings of utility modes. There have been several of these tapes available over the years but a quick scan through the adverts in *SWM* shows that the only ones on offer seem to be those from Klingenfuss. For those that only want a recording of the more basic modes it's worth putting a call through to the *SWM* office as they may still have copies of a tape that was produced for *Practical Wireless* that gives examples of a number of the simpler modes.

For the more sophisticated modes the Klingenfuss tape will be more appropriate. This tape contains forty-eight different recordings covering some speech modes and the following utility modes: Arabic, ARQ-E, ARQ-E3, ARQ-M, ASCII, ATU-Arabic, AUTOSPEC, CIS, Cyrillic, DUP-ARQ, FEC-A, F7B, ITA2, ITA5, MCVFT, MFSK, NATO, Packet Radio, Piccolo, RS-ARQ, SI-ARQ, SITOR, SWED-ARQ, third shift Cyrillic and VFT.

If you really want to get sophisticated you could invest in the new Klingenfuss double CD set of utility recordings. These build from the tapes and include seventy-one different recordings. Here's a selection of the modes that are included in this two and a half hour CD set: ACARS, Arabic, ARQ-E, ARQ-E3, ARQ-M, ARQ-N, ARQ6, ASCII, ATU-Arabic, AUTOSPEC, bit inversion, CIS, Cyrillic and third shift Cyrillic, DUP-ARQ, FEC-A, GOLAY, HC-ARQ, HNG-FEC, ITA2, ITA5, MCVFT, MFSK, NATO Link, Packet Radio, PACTOR, Piccolo, POCSAG, POL-ARQ, QAM, RS-ARQ, RUM-FEC, SI-ARQ, SI-FEC, SITOR, SPREAD, SWED-ARQ and TWINPLEX. As you can see, it's pretty comprehensive! One of the advantages of using a CD, as opposed to a tape, is that you can use it to test your decoding system. The only proviso with this is that you will need to be able to adjust the filter tuning of your decoder. The reason you can do this because the CD is very much more stable than most tape based systems, which tend to suffer slight speed variations that often confuse decoding systems. For more information of the Klingenfuss tapes and CDs, take a look at his advert in *SWM*.



DX FAX from Australia.

Frequency List

Now for this month's selection of readers frequencies. All the listing show here have been heard by readers over the past month or two so you should be able to receive them if you listen at around the appointed time. I can't give you a guarantee on this as some of the frequencies may not be in use every day and stations are free to change their schedules at will. I can also offer a couple of more comprehensive listings that you may find interesting. The first is the *Day Watson Beginner's List*. As the name implies this is a chronological listing of the some of the more reliable stations aimed at the new comer to utilities. I would recomend that anyone just starting out should use this list to avoid disappointment. The second list is a compilation of logs sent to me by readers over recent months. If you would like a copy of either of these lists just send three first or second class stamps and a sticky address label to the address at the head of the column.

Frequency	Mode	Speed	Shift	Callsign	Time	Notes
12.212MHz	RTTY	50	400	YZ07	1600	Tanjug press
19.980MHz	RTTY	50	400	9BC33	1615	IRNA
7.645MHz	RTTY	50	400	DDH7	1730	Hamburg Met
5.14MHz	RTTY	50	1000	RWW93	1730	Moscow met
12.14MHz	RTTY	75	850	HWN	1945	French naval
11.08MHz	RTTY	50	600	YKP28	1700	SANA Syria press
9.893MHz	SITOR	100	170	SPW	1750	Warsaw radio
12.11MHz	RTTY	50	400	YOM21	1200	Romanian press
7.842MHz	RTTY	50	400	CNM20	1630	MAP Morocco
11.638MHz	RTTY	50	400	DDK8	1200	Hamburg met
5.197MHz	CW	-	-	HWN	0500	Paris naval
12.165MHz	FAX	120	576	RKB78	1810	Moscow met
4.307MHz	FAX	120	576	GYA	1000	RN London
7.88MHz	FAX	120	576	DDK3	1600	Hamburg met
13.372MHz	RTTY	50	230	5YE	1722	Nairobi Air
18.0139MHz	ARQ-M	200	344	RFGW	1155	MFA Paris
19.4MHz	RTTY	50	105	VVD69	1240	Delhi met
8.0799MHz	FAX	120	576	NAM	0549	USN Satellite pic
10.117MHz	FAX	120	576	BAF4	2150	Beijing met
20.3019MHz	FAX	120	576	NKW	1350	USN Diego Garcia

Long Medium & Short

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

Note: l.w. & m.w. frequencies in kHz; s.w. in MHz; Time in UTC (=GMT). Unless stated, logs compiled during the four week period ending July 31.

Medium Wave Chart

Freq kHz	Station	Country	Power (kW)	Listener
520	Hof-Saale	Germany	0.2	A*,O*,7
526	Vatican City	Italy	5	P*
531	Ain Beida	Algeria	600	E*,F*,G*,K*,Z*
531	Leipzig	Germany	100	F*,G,K*,M*,O*,P*, Q*,X,Y,4
531	RNE5 via ?	Spain	?	A*,G*,K*,O*,P*,Q*
540	Wavre	Belgium	150/50	F,G,M*,O*,Q*,R, X,Z*,2
540	Solt	Hungary	2000	G*,O*,4
540	Sidi Bennour	Morocco	500	G*,K*,M*,Q*,Z*
540	Vitoria(EI)	Spain	10	A*
549	Les Trembles	Algeria	600	G*,K*,Q*,Z*
549	Bayreuth(DLF)	Germany	200	F,K*,O*,Q*,R
549	Thurmau	Germany	200	G*
549	St.Petersburg	Russia	1000	G*,O*
558	Espoo	Finland	100	O*
558	Tirgu Jiu	Romania	200	Q*
558	RNE5 via ?	Spain	?	E*,F*,G*,O*,Q*
567	Berlin	Germany	100	G*,O*
567	Tullamore(RTE1)	Ireland (S)	500	D,E*,F*,G,M*,Q, R,V,X,Z*
567	RNE5 via ?	Spain	?	G*,M*,O*
576	Muhlacker(SOR)	Germany	500	G*,O*,P,Q*
576	Schwerin(NOR)	Germany	250	F*,P*
576	Riga	Latvia	500	Q*
576	Barcelona(RNE5)	Spain	50	A*,F*,G*,O*,P*,Q*
585	Paris(FIP)	France	8	F,G,Q,2
585	Madrid(RNE1)	Spain	200	F*,G,O*,Q*
585	Dumfries(BBCScot)	UK	2	F
594	Frankfurt(HR)	Germany	1000/400	F*,G*,O*,Q*,R*
594	Oujda-1	Morocco	100	G*,M*
594	Muge	Portugal	100	O*,G*,O*,Q*
603	Lyon	France	300	O*
603	Sevilla(RNE5)	Spain	50	F*,G*,M*,O*,Q*
603	Newcastle(BBC4)	UK	2	O,V,W,Z*
612	Athlone(RTE2)	Ireland (S)	100	E*,F,G,M*,Q*,R, V,W,Z*
612	Lerida(RNE1)	Spain	10	G*,M*,Q*
621	Wavre	Belgium	80	F,G,O*,Q,2
621	Barcelona(OCR)	Spain	50	A*,G*,O*
630	Vigra	Norway	100	O*,Q*
630	Tunis-Djedeida	Tunisia	600	F*,G*
639	RNE1 via ?	Spain	?	E*,F*,G*,O*,Q*,R*
648	RNE1 via ?	Spain	10	G*,M*,O*
648	Orfordness(BBC)	UK	500	E*,F,M*,O*,Q,R,V,2
657	Neubrandenburg(NDR)	Germany	250	G*,O*,P*
657	Madrid(RNE5)	Spain	20	A*,O*,F*,G*,O*,Q*
657	Wrexham(BBCWales)	UK	2	M,R,V
666	Bodensees'dr(SWF)	Germany	300/180	G*,O*
666	Lisboa	Portugal	135	Q*
666	R.Vilnius	Lithuania	500	B*,O*
675	Marseille	France	600	F*,G*,M*,O*,Q*
684	Sevilla(RNE1)	Spain	500	F*,G*,M*,O*,Q*
684	Beograd	Yugoslavia	2000	G*,Q*
693	Droitwich(BBC5)	UK	150	F,M,Q,R,V,X
693	Startpoint(BBC5)	UK	50	2
702	Flensburg(NDR)	Germany	5	A*,F*,O*,P*
702	Monte Carlo	Monaco	300	O*
702	Banska or Presov	Slovak Rep.	400	G*,P*,Q*,Z*
702	Zamora(RNE1)	Spain	10	G*,M*,P*
711	Rennes 1	France	300	F*,G,M*,Q,R*
711	Heidelberg	Germany	5	A*,F*,O*,P*
711	Laayoune	Morocco	600	Q*,Z*
711	Murcia(COPE)	Spain	5	G*
720	Holzkirchen(RFE)	Germany	250	P*
720	Langenberg	Germany	200	P*
720	Lisnagarvey(BBC4)	Ireland (N)	10	E*,Q*,X
720	Norte	Portugal	100	M*,O*,P*,Q*
720	Lots Rd,Ldn(BBC4)	UK	0.5	G,Q,V
729	Putbus/Bergen(NDR)	Germany	10	P*
729	Cork(RTE1)	Ireland (S)	10	G*,O*,Q*,R
729	RNE1 via ?	Spain	?	F*,G*,O*,Q*
738	Paris	France	4	O*,Q
738	Poznan	Poland	300	G*,P*,Q*,5
738	Barcelona(RNE1)	Spain	500	F*,G*,O*,Q*
747	Flevo(Hilv2)	Holland	400	E*,F*,G,O*,Q,R,Z*,2
747	Cadiz(RNE5)	Spain	10	G*,O*
756	Braunschweig(DLF)	Germany	800/200	D,E*,F*,G*,O*,Q*,5
756	Lugoj	Romania	400	P*
756	Bilbao(EI)	Spain	5	G*,O*,Q*
756	Redruth(BBC4)	UK	2	F*,G*,O*,Q*
765	Sottens	Switzerland	500	F*,G*,O*,Q*
774	Bonn(WDR2)	Germany	5	P*
774	Enniskillen(BBC4)	Ireland (N)	1	G*,O
774	RNE1 via ?	Spain	?	G*,O*,Q*
783	Burg	Germany	1000	F*,G*,O*,P*,Q*,5
783	Miramar(R.Porto)	Portugal	100	G*,M*,O*,P*
783	Tartus	Syria	600	P*
792	Limoges	France	300	O*
792	Lingen(NDR)	Germany	5	O*,P*
792	Sevilla(SER)	Spain	20	G*,M*,O*,Q*
801	Munchen-Ismaning	Germany	300	E*,G*,M,O*,P*,Z*
801	St.Petersburg	Russia	1000	P*
801	RNE1 via ?	Spain	?	G*,M*,O*,P*,Q*
810	Voru	Estonia	5	Q*
810	Madrid(SER)	Spain	20	M*,O*
810	Burghead(BBC)	UK	100	E*,G*,X
810	Westerglen(BBC)	UK	100	H*,M,O*,Q*,R,V
819	Batra	Egypt	450	O*,P*,Q*,Z*
819	Toulouse	France	50	G*,O*
819	Trieste	Italy	25	F*
819	Warsaw	Poland	300	P*
819	S.Sebastian(EI)	Spain	5	G*,P*
828	Hannover(NOR)	Germany	100/5	M*,O*
828	Barcelona(SER)	Spain	50	G*,M*
837	Nancy	France	200	O*,Z*
837	COPE via ?	Spain	?	G*,O*,Q*
846	Rome	Italy	540	O*,G*,O*,Q*,R*
855	Murcia(RNE1)	Spain	125	F*,G*,O*,R*,Q*
864	Olomouc	Czech Rep.	10	4
864	Santah	Egypt	500	P*
864	Paris	France	300	F,O*
864	Socuellamos(RNE1)	Spain	2	G*
873	Frankfurt(AFN)	Germany	150	F*,G*,O*,Q*,R*,1,4,6*,7
873	Zaragoza(SER)	Spain	20	G*,O*,Q*
882	COPE via ?	Spain	?	G*,O*,Q*
882	Washford(BBC)	UK	100	E*,F*,K,O,Q,R,V,X
891	Algiers	Algeria	600/300	G*,K*,O*,Q*,Z*
891	Huisberg	Netherlands	20	G*,O*,Z*
900	Milan	Italy	600	G*,O*,Q*
900	Bilbao(COPE)	Spain	10	O*,P*
909	Mallorca(RNE5)	Spain	10	A*
909	B'mans Pk(BBC2)	UK	140	F,Q,R,X,2
909	M'side Edge(BBC2)	UK	200	E*,V
918	R.Ljubljana	Slovenia	600/100	G*,P,Q*
918	Madrid(R.Int)	Spain	20	A*,G*,O*,Q*
927	Wolvertem	Belgium	300	G*,O*,Q,R,Z*,2
936	Bremen	Germany	100	F*,G*,O*,Q*
936	Venezia	Italy	20	G*,O*
936	RNE5 via ?	Spain	?	G*
945	Liberec	Czech Rep.	6	5
945	Toulouse	France	300	G*,O*,Q*,Z*
954	Brno(Dobrochov)	Czech Rep.	200	G*,5
954	Madrid(CI)	Spain	20	F*,G*,Q*
963	Pori	Finland	600	G*,K*,L*,O*,Q*,Z*
963	Paris	France	8	F*,G*
963	Tir Chonaill	Ireland (S)	10	G*,X
963	Seixal(RRE)	Portugal	10	G*
972	Puke	Albania	20	G*
972	Hamburg(NDR)	Germany	300	E*,F*,G*,O*,Q*
972	RNE1 via ?	Spain	?	E*,G*,Q*
981	Alger	Algeria	600/300	G*,Q*,Z*
981	Megara	Greece	200	F*,G*
981	Coimbra	Portugal	10	G*,Q*
990	Berlin	Germany	300	F*,O*
990	Potenza	Italy	10	G*
990	R.Bilbao(SER)	Spain	10	G*
999	Torino	Italy	20	G*
999	Madrid(COPE)	Spain	50	E*,F*,G*,O*
1008	Las Palmas(SER)	Gran Canaria	?	P*
1008	Flevo(Hilv-5)	Holland	400	C,G*,O*,Q,R,2
1017	Rheinsender(SWF)	Germany	600	C,E*,F*,G*,O*,Q*
1017	Burgos(RNE5)	Spain	10	O*
1026	Graz-Oobl	Austria	100	E*,F*,O*,Z*
1026	SER via ?	Spain	?	G*,Q*
1035	Milan	Italy	50	G*
1035	Lisbon(Prog3)	Portugal		O*
1035	Tallinn	Estonia	500	Q*
1044	Dresden	Germany	250	E*,O*
1044	Sebaa-Aioun	Morocco	300	G*,Q*
1044	S.Sebastian(SER)	Spain	10	G*,O*
1053	Tetuan	Morocco	600	E*
1053	Zarogoza(COPE)	Spain	10	A*,O*
1053	Burghead(BBC1)	UK	20	E*
1053	Droitwich(BBC1)	Uk	150	F*,R,V,X
1053	Startpoint(BBC1)	UK	100	Q,2
1062	Kalundborg	Denmark	250	C,D*,G*,K*,O*,Q*,Z*
1071	Prague	Czech Rep.	60	O*
1071	Brest	France	20	C,G*,Q
1071	Lille	France	40	K*,O*,2
1071	Riga	Latvia	50	G*
1080	Katowice	Poland	1500	G*,O*,Q*
1080	SER via ?	Spain	?	A*,G*,O*,Q*
1089	B'mans Pk(BBC1)	UK	150	F*,Q,R,V,X,2
1089	M'side Edge(BBC1)	UK	150	E*
1098	Nitra(Jarok)	Slovakia	1500	E*,G*,J*,O*,Q*,Z*
1098	RNE5 via ?	Spain	?	O*,Q*
1107	Munich(AFN)	Germany	40	A*,F*,G*,O*,Q*,3,6*,7
1107	RNE5 via ?	Spain	?	G*,O*,Q*
1107	Wallasey(BBC1)	UK	0.5	X*
1116	Pontevedra(SER)	Spain	5	G*,O*
1125	La Louviere	Belgium	20	C,O*
1125	Deanovec	Croatia	100	P*
1125	RNE5 via ?	Spain	?	G*,P*,Q*
1134	Zadar	Croatia	600/1200	E*,G*,O*,P*,Q*,R*
1134	COPE via ?	Spain	2	G*,P*,Q*
1143	Bremerhevent(AFN)	Germany	5	1
1143	Stuttgart(AFN)	Germany	10	A*,G*,O*,R*,1,3,6*,7
1143	COPE via ?	Spain	2	O*,P*,Q*
1152	RNE5 via ?	Spain	10	G*,O*
1161	Strasbourg(Flnt)	France	200	C,G*,O*
1161	Toulouse	France	100	Z*
1161	S.Sebastian(EI)	Spain	50	Q*
1179	Thessaloniki	Greece	50	A*
1179	Santiago(SER)	Spain	10	A*,G*,O*
1179	Solvesborg	Sweden	600	C,G*,H*,I*,K*,L,O*, Q*,R*,Z*
1188	Kuurne	Belgium	5	A*,C,G*,O*,Q,2
1188	Reichenbach(MDR)	Germany	5	A*
1188	Szolnok	Hungary	135	G*,O*
1197	Munich(VOA)	Germany	300	G*,O*,6*
1197	Vitoria(EI)	Spain	5	E*,F*
1197	Virgin via ?	UK	?	G*,K*,O,Q*,V,2
1206	Bordeaux	France	100	C,O*,Q*
1206	Wroclaw	Poland	200	G*,O*
1215	Castellon(COPE)	Spain	2	O*
1215	Virgin via ?	UK	?	E*,N,Q,T,V,X,Y*,2,6*
1215	B'mans Pk(VI	UK	125	K*
1215	Droitwich(V)	UK	105	R
1215	Lisnagarvey(V)	UK	16	O
1215	Postwick(V)	UK	1.2	F*
1224	Vidin	Bulgaria	500	O*,Q*
1224	COPE via ?	Spain	?	Q*
1224	Virgin via ?	UK		G*
1233	Liege	Belgium	5	G*,O*
1233	Plzen(Pilsen)	Czech Rep.	40	4
1233	Nitra	Slovakia	40	O*
1242	Marseille	France	150	C,F*,O*
1242	Virgin via ?	UK	?	F,G*,K*,O*,V
1251	Marcali	Hungary	500	F*,G*,O*
1251	Huisberg	Netherlands	10	G*,O*,Q*,Z*
1251	Dubai	UAE	600	Z*
1260	Fier	Albania	1	G*
1260	SER via ?	Spain	?	A*,G*,O*,Q*
1269	Neumunster(DLF)	Germany	600	C,G*,O*,Q*,R*
1269	COPE via ?	Spain	?	G*
1278	Strasbourg	France	300	Z*
1278	Dublin/Cork(RTE2)	Ireland (S)	10	C,F*,G*,Q,Q,R,V,X
1287	Litomysl/Melnik(RFE).	Czech Rep.	300/400	G*,O*,Q*,Z*
1287	Lerida(SER)	Spain	10	A*,G*
1296	Valencia(COPE)	Spain	10	F,G*,O*,Q*
1296	Orfordness(BBC)	UK	500	G*,O*,Q*,R,Z*,2
1305	Marche	Belgium	10/5	O*
1305	Rzeszow	Poland	100	G*
1305	Orense(RNE5)	Spain	5	A*,G*
1314	Kvitsoy	Norway	1200	C,E*,F,G*,K*,O*,Q*, R*,V,2
1314	RNE5 via ?	Spain	?	G*
1323	Leipzig(RMWS)	Germany	150	G*,O*
1332	Brno(Domamil)	Czech Rep.	50/25	4
1332	Rome	Italy	300	G*,O*,Q*
1341	Lakihegy	Hungary	300	G*,O*
1341	Lisnagarvey(BBC)	Ireland (N)	100	E*,G*,I*,Q*,R,V,X
1341	Almeria(OCR)	Spain	2	G*
1341	Tarrasa(SER)	Spain	2	G*,Q*
1350	Nancy/Nice	France	100	C,G*,O*,Q*,Z*
1350	Pecs	Hungary	10	G*
1359	Berlin	Germany	250/100	O*
1368	Foxdale(Manx R)	IOM	20	G*,K,O,Q*,S,X
1377	Lille	France	300	C,F,G*,O*,Q,2
1377	Ukraine	Ukraine	50	A*
1386	Athens	Greece	50	A*
1386	Kaliningrad	Russia	500	I*,O*
1395	Lushnje(Tirana)	Albania	1000	G*,I*,K*,O*,R*,X*
1395	Calahorra(RNE5)	Spain	2	P*
1404	Brest	France	20	C,G*,O*,Q,R*,X*,Z*
1413	Wertheim(SOR)	Germany	0.2	P*
1413	RNE5 via ?	Spain	?	O*,Q*
1422	Heusweiler(SR)	Germany	1200/600	C,G*,O*,Q*,X*
1431	Oresden	Germany	250	O*
1440	Marnach(RTL)	Luxembourg	1200	C,G*,O*,Q,R
1440	Damman	Saudi Arabia	1600	O*,P*,U*
1449	Berlin	Germany	5	A*,O*,P*
1449	Squinzano	Italy	50	A*
1449	Redmoss(BBC4)	UK	2	O*
1467	Monte Carlo(TWR)	Monaco	1000/400	G*,K*,O*,Q*
1476	Wien-Bisamberg	Austria	600	G*,O*,U*,Z*
1485	Plzen(Pilsen)	Czech Rep.	2	4
1485	Augsburg(AFN)	Germany	1	A*,P*,1,3
1485	Regensburg(AFN)	Germany	0.3	6*
1494	Clermont-Ferrand	France	20	C,G*,O*
1494	St.Petersburg	Russia	1000	G*,Q*,R*
1503	Stargard	Poland	300	G*,J*,O*,Q*
1503	RNE5 via ?	Spain	?	A*
1512	Wolvertem	Belgium	600	C,F,G*,H*,K*,O*,Q, R*,Z*,2
1512	Jeddah	Saudi Arabia	1000	P*
1512	R.Ukraine Int.	Ukraine	?	P*
1521	Kosice(Cicatice)	Slovakia	600	O*,Q*
1521	Duba	Saudi Arabia	2000	P*
1521	R.Manresa(SER)	Spain	2	G*,P*
1530	Keflavik(AFRTS)	Iceland	0.25	E*
1530	Vatican R	Italy	150/450	G*,K*,O*,Q*
1538	Mainflingen(DLF)	Germany	700	C,F,G*,O*,Q*,R*
1539	Valladolid(SER)	Spain	5	F*,G*,O*
1557	Nice	France	300	C,G*,O*,Z*
1566	Mayak	Russia	?	G*,P*
1566	Sarnen	Switzerland	300	C,Q*
1566	Stax	Tunisia	1200	P*,Q*
1575	Burg	Germany	250	G*
1575	Genova	Italy	50	A*,G*,P*,U*
1575	SER via ?	Spain	5	A*,O*,G*,P*,Q*
1575	Villanueva(OCR)	Spain	5	G*
1584	SER via ?	Spain	2	G*,Q*
1593	Langenberg(WDR)	Germany	400/800	C,G*,K*,O*,Q*,R*
1602	SER via ?	Spain	?	G*,Q*
1602	Vitoria(EI)	Spain	10	A*,F*,G*
1611	Vatican R	Italy	15	A*,9*

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

Listeners:
A: Ted Bardy, N.London
B: Leo Barr, Sunderland.
C: Darren Beasley, Bridgwater.
D: Vere Brindley, Woodhall Spa.
E: Geoff Crowley, Hafnarfjordur, Iceland.
F: John Eaton, Woking.
G: Gerry Haynes, Bushey Heath.
H: Francis Hearne, N.Bristol.
I: Simon Hockenhull, E.Bristol.
J: Richard Howard, Northampto.
K: Sheila Hughes, Morden.
L: Rhoderick Illman, Oxted.
M: Stephen Jones, Oswestry.
N: Ronald Kilgore, Co.Londonderry
O: Eddie McKeown, Newry.
P: Roy Merrall, Dunstable.
Q: George Millmore, Wootton IoW.
R: Sid Morris, Rowley Regis.
S: Sid Morris, Cwm Nantcol.
T: John O'Toole, Stratford.
U: Roy Patrick, Derby.
V: Paul Pybus, Hull.
W: Harry Richards, Barton-on-Humber.
X: Tom Smyth, Co.Fermanagh
Y: John Stevens, Largs.
Z: Michael Williams, Redhill.
1: Tim Bucknall, Congleton.
2: Tim Bucknall, Calais.
3: Tim Bucknall, Karlovy Vary.
4: Tim Bucknall, Pilsen.
5: Tim Bucknall, Prague.
6: Tim Bucknall, Regensburg.
7: Tim Bucknall, Rudeshiem.

Some International Broadcasters altered their s.w. schedules in August, but gave listeners little warning. As far as possible, such changes have been included herein, but the details may be incomplete. Further changes are likely at the end of September and in November.

Long Wave Reports

Note: l.w. & m.w. frequencies in kHz; s.w. in MHz; Time in UTC (=GMT). Unless stated, all logs compiled in the four week period ending September 4.

A l.w. transmission on 245kHz, which may have come from Erzurum, Turkey (200kW) was picked up by **Ted Bardy** in N.London on July 27. He says ,"I came across it by chance. The familiar Middle East music coupled with vocal tones of Turkish, although very weak, was quite evident and the frequency was as recorded". It was SINPO 12231 at 2032 UTC.

Reporting from Iceland, **Geoff Crowley** (Hafnarfjordur) says, "The lower frequencies have started to pick up now with the coming darkness. The length of the day is now decreasing by 35 minutes every week". He logged Allouis on 162 as 43243 at 2158; Atlantic 252 as 34142 at 2200; also Saarlouis on 153 as 31131 at 2201.

Whilst travelling to the Czech Republic, **Tim Bucknall** (Congleton) seized the chance to check the band. Amongst the signals he heard in Rudeshiem (see chart) was BBC R4 on 198kHz. However, when he arrived in Karlovy Vary (Czech Rep) he found that BBC R4 was masked by Warsaw 3 on 198 (200kW) from Poland.

Medium Wave Reports

Rather poor conditions for m.w. transatlantic DXing were noted in early August by Ted Bardy. The signal from CJYQ in St. John's on 930, often used by DXers as a pointer to conditions, was 23232 at 0053 on August 7, no other signals were heard.

On the nights of August 20-29, **Sid Morris** (Rowley Regis) spent hours searching the band for transatlantic signals at Cwm Nantcol, one of his favourite locations in Gwynedd. He logged twelve stations in Canada and five in the USA. The earliest signal to reach him came from CBG in Gander on 1400, SIO232 at 2330, but most were logged after 0100. By 0135 CJYQ on 930 was peaking SIO323.

Thanks to **Jeff Mutter** (Charlotte, NC) for telling me that WNEW in New York, on 1130 changed format and call letters in January '93. He says, "This station is now WBBR (Bamburg Business Radio) with an all news/business format. Another of the transatlantics, WQXR on 1560, subsequently changed its call letters to WQEW and changed from classical to the nostalgia/big band format that WNEW had aired".

Some of the signals from N.Africa and the Middle East also reached the UK at night in August. Surprise of the month for **George Millmore** (Wootton, IoW) came on August 13, when the sky wave signal from Batra/Cairo rated SIO444 at 2140. Good reception from some stations in Algeria and Morocco was noted after dark by **Sheila Hughes** in Morden. In Derby, **Roy Patrick** logged Dammam, Saudi Arabia on 1440 every night after RTL closed at 2105. He found their outlet from Duba on 1521 often dominated the co-channel stations, rating 34333. A call to prayer in Arabic via Jeddah on 1512 was heard by **Roy Merrall** in Dunstable at 0059.

Broadcasts from R.Maldwyn in Newtown, Powys on 756 reach some quite distant places - see chart. However, **John Wells** (E.Grinstead) is wondering if the radiated power has been reduced, because he now has difficulty in receiving their ground wave. He has noticed that BBC R.Sussex is using the title 'Radio Sussex and Surrey' during some programmes.

Local Radio Chart

Freq kHz	Station	ILR. BBC	e.m.r.p (kW)	Listener
558	Spectrum R	I	7.50	D,F*,G,I*,N,O,S,V
585	R.Solway	B	2.00	M,O,T
603	Cheltenham(CD603)	I	?	F,G,N,O,S,V
603	Invicta SG (Coast)	I	0.10	D,F,G,I*,M,N,V
630	R.Bedfordshire(3CR)	B	0.20	C,F,G,I,J,N,O,Q,T,V
630	R.Cornwall	B	2.00	N,P
657	R.Ciwyd	B	2.00	G,J,M,N,O,T,U,V
657	R.Cornwall	B	0.50	N
666	DevonAir R	I	0.34	F,G,I,M*,N,V
666	R.York	B	0.80	C,G,I,M*,S,T,V
729	BBC Essex	B	0.20	A*,D,F,G,N,S,T,U,V
738	Hereford/Worcester	B	0.037	F,G,N,O,S,T,V
756	R.Cumbria	B	1.00	M
756	R.Maldwyn	I	0.63	G,K,N,O,P,V
765	BBC Essex	B	0.50	D,F,G,M*,N,O,Q,S,T,V
774	R.Kent	B	0.70	D,F,G,I,N,V
774	R.Leeds	B	0.50	C,S,T,V
774	Gloucester (3CSG)	I	0.14	N,O
792	Chiltern (S.Gold)	I	0.27	F,G,M*,N,O*,S,T,V
801	R.Devon	B	2.00	F,G,M*,N,V
828	Chiltern (S.Gold)	I	0.20	F,G,S,V
828	R.Aire (Magic828)	I	0.12	S,T
828	R.WM	B	0.20	M*,O
828	2CR (Cl.Gold)	I	0.27	N,V
837	R.Furness	B	1.00	M
837	R.Leicester	B	0.45	C,F,G*,I,J,N,O,S,T,V
855	R.Devon	B	1.00	N
855	R.Lancashire	B	1.50	M,T
855	R.Norfolk	B	1.50	C,G*,I,O,S,T,U,V
855	Sunshine R	I	0.15	G*,I,O,V
873	R.Norfolk	B	0.30	C,F,G*,I,N,S,T,V
936	Brunel R (Cl.Gold)	I	0.18	G*,N,V
945	R.Trent (Gem AM)	I	0.20	F*,G*,L*,M*,N,O,S,T,V
954	DevonAir (Cl.Gld)	I	0.32	G*,I,J,N,V
954	R.Wyvern (WYVN)	I	0.16	G*,O,S,U,V
990	WABC (Nice & Easy)	I	0.09	G*,K,O,V
990	R.Aberdeen	B	1.00	M
990	R.Devon	B	1.00	G*,I,N,V
990	Hallam R.(Gt.Yks)	I	0.25	G,S,T
999	R.Solent	B	1.00	G*,I,N,V
999	R.Trent (Gem AM)	I	0.25	G*,S,T,V
999	Red Rose (Gold)	I	0.80	M
1017	Beacon R (WABC)	I	0.70	B,G,N,O,S,T,V
1026	Downtown R	I	1.70	U
1026	R.Cambridgeshire	B	0.50	B,D,G*,S,T,V
1026	R.Jersey	B	1.00	B,N,V
1035	NorthSound R	I	0.78	G,L*
1035	R.Kent	B	0.50	B,D,G*,I,N,V
1035	R.Sheffield	B	1.00	S,T
1035	West Sound R	I	0.32	L,M
1107	Moray Firth R	I	1.50	M
1116	R.Derby	B	1.20	C,G,I,M*,O,S,T,V
1116	R.Guernsey	B	0.50	B,D,G,I,N,V
1152	BRMB (Xtra-AM)	I	3.00	B,O
1152	LBC (L.Talkback R)	I	23.50	D,E*,G*,I*,N,Q,V
1152	R.Broadland	I	0.83	M*,V
1152	R.Clyde (Clyde 2)	I	3.06	L*
1161	Brunel R (Cl.Gold)	I	0.16	B,G*,H*,V
1161	R.Bedfordshire(3CR)	B	0.10	B,G*,V
1161	R.Sussex	B	1.00	I,N,V
1161	R.Tay	I	1.40	L,M*
1161	Viking R.(Gt.Yks)	I	0.35	M*,S,T
1170	GNR Teeside	I	0.32	M*
1170	Portsmouth (SCR)	I	0.12	G,N,V
1170	R.Orwell (SGR)	I	0.28	D,G,V
1170	Signal R.(S.Gold)	I	0.20	O
1170	Swansea Sound	I	0.58	B,M*
1242	Invicta Snd(Coast)	I	0.32	D,G*,I*,T,V
1242	Isle of Wight R.	I	0.50	B,G*,M*,N,V
1251	Saxon R. (SGR)	I	0.76	G*,L*,M*,V
1260	Brunel R (Cl.Gold)	I	1.60	B,G*,M*,N,V
1260	R.York	B	0.50	M*,S,T
1260	Sunrise R	I	0.29	G,O,S,V
1260	Marcher Snd (Gold)	I	0.64	G*,M*,P
1278	Bradford (Gt.Yks)	I	0.43	G*,L*,S,T,U
1305	Barnsley (Gt.Yks)	I	0.15	G,S,T
1305	Red Dragon (Touch)	I	0.20	B,G,H*,M*,N,V
1323	R.Bristol (Som.Snd)	B	0.83	B,G,M*,V
1323	Brighton (SCR)	I	0.50	D,F,G*,N,V
1332	Hereward R.(WGMS)	I	0.60	C,G,M*,S,T,V
1332	Wiltshire Sound	B	0.30	B,G,M*,N,V
1359	Essex R.(BreezeAM)	I	0.28	G,V
1359	Mercia Snd(Xtra-AM)	I	0.27	G,O
1359	Red Dragon (Touch)	I	0.20	H*
1359	R.Solent	B	0.85	B,O,F,G*,N
1368	R.Lincolnshire	B	2.00	G,S,T,V
1368	R.Sussex	B	0.50	F,G,I,N,V
1368	Wiltshire Sound	B	0.10	B,G,M*,N
1413	Sunrise R.	I	0.125	F,G,I*,N,V
1431	Essex R.(BreezeAM)	I	0.35	O,F,G,L*,M*,N,V
1431	R 210 (Cl.Gold)	I	0.14	B,G,N,T,V
1449	R.Peterboro/Cambs	B	0.15	B,C,F,G,M*,N,T,U,V
1458	GLR	B	50.00	B,D,G,H*,I*,N,T,U
1458	GMR	B	5.00	B,S,T
1458	R.Cumbria	B	0.50	M
1458	R.Devon	B	2.00	B,N,V
1458	R.Newcastle	B	2.00	L,M,S
1458	Radio WM	B	5.00	O
1476	County Sound	I	0.50	F,G,I*,M*,N,R*,V
1485	R.Humberside	B	1.00	C,G,M*,S,T
1485	R.Merseyside	B	1.20	M,O
1485	R.Sussex	B	1.00	F,G,N,V
1503	R.Stoke-on-Trent	B	1.00	B,G,M*,N*,O,S,T,V
1521	Reigate (Cty Snd)	I	0.64	A*,F,G,I*,L,M*,N,V
1530	Sheffield (Gt.Yks)	I	0.74	C,G,L,M*,S,T
1530	R.Essex	B	0.15	F,G,N,V
1530	R.Wyvern (WYVN)	I	0.52	B,G,M*,N,O
1548	Capital R (Cap G)	I	97.50	D,G,I*,N,Q,S,V
1548	R.Bristol	B	5.00	B,M*,N
1548	R.Forth (Max AM)	I	2.20	L,M*,U
1548	R.Hallam (Gt.Yks)	I	0.74	T
1557	Chiltern R.(Gold)	I	0.78	B,G,L*,M*,O,S,T,V
1557	Southampton (SCR)	I	0.50	D,G*,N,V
1557	R.Lancashire	B	0.25	M*
1557	Tendring (Mellow)	I	?	V
1584	Kettering (KCBC)	I	0.04	B,G,V
1584	R.Nottingham	B	1.00	C,G,M*,N,S,T,V
1584	R.Shropshire	B	0.50	B,G,O,V
1584	R.Tay	I	0.21	L
1602	R.Kent	B	0.25	B,D,F,G,I,L,M*,N,V

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

Listeners:

A: Ted Bardy, N. London.
B: Leo Barr, Sunderland.
C: Darren Beasley, Bridgwater.
D: Vera Brindley, Woodhall Spa.
E: Tim Bucknall, Congleton.
F: Geoff Crowley, Hafnarfjordur, Iceland.
G: Martin Dale, Stockport.
H: John Eaton, Woking.
I: Gerry Haynes, Bushey Heath.
J: Simon Hockenhaull, E. Bristol.
K: Sheila Hughes, Morden.
L: Rhoderick Illman, Oxted.
M: Stephen Jones, Oswestry.
N: Cyril Kellam, Sheffield.
O: Ross Lockley, Stirling.
P: Eddie McKeown, Newry.
Q: George Millmore, Wootton, IoW.
R: Sid Morris, Rowley Regis.
S: Harry Richards, while in Worthing.
T: Tom Smyth, Co.Fermanagh.
U: George Tebbitts, Penmaenmawr.
V: John Wells, East Grinstead.
W: Francis Hearne, N.Bristol.
X: Francis Hearne, while in Nottingham.
Y: David Rogers, Bolton.

Short Wave Reports

Reception from many areas was poor during much of August. Although the effects of solar activity disturbed conditions from time to time, many of the broadcasts were marred by severe co-channel interference.

As expected, daily variations were evident in the **25MHz (11m)** band. R.Australia has ended its signals to NE.Africa from Darwin on 25.750. There were no reports to indicate how well the remaining broadcasts reach their target, but they were received in the UK via back scatter and other modes. Under favourable conditions UAE R, Abu Dhabi 25.690 (Ar to F.East 0900-1100) 22222 at 0930 here; DW via Julich 25.740 (Ger to E.Asia 1100-1355) was 32332 at 1230 by **Robert Connolly** in Kilkeel; RFI via Issoudun 25.820 (Fr to Af 0900-1545) as 24332 at 0915 by **Simon Hockenhull** in E.Bristol.

The **21MHz (13m)** band is now used more extensively by R.Australia. Their Darwin broadcast to SE.Asia 21.525 (Eng 0100-0900) was 45233 at 0605 by **John Eaton** in Woking; to Pacific areas via Canarvon 21.595 (Eng 0100-0900) as SIO333 at 0830 by **Kenneth Buck** in Edinburgh; to Asia via Darwin 21.745 (Eng 0800-1100) as 15331 at 1045 by **Eric Shaw** in Chester. While in Majorca, **Bill Griffith** (W.London) logged it as 44444 at 1000.

Among the mornings signals in this band were the BBC via Limassol, 21.470 (Eng to E.Af 0430-1615), 35553 at 0615 by **David Edwardson** in Wallsend and via Ascension Is 21.660 (Ehg to Af 0730-1745) 35333 at 1109 by **Ronald Kilgore** in Co.Londonderry; R.Japan via Moyabi 21.575 (Eng to Eu, M.East 0700-0900) 32422 at 0755 by **Rhoderick Illman** in Oxted; UAE R, Abu Dhabi 21.735 (Ar to ? 0800-1300?) SIO444 at 0800 by **Richard Howard** in Northampton and 21.630 (Ar to Eu? 0800?-1300) SIO444 at 1134 by **John Coulter** in Winchester; R.Pakistan, Islamabad 21.520 (Eng to Eu 0800-0845) 53454 at 0805 by **Eddie McKeown** in Newry and 21.520 (Eng to Eu 1100-1120) 43433 at 1112 by **Darran Taplin** in Brenchley; R.Finland via Pori 21.550 (Eng to Aust, NZ 0800-0830) 55555 at 0820 by **Chris Shorten** in Norwich; R.Slovakia Int 21.705 (Eng to Aust 0830-0900) 34353 at 0840 by **Tim Allison** in Middlesbrough; UAE R.Dubai 21.605 (Eng to Eu 1030-1055) SIO444 at 1032 by **Bill Clark** in Rotherham; RAI Rome 21.775 (It to ? 1000?-?) SIO333 at 1054 by **Philip Rambaut** in Macclesfield; RNI Oslo 21.705 (Norw to Asia?, Aust? 1100-1130) 55544 at 1115 by **Darren Beasley** in Bridgwater; R.Moscow Int 21.450 (Eng WS 1100?-1230?) 35433 at 1159 in Hafnarfjordur.

After mid-day, UAE R.Dubai 21.605 (Eng to Eu 1330-1400) 34423 at 1331 by **Leo Barr** in Sunderland; RCI via Sackville 21.455 (Eng, Fr to Eu, M.East 1330-1430) SIO444 at 1340 by **John O'Halloran** in Harrogate; HCJB, Ecuador 21.455 (Eng, u.s.b.+ p.c.) 34222 at 1715 by **Harry Richards** in Barton-on-Humber; R.Nederlands via Bonaire 21.590 (Eng to Af 1730-2025) 44333 at 1752 in Morden; WYFR via Okeechobee 21.500 (Eng, Ger to Eu, Af 1800-2200?)

Long Wave Chart

Freq kHz	Station	Country	Power (kW)	Listener
153	Bechar	Algeria	1000	P
153	Donebach	Germany	500	A*,B*,D,E,G*,H,I,K,M,N*,P,R*,S*,U*
153	Brasov	Romania	1200	A*,F*,K*,M*
162	Allouis	France	2000	A*,B,D,E*,F,H,I,K,M,N,P,R*,S,U*,V*
171	Kaliningrad	Russia	1000	A*,H,K*,M,N,P,R*,S*,U*
171	Medi 1-Nador	Morocco	2000	A*,F*,G*
171	Moscow	Russia	500	F
177	Oranienburg	Germany	750	A*,B*,D,E,H*,K*,M,N*,P,R*,U*
183	Saarlouis	Germany	2000	A*,B*,D,E*,F,H*,I*,K,M,N,P,R*,S,U*
189	Caltanissette	Italy	10	L*
189	Tbilisi	Georgia	500	A*
198	Warsaw 3	Poland	200	C
198	BBC Droitwich	UK	500	A*,D,F,H,I,K,M,N,Q,S,U*
207	Munich	Germany	500	A*,B,F,G*,H*,K*,M,N*,P,R*,S*,U*
207	Reykjavik	Iceland	100	E*
207	Azilal	Morocco	800	A*,L*
207	Kiev	Ukraine	500	A*,L*
216	RMC Roumoules	S.France	1400	A*,D,F,G*,K*,M,N,P,R*,S*,U*,V*
216	Oslo	Norway	200	A*,H*,K*,V*
225	Raszyn Resv TX	Poland	?	A*,D,F*,H*,K*,M,N*,P,R*,S*,U*
234	Beidweiler	Luxembourg	2000	A*,D,F,H*,K,M,N,P,R*,S,U*
234	St.Petersburg	Russia	1000	K*,R*
243	Kalundborg	Denmark	300	A*,B,F,G*,H,I,K,M,N*,P,R*,T*,U*
243	Erzurum	Turkey	200	A*
252	Tipaza	Algeria	1500	A*,H*,L*,M*,P*,T*
252	Atlantic 252	S.Ireland	500	A*,E*,F,G,H*,I,J,K,M,N,O*,Q,R*,S,U*
261	Burg	Germany	200	B,F,G*,M,N*,P,R,T*
261	Taldom(Moscow).	Russia	2000	A*,D,H*,K*,N,R*,U*
270	Topolna	Slovak Rep.	1500	A*,D,F,G*,K*,M,N,R*
270	Orenburg	Russia	40	K*
279	Minsk	Belarus	500	A*,F*,K*,M*,N*,P*,U*,V*

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

Listeners:
A: Ted Bardy, N.London.
B: Vera Brindley, Woodhall Spa.
C: Tim Bucknall, Karlovy Vary.
D: Tim Bucknall, Rudesheim.
E: Geoff Crowley, Hafnarfjordur, Iceland.
F: John Eaton, Woking.
G: Simon Hockenhull, E.Bristol.
H: Sheila Hughes, Morden.
I: Stephen Jones, Oswestry.
J: Ronald Kilgore, C.Londonderry.
K: Eddie McKeown, Newry.
L: Roy Merrall, Dunstable.
M: George Millmore, Wootton, IoW.
N: Sid Morris, Rowley Regis.
O: John O'Toole, Stratford.
P: Fred Pallant, Storrington.
Q: Paul Pybus, Hull.
R: Harry Richards, Barton-on-Humber.
S: Tom Smyth, Co.Fermanagh.
T: John Stevens, Largs.
U: Phil Townsend, E.London.
V: Michael Williams, Redhill.

45444 at 1832 by **Gerry Haynes** in Bushey Heath; and 21.525 (Eng to Eu, Af 2000-2230) 33333 at 2140 in Kilkeel HCJB, Ecuador 21.455 (Eng, u.s.b.+ p.c.) 45544 at 2015 by **Ross Lockley** in Stirling; VOFC Taiwan via Okeechobee 21.720 (Eng to Eu 2200-2300) 45554 at 2200 by **John O'Toole** in Stratford.

The **18MHz (15m)** broadcasts from WEWN Birmingham on 18.930 (Port?, Eng, Sp to Eu? 1200-2155) were SIO111 at 2051 by **Michael Williams** in Redhill.

Two of R.Australia's **17MHz (16m)** broadcasts have reached the UK: from Darwin 17.695 (Eng to S.Asia 0700-0900) 24542 at 0811 in Wallsend and 17.910 (Eng to Asia 1100-1300) 34333 at 1230 by **Michael Griffin** in Ross-on-Wye.

In the morning, BBC via Mahe 17.885 (Eng to E.Africa 0500-0630) 33222 at 0513 by **Ron Galliers** in Islington and via Kranji, 17.830 (Eng to F.East 0500-1030) 44333 at 0959 in Bushey Heath; R.Romania Int, Bucharest 17.805 (Eng to Pacific areas 0645-0715) 54454 at 0702 in Norwich; R.Finland via Pori 17.800 (Eng to Aust 0800-0830) 23332 at 0800 by **Peter Polson** in St.Andrews; Voice of Greece, Athens 17.525 (Gr, Eng to Aust 0800-0950) SIO444 at 0924 in Northampton; KHBI, N.Mariana Is 17.555 (Eng to NE.Asia 0800-1155) 23342 at 0930 in Chester and 17.555 (Eng to NE.Asia 0800-1155) 34223 at 1105 by **Peter Pollard** in Rugby; AIR via Aligarh 17.895 (Eng to NE.Asia 1000-1100) 32322 at 1014 in Co.Londonderry; Africa No.1, Gabon 17.630 (Fr, Eng to W.Africa 0700-1600) 54544 at 1030 in Bridgwater; R.Bulgaria, Sofia 17.830 (Eng to Eu 1030-1200) SIO444 at 1038 in Macclesfield; SRI via Schwarzenburg 17.670 (Eng to SE.Asia, Far East 1100-1130) 44444 at 1100 in Morden; R.Pakistan Islamabad 17.900 (Eng to Eu 1100-1130) 44343 at 1105 in Oxted; DW via Julich? 17.860 (Eng to W.Africa 1100-1150) 55555 at 1110 in Hafnarfjordur.

In the afternoon, AWR Africa via Moyabi 17.890 (Eng to Af 1200-1300, Sun only) was 43543 at 1200 in Stirling; Voice of Greece, Athens 17.515 (Gr, Eng to C.Africa 1300-1350) SIO455 at 1335 in Edinburgh; WEWN, Birmingham 17.510 (Eng to Eu 1400-1555) SIO444 at 1527 in Rotherham; R.Japan via Ekala 17.775 (Eng to Eu, M.East, N.Africa 1700-1800) 34333 at 1738 in Middlesbrough.

Later, HCJB Quito 17.790 (Eng to Eu 1900-2000) 34433 at 1917 in Brenchley; R.Algiers Int via Bouchaoui 17.745 (Eng to Eu, E/C.Africa 1900-2000) 43333 at 1930 by **Richard Bealey** in Exeter; RCI via Sackville 17.875 (Eng to Eu 2030-2130) 55444 at 2044 by **Vera Brindley** in Woodhall Spa; RFI via Montsinery 17.620 (Fr to Af 2000-2200) 44444 at 2100 in Kilkeel; R.Havana Cuba 17.760 (Eng to Eu, M.East, Af 2100-2200) 23222 at 2136 by **Robin Harvey** in Bourne; VOFC via Okeechobee 17.750 (Eng to Eu 2200-2300) 35132 at 2200 in Newry; VOA via Tinang 17.735 (Eng to E.Asia, Pacific 2100-0100) 25322 at 2208 in Woking.

R.New Zealand's **15MHz (19m)** broadcasts to Pacific areas have reached the UK some mornings! Their 100kW transmission from Rangataiki on 15.120 (Eng 2137-0658) was SIO322 at 0658 in Rotherham. Radio Australia's broadcast to S.Asia via Shepparton on 15.320 (Eng 2200-0730) has also been heard here. In Wallsend it rated 24532 at 0604. Much later, their transmission from Darwin on 15.575 (Chin to Asia 2200-2300) rated 34443 at 2220 in Woking.

Also logged here in the morning were BBC via Ascension Is 15.400 (Eng to C/W.Africa 0500-0600) 43333 at 0530 in Islington; HCJB Quito 15.270 (Eng to Eu 0700-0830) 54544 at 0730 in Majorca; R.Austria Int, via Moosbrunn 15.410 (Ger, Fr, Eng to M.East 0400-0800) 44434 at 0746 in Barton-on-Humber; R.Kuwait via Kabd 15.495 (Ar 0715-1305) 44333 at 0950 in Oxted; RTM Tanger, Morocco 15.360 (Ar 1045-1700) SIO434 at 1105 in Winchester.

In the afternoon, WWCR Nashville 15.685 (Russ, Eng to Eu 1000-0000) was 44544 at 1215 in Hafnarfjordur and 44333 at 1235 in Stratford; R.Finland via Pori 15.400 (Fin, Eng to USA 1100-1400) 53354 at 1259 in Newry; WCSN Scotts Corner 15.665 (Eng, Russ, Ger to Eu 1200-1555) 55544 at 1300 in Bridgwater; BBC via Masirah Is 15.310 (Eng to M.East, Asia 0900-1700) 54444 at 1455 in Bushey Heath; Voice of Greece via Avlis 15.630 (Gr, Eng, Sw to USA 1500-1550) SIO222 at 1530 by **Tom Smyth** in Co.Fermanagh; KTWR, Guam 15.610 (Eng to S.Asia, India 1500-1700) 32333 at 1553 in Woodhall Spa; AWR Russia 15.125 (Eng 1600-1630) SIO433 at 1600 in Harrogate; Channel Africa, Johannesburg 15.220 (Eng to Af 1558-1655) 32432 at 1600 in Stirling; R.Pakistan, Islamabad 15.555 (Eng to M.East 1600-1630) 54444 at 1605 in Norwich.

In the evening, WEWN Birmingham 15.695 (Eng to Eu 1800-1855) was 24443 at 1820 in Chester; RNB Brasilia, Brazil 15.265 (Eng, Ger to Eu 1800-2100) 44444 at 1900 in Ross-on-Wye; AIR via ? 15.075 (Eng to E.Africa 1745-1945) 43312 at 1904 in Sunderland; Voice of Vietnam, Hanoi 15.009 (Eng to Eu 1900-1930) SIO343 at 1920 in Edinburgh; KTBN via Salt Lake City 15.590 (Eng to USA 1600-0200) 33333 at 1933 in St.Andrews; R.Romania Int, Bucharest 15.365 (Eng to Eu 1900-2000) 55555 at 1946 in Brenchley; VOIRI Tehran 15.260 (Eng to Eu 1930-2030) 43433 at 1948 in Middlesbrough; R.Bulgaria, Sofia 15.330 (Eng 2000-2100) 33333 at 2035 in Rugby; BBC via Ascension Is 15.390 (Eng to Caribbean area 2115-2130) 34333 at 2115 in Morden; R.Korea, Seoul 15.575 (Eng to Eu 2145-2245) 54433 at 2145 in Co.Londonderry; R.Damascus, Syria 15.095 (Eng to USA 2110-2210) 44444 at 2145 by **P.Gordon Smith** in Kingston, Moray.

Later, R.for Peace Int, Costa Rica 15.030 (Eng, u.s.b. + p.c. 24hr) SIO111 at 2302 in Redhill; BBC via Ascension Is 15.400 (Eng to Af 1500-2315) 23322 at 2315 in E.Bristol; UAE R, Abu Dhabi 15.305 (Eng to USA 2200-0000) 55555 at 2315 in Bourne; also 15.315 (Eng to USA 2200-0000) SIO322 at 2345 by **Francis Hearne** in N.Bristol.

Quite a number of the **13MHz (22m)** broadcasts are meant for Europe. Those noted came from WYFR via Okeechobee 13.695 (Eng 0500-0800, also to Af) 23322 at 0520 in Islington; UAE R.Dubai 13.675 (Ar, Eng 0615-2100) 45444 at 1517 in Woking; R.Pyongyang, N.Korea 13.785 (Eng 1500-1550) 34333 at 1544 in St.Andrews; R.Bulgaria via Plovdiv? 13.670 (Eng 1730-1900) 44444 at 1730 in Hafnarfjordur and SIO433 at 1736 in Northampton; R.Austria Int via Moosbrunn 13.730 (Eng, Fr, Sp 0500?-1900) 44434 at 1830 in Ross-on-Wye; R.Kuwait via Kbad 13.620 (Eng 1800-2100) 44444 at 1930 in Exeter; RCI via Sackville 13.650 (Eng 2030-2130) SIO444 at 2054 in Rotherham; Croatian R via Deanovec 13.830 (Cr [News in Eng 2100-2120]) 45444 at 2100 in Stirling; WHRI South Bend 13.760 (Eng 1700-0000) 33333 at 2200 by **Tony Singh** in Hitchin.

Whilst beaming to other areas R.Australia via Darwin 13.605 (Chin, Eng to China 0900-1430) rated SIO222 at 0930 in Harrogate and 34323 at 1405 in Bridgwater and 13.605 (Chin to China 2200-0000) SIO344 at 2200 in Edinburgh; SRI via Schwarzenburg? 13.635 (Eng to C/SE.Asia 1500-1530) 34323 at 1503 in Woodhall Spa and 13.635 (Eng to Af 2000-2030) 43343 at 2027 in Rugby; R.Pakistan, Islamabad 13.590 (Eng to M.East 1600-1630) 54444 at 1610 in Norwich; AWR (KSDA) Agat, Guam 13.720 (Eng to Af 1700-1900), Sat/Sun only) 33223 at 1745 in Newry; R.Vlaanderan Int, Belgium 13.685 (Eng to Af? 1800-1830) 42222 at 1819 in Bushey Heath; DW via Julich 13.690 (Eng to Af 1900-1950) 34433 at 1908 in Brenchley; BBC via Rampisham 13.660 (Eng to Falkland Is 2130-2145) SIO122 at 2130 in Redhill; VOA via Selebi-Phikwe 13.710 (Eng to Af 1600-2200) SIO222 at 2141 by **Julian Wood** in Elgin; R.Nederlands via Flevo 13.700 (Du to S.Am 2130-2225) 44333 at 2208 in Bourne; WWCR Nashville 13.845 (Eng to E.USA 1200-0100) 43333 at 2315 in Kilkeel; WSHB Cypress Creek 13.760 (Eng, Sp to S.Am 0000-0400) 35334 at 0005 in Barton-on-Humber.

Sometimes R.New Zealand's **11MHz (25m)** broadcast to Pacific areas on 11.735 (Eng 1850-2130) has reached the UK. It peaked SIO322 at 2007 in Rotherham. More often R.Australia's broadcast to S.Pacific via Shepparton? on 11.680 (Eng ?-2055) has been heard here. It rated 33333 at 1800 in Hitchin.

Also logged here were HCJB Quito 11.925 (Eng to S.Pacific areas 0730-1130) 44333 at 0745 in Norwich; FEBC, Philippines 11.690 (Eng to China, New Guinea 0900-1100) 23222 at 0945 in Bridgwater; R.Nederlands via Bonaire 11.895 (Eng to Pacific areas, Far East 0730-1025) 24332 at 1000 in Chester; BBC via

Transatlantic DX Chart

Freq kHz	Station	Location	Time (UTC)	DXer
		USA		
1010	WINS	New York, NY	0200	B
1050	WEVD	New York, NY	0155	B
1210	WOGL	Philadelphia, PA	0005	B
1220	WKNR	Cleveland, OH	0120	B
1500	WTOP	Washington, DC	0020	B
		Canada		
590	VOCM	St.John's, NF	0130	A,B
620	CKCM	Grand Falls, NF	0210	B
710	CKVO	Clarenville, NF	0145	B
750	CBGY	Bonavista Bay, NF	0150	B
820	CHAM	Hamilton, ON	0215	B
930	CJYQ	St.John's, NF	0119	A,B
960	CHER	Sydney, NS	0225	B
990	CBY	Corner Brook, NF	0140	B
1150	CKOC	Hamilton, ON	0230	B
1270	CJCB	Sydney, NS	0050	B
1380	CKPC	Brantford, ON	00315	A,B
1400	CBG	Gander,NF	2330	B

DXers:
A: Ted Bardy, N.London.
B: Sid Morris, Cwm Nantcol.

SHORT WAVE MAGAZINE
PCB SERVICE

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SR008	Experimental VHF Receiver	Jun 91	5.81
SR007	VLF Receiver	Dec 90	5.24
SR006	Medium Wave AM Radio	Nov 90	3.34
SR005	R210 Converter	July/August 90	6.87
SR004	PRO-2004 Modifications	Oct 89	6.63
SR003	HF to VHF Converter	Aug 89	5.22
SR002	Weather Satellite Reception	Jun 88	3.88

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Tel: 021-353 9326

Tropical Bands

Freq MHz	Station	Country	UTC	DXer
2.310	ABC Alice Springs	Australia	1920	H,I,L,P
2.325	ABC Tennant Creek	Australia	2055	H,I,L,N,O,P
2.485	ABC Katherine	Australia	2010	H,L
2.850	KCBS Pyongyang	N.Korea	2057	L
3.200	TWR Ndebele	Swaziland	1940	L,P
3.210	Em.Nacional, Maputo	Mozambique	2058	J,L,P
3.220	R.Togo, Lome	Togo	2150	G,J,L,P
3.225	RRI Tanjung Pinang	Indonesia	2241	P
3.230	R.Oranje	S.Africa	2100	L,P
3.232	RRI Bukittinggi	Indonesia	2248	P
3.240	TWR Shona	Swaziland	1925	L,O,P
3.250	R.Pyongyang	N.Korea	1958	P
3.255	BBC via Maseru	Lesotho	2157	H,I,J,L,N,P
3.260	Guizhou 1	China	2210	P
3.267	RRI Gorontalo	Indonesia	2150	P
3.270	R.Ecos del Oriente	Ecuador	0255	L
3.270	SWABC 1, Namibia	S.W.Africa	2110	E,F,I,J,L,O,P,U
3.275	TWR	Swaziland	1805	P
3.280	R.Beira	Mozambique	1841	L
3.290	SWABC 2, Namibia	S.W.Africa	1948	J
3.300	R.Cultural	Guatemala	0249	H,L
3.316	SLBS Goderich	Sierra Leone	2059	B,H,I,J,L,T,U
3.320	R.Allegro	S.Africa	2300	E,J,L,U
3.320	R.Suid Afrika	S.Africa	1845	I,P
3.325	FRCN Lagos	Nigeria	2128	I,J,L,P
3.330	R.Kigali	Rwanda	2057	J,L,T
3.338	R.Maputo	Mozambique	2146	L,P
3.345	EP do Huambo	Angola	2104	L
3.356	R.Botswana	Gabarone	2116	F,H,I,J,L
3.359	RTV Malegasy	Madagascar	1841	P
3.365	R.Rebelde, La Julia	Cuba	0150	E,O,P
3.365	GBC R-2	Ghana	2001	E,G,H,I,J,L,O,Q,T,U,V,W
3.365	TWR	Swaziland	0030	E
3.380	R.Chortis	Guatemala	0300	P
3.380	R.Malawi	Malawi	2059	J,L,P,T
3.395	RRI Tanjungkarang	Indonesia	2308	P
3.900	Hulunber"er, Hailar	China	0247	L
3.905	AIR Delhi	India	1724	J,P
3.915	BBC Kranji	Singapore	1740	J,L
3.940	PBS Hubei Wuhan	China	2132	L
3.950	Qinghai PBS, Xining	China	2230	E,P
3.955	BBC Skelton	England	0535	G,L,O
3.955	Channel Africa	S.Africa	1915	P
3.955	Novosibirsk rty A.Ata	Kazakhstan	1846	L,P
3.965	RFI Paris	France	2230	E,G,L,M,O,Q,V,Y
3.975	BBC Skelton	England	0405	O
3.980	VOA Munich	Germany	2210	E,F,L,M,O,Q,V,Y
3.985	China R via SRI	Switzerland	2130	E,G,L,O,S
3.985	SRI Beromunster	Switzerland	2213	L,Q,V,Y
3.995	DW via Julich	Germany	2222	E,F,G,L,O,V
3.995	Channel Africa	S.Africa	0332	L
4.000	Bofoussam	Cameroon	1935	L
4.005	RRI Padang	Indonesia	2312	P
4.020	China R, Beijing	China	1852	P
4.035	Xizang PBS, Lhasa	Tibet	2235	P
4.450	R.Frontera, Cobija	Bolivia	2323	P
4.460	CPBS 1, Beijing	China	2100	P
4.500	Xinjiang BS, Urumqi	China	2307	H,O
4.549	R. Oif.Tropico	Bolivia	2332	P
4.650	R.Santa Ana	Bolivia	0330	L
4.682	R.Pairiti	Bolivia	0328	L
4.735	Xinjiang, Urumqi	China	2345	H,O,P
4.755	R.Educ CP Grande	Brazil	0040	P
4.755	Caracol Neiva	Columbia	0124	O
4.760	Yunnan PBS,Kunming	China	2200	E,P
4.760	ELWA Monrovia	Libena	2126	L,P
4.760	TWR	Swaziland	2140	F,O
4.765	Brazzaville	PR.Congo	2230	Q,V
4.770	FRCN Kaduna	Nigeria	1955	B,C,E,F,G,H,I,J,K,L,M, O,Q,T,V,W
4.775	R.Portal da Amazonia	Brazil	0035	P
4.775	R.Gabon, Libreville	Gabon	2117	E,F,G,I,J,L,O,P,T
4.780	RTD	Djibouti	1825	J,L,P,T
4.785	Zhejiang PBS,Hangzhou	China	2246	P
4.790	Azad Kashmir R	Pakistan	0130	L,O,P,X
4.790	R.Atlantida	Peru	0220	H,P
4.790	TWR Manzini	Swaziland	1801	J
4.800	CPBS 2 Beijing	China	2212	P
4.800	R.Popular Cuenca	Ecuador	2350	L,P
4.800	AIR Hyderabad	India	1735	H,P,X
4.800	LNBS Lesotho	Maseru	1947	J,L,Q,T
4.805	R.Nac.Amazonas	Brazil	2355	E,O,P
4.815	R.Difusora, Londrina	Brazil	0230	P
4.815	R.diff TV Burkina	Ouagadougou	2103	I,J,L
4.820	E.Prov.Huila	Angola	2240	E
4.820	La Voz Evangelica	Honduras	0410	E,I,L,O
4.820	AIR Calcutta	India	2357	E,O,P

Freq MHz	Station	Country	UTC	OXer
4.825	R.Cancao Nova	Brazil	0237	I,L,P
4.830	R.Botswana, Gaborone	Botswana	2102	E,F,H,J,L,M,O,Q,T
4.830	R.Tachira	Venezuela	0232	E,L,M,O
4.833	R.Buenaventura	Colombia	0241	L
4.835	ABC-Alice Springs	Australia	2133	J,P
4.835	R.Tezulutlan, Coban	Guatemala	0050	E,L
4.835	RTM Bamako	Mali	2040	E,L,Q,T
4.840	Heilongjiang, Harbin	China	2300	P
4.840	R.Interoceanica	Ecuador	0021	P
4.840	R.Valera, Trujillo	Venezuela	0008	P
4.845	R.Fides, La Paz	Bolivia	0005	P
4.845	ORTM Nouakchott	Mauritania	2110	E,J,L,M,N,O,Q,T,V
4.850	R.Yaounde	Cameroon	2230	E,L,O,V
4.855	R.Centenario	Bolivia	0120	P
4.860	AIR New Delhi	India	1921	J,P,T
4.865	PBS Lanzhou	China	2200	E,G,I,P
4.865	L.V. del Cinaruco	Colombia	0405	H,I,L,M,O
4.865	R.Mozambique	Mozambique	2010	G,P
4.870	R.Cotonou	Benin	2102	E,F,G,J,L,O,Q,T,V
4.875	R.La Cruz del Sur	Bolivia	0017	P
4.875	Super R.Roraima	Brazil	2207	P
4.880	R.Nac.Espejo, Quito	Ecuador	0026	P
4.885	R.Clube do Para	Brazil	0045	E,H,L,O
4.885	Voice of Kenya	Kenya	1902	J,L,P,T
4.890	RFI Paris	via Gabon	0359	I,O
4.895	Voz del Rio Arauca	Colombia	0017	L,O
4.895	Hanoi 1	Vietnam	2350	E
4.905	R.Nat N'djemena	Chad	1949	F,J,L,M,N,O,Q,T
4.910	Tennant Creek	Australia	2114	T
4.910	AIR Delhi	India	1738	J,P
4.910	R.Zambia, Lusaka	Zambia	1747	J,L,T
4.915	R.Nac.Macapa	Brazil	0130	E
4.915	PBS Guangxi, Nanning	China	0030	E
4.915	Armonias del Caqueta	Colombia	0414	O
4.915	GBC-1, Accra	Ghana	2102	D,E,F,G,J,L,M,N,O,Q, T,U,V
4.915	Voice of Kenya	Kenya	1904	I,L
4.920	R.Quito	Ecuador	0220	H
4.920	AIR Madras	India	1733	P
4.925	Em Meriid, Arauca	Colombia	2247	P
4.935	R.Capixaba, Vitoria	Brazil	0300	L
4.935	Voice of Kenya	Kenya	2128	J,L,O,Q,T,V
4.940	AIR Gauhati	India	2203	F
4.945	Channel Africa	S.Africa	1730	P
4.950	R.Nac.Luanda	Angola	2300	P
4.955	R.Marajoara, Belem	Brazil	2345	P
4.960	AIR New Delhi	India	0130	X
4.965	R.Alvorada	Brazil	0605	L
4.965	R.Santa Fe, Bogota	Colombia	2350	P
4.970	R.Rumbos, Caracas	Venezuela	0035	E,L,P
4.975	R.Uganda, Kampala	Uganda	1947	J,L,N,O,Q,T
4.980	Ecos del Torbes	Venezuela	0202	H,L,O
4.985	R.Brazil Central	Brazil	0129	O
4.990	AIR via Madras	India	0010	O,P,X
4.990	FRCN Lagos	Nigeria	2106	O,E,G,I,J,L,O,Q,T
4.990	R.Ancash, Huaraz	Peru	0410	H
5.005	R.Nacional, Bata	Eq.Guinea	2140	E,Q
5.005	R.Nepal, Kathmandu	Nepal	1705	P
5.010	R.Garoua	Cameroon	2102	E,J,L,M,O,P,Q,T
5.010	Guangxi 2, Nanning	China	2255	E
5.010	R.Madagasikara	Madagascar	2140	F
5.015	R.Brazil Tropical	Brazil	0228	L,O
5.020	PBS-Jiangxi Nanchang	China	2250	E
5.020	La Voix du Sahel	Niger	0603	L
5.020	ORTN Niamey	Niger	2142	F,I,L,O
5.025	R.Parakou	Benin	2118	J,Q
5.025	R.Uganda, Kampala	Uganda	2041	J,L,T
5.030	R.Continente Caracas	Venezuela	2112	M
5.035	R.Bangui	C.Africa	2109	C,E,F,J,L,N,O,Q,T,V
5.040	Voz del Upano, Macas	Ecuador	0235	L
5.045	R.Cultura do Para	Brazil	0035	E,L
5.047	R.Togo, Lome	Togo	2103	E,F,G,I,J,K,L,M,N,O, R,T,U,V
5.050	Voz de Yopal, Yopal	Colombia	0240	L,P
5.050	Em Jesus Gran Poder	Ecuador	0313	L
5.050	AIR Aizawal	India	0055	E
5.050	R.Tanzania	Tanzania	1945	J,L,N,Q,T
5.052	SBC R-1	Singapore	2302	J
5.055	Faro del Caribe	Costa Rica	0252	L
5.055	RFO Cayenne(Matoury)	French Guiana	2301	J,L,O,P
5.055	TWR Manzini	Swaziland	0304	L
5.075	Caracol Bogata	Colombia	0040	A,E,H,J,L,N,O
5.087	R.Eco, Iquitos	Peru	2355	P
5.163	CPBS 2, Beijing	China	2216	P
5.320	CPBS 1, Beijing	China	2100	L,P
5.420	PBS Minority Sce	China	2212	P

OXers:
A: Tim Allison, Middlesborough.
B: Leo Barr, Sunderland.
C: Vera Brindley, Woodhall Spa.
D: Bill Clark, Rotherham.
E: Robert Connolly, Kilkeel.
F: Geoff Crowley, Iceland.
G: John Eaton, Woking.
H: David Edwardson, Wallsend.
I: Ron Galliers, Islington.
J: P.Gordon Smith, Kingston, Moray.
K: Bill Griffith, Majorca.
L: Gerry Haynes, Bushey Heath.
M: Sheila Hughes, Morden.
N: Ross Lockley, Stirling.
O: Eddie McKeown, Newry.
P: Roy Merrall, Dunstable.
Q: Sid Morris, Rowley Regis.
R: John O'Halloran, Harrogate.
S: John O'Toole, Stratford.
T: Fred Pallant, Storrington.
U: Roy Patrick, Derby.
V: Harry Richards, Barton-on-Humber,
W: Eric Shaw, Chester.
X: Tony Singh, Hitchin.
Y: Phil Townsend, E.London.

Kranji 11.750 (Eng to Asia, India 0900-1030) 42222 at 1000 in Bushey Heath and via Ascension Is 11.750 (Eng to S.Am 2200-0330) 34333 at 2301 in Bourne; Voice of the Mediterranean, Malta 11.925 (Eng, Ar to N.Africa 1400-1600) 33333 at 1452 in St.Andrews; R.Pakistan, Islamabad 11.570 (Eng to M.East 1600-1630) 44334 at 1620 in Barton-on-Humber; KHBI, N.Mariana Is 11.580 (Eng to Asia 1600-1755) SIO333 at 1630 in Harrogate; FEBA, Seychelles 11.840 (Am to Ethiopia 1630-1700, Wed-Sun) SIO322 at 1655 in Northampton; Channel Africa, Johannesburg 11.750 (Eng to Af 1658-1755) 54554 at 1714 in Kingston; R.Nac da Amazonia, Brazil 11.780 (Port 0900-0200) SIO322 at 2044 in Macclesfield; R.Anhanguera, Brazil 11.830 (Port 0800-0300) 33433 at 2305 in Stirling; R.Havana, Cuba 11.970 (Sp to S.Am 2300-0600) 33333 at 0015 in Kilkeel.

While broadcasting to Europe, R.Prague, Czech Rep 11.990 (Eng 0730-0800) was 44444 at 0740 in Morden; HCJB Quito 11.835 (Ger, Fr, Eng 0600-0830) 43433 at 0748 in Islington; R.Slovakia, Bratislava 11.990 (Eng 0830-0857) 55555 at 0830 in Majorca; R.Romania Int, Bucharest 11.940 (Eng 1300-1400) 45444 at 1349 in Woking; Polish R, Warsaw 11.840 (Eng 1500-1555) 54444 at 1518 in Co.Londonderry; Israel R, Jerusalem 11.587 (Eng 1900-1930, also to USA) SIO444 at 1907 in Edinburgh; AIR via Bangalore? 11.620 (Eng, Hi to Eu 1745-2230) 44444 at 1920 in Exeter; R.Damascus, Syria 12.085 (Eng 2008-2108) 43344 at 2010 in Rugby; China R, Beijing 11.500 (Eng to Eu 2000-2157) 45454 at 2030 in Stratford; R.Japan via Moyabi 11.925 (Eng 2100-2200) 43433 at 2117 in Brenchley; R.Budapest, Hungary 11.910 (Eng 2100-2200) 44454 at 2137 in Newry; R.Bulgaria, Sofia 11.720 (Eng 2145-2315) 44444 at 2155 by **George Tebbitts** in Penmaenmawr; R.Iraq Int, Baghdad 11.810 (Eng 2100-2300) SIO433 at 2230 in N.Bristol; R.Yerevan Armenia 11.920 (Eng 2241-2255) 54444 at 2257 in Middlesbrough.

R.New Zealand's **9MHz (31m)** broadcast to Pacific areas on 9.700 (Eng 0659-1206) was 22242 at 1004 in Co.Londonderry. Later, R.Australia via Carnarvon 9.510 (Eng to S.Asia 1430-1800) was SIO322 at 1700 in Macclesfield. R.Nac del Paraguay 9.735 (Sp 0800-0400) was 34443 at 2250 in Wallsend.

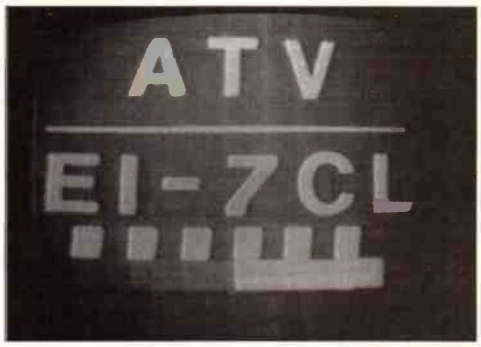
Some of the 31m broadcasts to Europe stem from TWR Monaco 9.480 (Eng 0700-0800) 45544 at 0728 in St.Andrews; SNBC Omdurman, Sudan 9.165 (Eng 1800-1900) 44333 at 1835 in Kingston; VOA via Gloria 9.760 (Eng 1700-2100) 44333 at 1912 in Oxted; VOIRI Tehran 9.022 (Eng 1930-2030) 33333 at 1930 in Exeter; Voice of Turkey, Ankara 9.445 (Eng 2000-?) 33333 at 2015 in Rugby; R.Budapest, Hungary 9.835 (Eng 2100-2200) 53334 at 2110 in Penmaenmawr.

The occupants of the **7MHz (41m)** band include Channel Africa, Johannesburg 7.230 (Eng to Af 0358-0455) 43343 at 0405 in Norwich; WYFR via Okeechobee 7.355 (Eng to Eu 0600-0800, also to Af) SIO433 at 0628 in Rotherham; WJCR Upton 7.490 (Eng E.USA 24hrs) 35433 at 0700 in Chester; WHRI South Bend 7.315 (Eng to E.USA 0000-1300) 44434 at 0710 in Ross-on-Wye; R.Australia via Carnarvon 7.260 (Eng to Asia? 1430-2055) 21222 at 1825 in Woodhall Spa and SIO212 at 2030 in Co.Fermanagh; AIR via Aligarh 7.412 (Eng to Eu 2045-2230) 43443 at 2125 in Kilkeel.

R.Australia's **6MHz (49m)** broadcast to S.Asia has been moved to 5.960 (Eng 1800-2055). It rated 32432 at 1950 in Bridgwater.

Watching Brief

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



This screen shot of ATV, Irish-style was taken by Dave Hooper EI2HR, in Templeogue. The station ident belongs to Mike North EI7CL nearby in Dublin.

One of the fun(?) aspects of the ATV hobby is going portable. This involves setting up a complete send and receive ATV station outdoors, making sure to take a source of power (usually 12V batteries), food and drink. A LandRover is ideal but failing this, people make do with a roomy estate car, motor caravan or whatever is available. Mostly operation is at spots remote from civilisation - in fact from hilltop sites, to take advantage of the better 'take-off' for working a bit of DX. This is essential if you are using the microwave bands.

So here's a letter, or rather a report, from **Dave G8VZT** describing a practical example of portable operation that achieved a 'first' Or did it? Read on!

The title of the report is 'EI Expedition 22.7.93 - 27.7.93, located on hill top Kippure, locator IO73SG'.

"Present were G8VZT, G4ZJY, G3UKV, G8PAW, G7BWQ, 2E1AEC, Kerry and Anita alias Fred. The main reason for the expedition was to work the 3cm narrowband cumulative session on 24.7.93 and, of course, to enjoy the local brew and surroundings. We arrived on site (750m a.s.l.) on July 22 and had rain and rain and rain, etc., until we left on the morning of July 27. Total sunshine amounted to about 4 to 5 hours. We operated on the Saturday in the low-power contest on the 144MHz band as EI/G8PAW. Sunday July 25 was the 3cm narrowband contest: some 14.5 contacts took place, the best DX being G3JVL on Hayling Island at 454km.

"Enough of that, now down to more serious matters. Having got my 3cm ATV system finished in time for the expedition thanks to the help and advice of Tony G4CBW, I took it with me. Having made a sked with Tony G4CBW and friend Tony GW4VEQ, they went portable to Anglesey. I transmitted first to them. Within seconds came the reply 'P5, full colour'. He then proceeded to take off his dish and waggle the LNB only at me, still taking a P5 picture. When Tony G4CBW transmitted to me I also went through the same procedure, with the same results. The contact was GW4CBW/P to EI/G8VZT/P, with f.m. television. The date was 22 July 1993 and distance was 122km. We had a 1W transmitter and LNB receiver at each end. Is this a first between EI and GW?"

Well, Dave, it's difficult to say. Technically this is not the first ATV contact between EI and GW but you may well find yourself the first person to claim the contact across the Irish Sea! I shall return to this point but first let's take up your letter again. Dave continues.

"Also on July 24, we made a 172km contact between GW3FYX/P and EI/G8VZT/P; is this considered DX on FM-TV? My thanks go to the Department of Transport, Energy and Communications in Dublin for giving permission to operate FSTV portable on 23cm and 3cm. Thanks also to the EI television lads who visited us over the period. And where was everybody on the Cumulatives evening of the 22nd? We were looking and listening but had no takers for EI/GW7ATG - the only result was one contact, on 3cm."

This point that Dave makes important is because without special permission, portable microwave ATV operation is illegal in the Irish Republic and an illegal transmission could not be entered in the record books. That's why I say you're definitely not the first to span the Irish Sea, but as you had a permit for that operation you might well be the first to claim the path legitimately. I'll say no more about this except remind all amateurs operating abroad to check the licence conditions in force there.

End of an Era

Robot Research is reportedly leaving the amateur market: this is a bit of a shock considering that Robot slow-scan gear was been a fixture in amateur radio since 1969. In those early days of SSTV Robot established a vital standard and benchmark for amateurs working slow-scan. Since then a multiplicity of new standards have arisen ("Yeah, sure we're in favour of standards, that's why we support so many of them!) and many lower-priced lookalike products have robbed Robot of sales.

So it was not surprising that Robot is now concentrating on commercial sales, which is where the real money is. Slow-scan equipment is used by many police forces for sending mugshots over 'phone line television' and Robot Research Inc. now claims to be an international leader in the field of digital video products and closed-circuit TV control systems for security purposes.

Writing in the American magazine *ATV Quarterly*, Henry Ruh notes how the early days of SSTV were underwritten by the founders of Robot. They were also amateurs and took annual losses, financing the business from their own pockets. This did not come to light until the original owners died and it was discovered they had been using their personal finances to continue production of amateur products at a price well below the commercial equivalents.

In the past few years computers have taken over much of the amateur radio domain, especially in SSTV and RTTY. Computers with powerful graphics conversion capabilities like the IBM PC and the Amiga are well placed to manipulate SSTV images and the multiple display formats that SSTV enjoys. The Robot 1200C was a stout colour SSTV system, says Henry, but with little promotion and a high sales price (compared to computers that could do a lot more), sales had dropped to two units a month, according to Robot management. Thus the decision was taken to discontinue the amateur equipment line and the last of the 1200Cs was sold earlier this year.

SSTV, slow-scan television, is a television system using freeze-frame images refreshed every eight seconds (or at other intervals).

Info in Orbit

CONTINUED FROM PAGE 58

even using an Icom 7100 receiver set to wide-band f.m.!

A dramatic change in reception coverage was experienced by **Jim Granville** of Poulton-le-Fylde when he reduced the height of his antenna by just over half a metre. Previously he was able to track satellites right over Greenland - now he loses the picture much earlier. Small changes in the height of an antenna can have a dramatic effect, usually on the level of interference rather than a significant change in coverage. I have seen this with antennas when being tested for general reception.

Chris Smith of Lincoln has more experience of meteorology than most - he was a Meteorological Observer until his recent retirement. He came into contact with satellite reception in the Falkland Islands some years ago where they received pictures on a FAX machine. More recently he bought a 386SX PC and Timestep hardware/software decoding equipment. Chris comments that amateurs have a better selection of pictures than are available to the professionals. I believe that local offices have access to NOAA imagery but perhaps few ever see METEOR images!

A letter received from **Professor Gerald Sargent G8CUV** from Brisbane, Australia tells me about some WXSAT software written by an Australian writer. The software is called Maxisat, and I hope to obtain further details for inclusion here.

Next Time

I have received an upgrade to the Timestep package PROsatII for which I hope to include a short review next month. Also under test is a receiver from Martelec, and a review of a shareware WXSAT decoding program. Making your own Keplers - more next month!

Kepler Elements

I will send a print-out of the latest WXSAT elements upon receiving an s.a.e. and extra stamp. [This contributes to the not inconsiderable cost of collecting the data.] All operating WXSATs plus MIR are available, together with transmission frequencies.

If you require other satellites such as the amateur radio, GPS, GLONASS or whatever, please enclose at least two extra stamps towards the costs. This data originates from NASA and is collected from UK BBSs for distribution on request.

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NOAAs 9, 11 a.p.t. on 137.62MHz; NOAAs 10, 12 on 137.50MHz; NOAA beacons on 136.77 and 137.77MHz; METEOR 3-4, 3-5, (3-6?) on 137.30MHz; METEOR 3-3 on 137.85MHz; FENGYUN 1-3 monitor 137.06 and 137.80MHz.

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ICS FAXI prints fax pictures, RTTY & NAVTEX straight to printer, £150 or **exchange** scanner. ICS FAXII, £75. Reason for sale, upgrading system, might exchange both for scanner above. A. Bell, Kent. Tel: (0959) 575113.

ICS FAXIII 3.5/5.25 disks, as new, £80. J&J Scancat 3.5 disk, unused, £20. Denman, 24 Ascot Road, Copnor, Portsmouth PO3 6EY. Tel: (0705) 820315.

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Derek Stephenson
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John Breeds
This book deals almost exclusively with television broadcast satellites and is a comprehensive collection of chapters on topics, each written by a expert in that field. It appears to be aimed at the professional satellite system installer, for whom it is invaluable, but it will be appreciated by a much wider audience - anyone interested in satellite technology.
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Martin Davidoff K2UBC
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Edited Ian White G3SEK
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Ian Hickman
This book provides an easy-to-read introduction to modern r.f. circuit design. It's aimed at those learning to design r.f. circuitry and users of r.f. equipment such as signal generators and sweepers, spectrum and network analysers. *320 pages.* **£16.95**

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BOOKS

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Once again it's the time of year for another issue of *What Scanner.* This issue is being given away, free, with both *Short Wave Magazine* and *Practical Wireless*, so reaching an even wider audience than in previous years.

Scanning has grown in popularity over the last year or so, probably as a result of the 'scandals' that have been widely covered by the press - tabloid or otherwise. However, the widely predicted clampdown by the authorities has not happened - in fact it now seems to have receded somewhat.

I hope that you enjoy reading this issue of *What Scanner.* If you received your copy with *Short Wave Magazine* you do not need me to tell you that *SWM* is essential reading for scanning enthusiasts. If, however, you are a *Practical Wireless* reader and this is your introduction to the world of listening, may I be so bold as to suggest that you might find *Short Wave Magazine* worth looking at.

Dick Ganderton

CONTENTS

VHF UTILITY LISTENING

'Utility' listening has become one of the most popular facets of the short wave listening hobby in recent years. You only have to look at columns like 'Decode' and 'SSB Utility Listening' in Short Wave Magazine *and the proliferation of adverts for data decoders for many different modes: c.w., RTTY & FAX, to mention just a few, to see how popular this type of listening has become. To ask, "What is utility listening?" is a bit like asking, "How long is a piece of string?" Tim Anderson explains more.*

Perhaps the most succinct definition of utility listening would be to say that it is listening to signals other than broadcast and amateur stations. Often listeners will specialise in a particular mode or type of station for their utility listening, some will use only RTTY and decode News Agency broadcasts, others prefer FAX and receiving weather data, some will just listen to the various military/aviation bands spread across h.f. following movements of planes right across the Atlantic. In short, there are hundreds of different types of signals out there to be copied.

Most utility listeners, except perhaps for aviation enthusiasts and satellite fans, would be using frequencies between 30kHz and 30MHz for their signal chasing, but as I have found, utility listening need not stop there.

Throughout much of the world, low v.h.f. (30-50MHz approximately) is used for many interesting services such as power utilities, military, telephones, fire services, police, forestry services, railways and many others. Given that v.h.f. propagation is generally line of sight, you may be forgiven for thinking that there is not much chance of receiving any of these services from overseas and whilst it is true that you won't hear things everyday in this part of the spectrum, there are many days when European and even world-wide reception is possible. Equipment to receive all of these signals is not hard to find, any scanner that covers low v.h.f. will do.

IT ALL STARTED WITH 50MHz

I have owned a scanner of one sort or another for nine years now and I used them mostly for TVDX as an 'early warning' monitor to keep track of how many TV channels were active during openings. I didn't really become aware of all the world-wide DX that could be heard on v.h.f. until I became interested in the 50MHz amateur band.

Many amateurs who use the 50MHz band monitor the 'World-wide 6m Information and Talk Back Net' on 28.885MHz to keep abreast of the openings and the DX. I heard several amateurs on this net swapping frequencies of STLs (Studio to Transmitter Links) in various exotic locations. These STLs are used in the same way as the amateur beacons to indicate the direction of any possible openings and also to monitor the rise of the m.u.f. (maximum usable frequency). Many amateurs also had lists of the exact offsets of many world-wide E2 and R1 TV transmitters,

RC-135V 64-14844 of the 55th Wing at RAF Mildenhall during late April '93. It flew as 'Bama 15' on 3rd May to Bosnia to oversee that nights food-drops.
The 'OF' tail-code signifies Offutt AFB in Nebraska, USA where the 55th Wing is based.

48.25 & 49.75MHz nominal vision frequencies, for the same reason.

I took note of a few of the frequencies that were mentioned and entered them into the scanner memories. The first STL I heard was in Columbia, South America. Very pleased with this DX, I started to scan between 30 and 50MHz and was surprised how many signals I could hear from the USA and Central America.

How could I hear all this DX at these frequencies? Quite simply because of the sun spot cycle being near its peak. There have been many other articles in many radio magazines explaining the vaguaries of our sun and its eleven-year sun spot cycle, so I don't intend to go into a full explanation here. Suffice it is to say that for two to three years either side of the sun spot cycle peak the F2 layer of the ionisphere becomes more highly ionised and generally speaking the higher the ionisation, the higher the Maximum Useable Frequency or m.u.f.

Over the past four winters, m.u.f.s have climbed to 51MHz or more, often for a week or more at a time, allowing reception of many world-wide utility signals on v.h.f. Depending on how quickly this cycle declines we may still have one or two winters of F2 propagation on v.h.f. Of course, all the other more familiar v.h.f. propagation modes will produce DX reception of some sort on the low v.h.f. bands.

Summertime Sporadic E, or Es, often brings in signal from much of Europe and occasionally North Africa and the Middle East. Tropospheric reception does occur on low v.h.f. but generally it is not as intense as high v.h.f., 144MHz for example, although I have received trop signals from France and Germany on low v.h.f.

MYSTERY SIGNALS

Some of the signal received are a real mystery due to the language problem, but with a little patience and detective work you can often locate the source of the signals. Radio procedure seems to be much the same the world over, listening to a radio net one morning in a totally incomprehensible (at least to me) language, I noted that all the stations were called by a name, rather than a number. Some of these names seemed vaguely familiar and given the time of day, the signals were more than likely coming from the Near of Middle East, so I made some notes, phonetically, of all the names and looked them up in the atlas. Many of these names correspond to town names like Turkey. For most listeners in the UK, signals from the USA and Canada will be the most interesting as they use English, or at least a form of it!

Many police services in the USA have channels on low v.h.f. and plenty of these channels are simplex. Once the m.u.f. is high enough and the propagation in the right direction, sections of the low v.h.f. spectrum can be crammed with police communications. Not just the base stations either, I have often heard the mobiles and on one occasion a policeman in New York involved in a chase could be heard, panting, into his hand-held! Knowing the locations of these police signals makes listening even more exciting. It takes a little bit of patience as obviously no one is going to announce their location on every communication, but the controllers often direct cars to addresses that include the area of a city, like the Bronx, in New York. As controllers or dispatchers as they are known over the water, often direct cars in 'hot pursuit' by road or highway numbers, it is useful to have an American atlas handy. Mine is the *Bartholomew Road Atlas America*, which includes Canada, the USA and Mexico along with major city maps that I bought from WH Smith. Using this I have twice followed car chases in New York state and Washington DC on the map.

Other signals from the Americans, heard by me or other UK scanning enthusiasts, include power utility controllers sending linemen, 'To an overhead cable break that had been made by squirrels chewing through the cable, again!', port workers involved in docking ships, ambulance dispatchers, railway track repairmen and outside broadcast links for TV news. Yet more signals from around the world include a police net in Pakistan, American workers in the Gulf who sounded as though they were involved in the operations to cap all the burning oil wells in Kuwait, military communi-cations from the USSR (as it were then), STLs from many countries and once, US forces somewhere in the Pacific.

DIFFERENT SIGNALS

Another type of signal often heard on low v.h.f. when conditions are right is harmonics from h.f. broadcast and utility. Many h.f. broadcasters use very high power transmitters, often hundreds or even thousand kilowatts, and while most h.f. broadcasters take great care to keep harmonic radiation from their transmitters to a minimum, some power is still radiated as harmonics. These harmonics could be in their tens or hundreds of watts range and easily propagated around the world when conditions are right.

Tracing the source of these signals is easy with a short wave receiver and a book such as the *World Radio TV Handbook*. Take note of the frequency of the monitored harmonic and start dividing - divide by two and check the resulting possible, fundamental frequency on the h.f. receiver, no luck? Divide by three and check again and so on until you find the real fundamental, check what service it is and refer to your *WRTH* and you will have the source of your signal. Many of the harmonics heard will be of broadcast stations but some will be from utility stations such as the Egyptian SUK16 c.w. station I heard on 34.38MHz, see **Table 1**. It would be an interesting exercise to see who could hear the highest multiple, 5th, 6th, 7th?

Equipment and antennas for this sort of reception need not be sophisticated. My present scanner is the Realistic PRO-2005. Multi-element beams for low v.h.f. are nice if you have the room for them and a deep pocket! All reception on the scanner,

including Australian TV video carriers, has been with loft mounted dipoles cut for 40 and 50MHz. To help you on your way I have included: **Table 1** - a selection of frequencies from my own database and **Table 2** - band plan for low v.h.f. in the USA.

USEFUL PUBLICATIONS

Monitoring Times (ISSN 0889 5341) published in the USA by Grove Enterprises, PO Box 98, 140 Dog Branch Road, Brasstown, NC 28902-0098, USA. Subscription rate $28.50 US Funds outside the USA. Covers everything from v.l.f. to Satellite TV including a comprehensive scanning column.

RCMA Journal, the magazine of the Radio Communications Monitoring Association. Address RCMA Inc., PO Box 542, Silverado, CA 92676, USA. Subscriptions for Europe are $28 surface mail and $54 airmail. Another excellent magazine with many columns including one on v.h.f. DXing.

Betty Bearcat Frequency Directory. This was published in two volumes covering the Western & Eastern half of the USA. The series has now been expanded to cover the USA in 12-16 volumes. These directories list thousands of USA frequencies in geographical and frequency order and cost $14.95 each in the USA. The only address I have is Uniden Parts Dept., 9340 Castelgate Drive, Indianapolis, IN 46256, USA (although it might be worth trying Uniden UK as a source).

Of course, don't forget our own *Short Wave Magazine!* ■

Table 1

Freq (MHz)	Mode	Service	Location
30.000	FM	US Military Link	Europe
30.040	FM	Trawlers	Canada
30.055	FM	Radiophones	Barbados
30.125	FM	Military	USSR/CIS
30.160	FM	Mobile phone	Quebec, Canada
30.475	FM	Security Service	El Savador
30.700	FM	Ocean drilling	Gulf of Mexico
31.060	FM	Jamaica bus depot	New York, USA
31.350	FM	Radio pager CHV	Uraguay
31.400	FM	?	Scandanavia
31.900	FM	OB link	Ontario, USA
32.200	?	Military	Italy
32.200	FM	Repeater	Iraq
32.870	FM	VIP Taxi service, call WAR315	Washington DC, USA
33.160	?	Guam cable TV Repeater	Agana, Guam
33.350	FM	Collective farms	Cuba
33.400	?	UN Forces	Cyprus
33.560	FM	Trumble Fire dept.	New England, USA
33.570	SSB	Scrambled	?
34.380	CW	Harmonic of SUK16 on 17.189MHz	Egypt
34.760	FM	Autobahn assistance	Germany
34.790	FM	Statue of Liberty, call KID703	New York, USA
35.220	FM	Radio Llamada paging, call AZ1229	Argentina
35.340	FM	US Forces	Middle East?
35.680	FM	Radio paging, call WNO364	USA
37.180	FM	Secret Service	USA
37.695	?	CB	Asia
37.800	FM	Police	South Africa
38.640	AM	BBC World Service harmonic	Cyprus
38.650	FM	Pakistan Police	Pakistan
39.250	FM	Power plant	NSW, Australia
39.460	FM	Highway Patrol	Kansas, USA
39.650	?	Pager	Amsterdam
40.469	?	Auroral research radar	Alaska
40.680	?	Industrial, Scientific & Medical (ISM)	World-wide
40.870	FM	NASA	USA
41.150	WBFM	STL for Radio Netherlands	Hilversum
41.150	FM	USMC Air Station	Hawaii
41.275	FM	WNBC TV OB Link	New York, USA
42.080	FM	Highway Patrol	S. Carolina, USA
42.480	FM	State Police	Michigan, USA
43.065	FM	STL for Radio Yerevan	USSR/CIS
43.650	FM	Fire dept.	Colon, Panama
43.290	?	Meteor scatter system for Transtrack	Marion, USA
44.040	FM	Telephones	Italy
45.300	FM	Telephone link	Japan
45.700	WBFM	STL for RCN	Columbia
45.785	FM	Telephone link	Asia
46.100	FM	Repeaters	Thailand
46.610	FM	Cordless phones	USA
46.750	FM	Presidential helicopter	USA
48.250	FM	RT link	Asia
48.500	WBFM	STL	Italy
48.600	FM	PMR	Australia
48.875	WBFM	STL	Italy
48.960	FM	Repeater	Cuba
49.200	FM	Telephones	Italy
49.410	FM	Hydro operations	Niagara Falls, USA
49.595	?	Digital MS System	Kentucky, USA
49.760	?	MARS US Army	Baltimore, USA
49.800	FM	National Guard	Rhode IS., USA
50.750	WBFM	STL	Italy
52.850	WBFM	STL	Italy
55.070	WBFM	STL	Japan
58.200	WBFM	STL	Italy

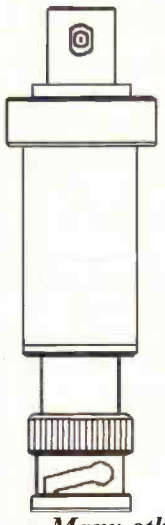
Table 2

Freq To Freq (MHz)	Services
30.580-30.640	Industrial
30.680-30.640	Forestry & business
30.700-33.380	Petroleum utilities
31.260-31.980	Industrial & forestry conservation
33.440-33.980	Fire departments
35.040-35.980	Industrial, business & telephone maintenance
37.040-37.400	Local police
37.100	Fire departments
37.100-37.260	Local goverment & police
37.460-37.860	Power utilities
37.920-37.960	Highway maintenance
39.020-39.960	Local police
39.100-39.980	Local goverment & police
42.020-42.940	State police
42.280	Fire departments
42.960-43.180	Industrial & business
43.700-44.600	Trucking
44.620-45.060	State police & forestry conservation
44.640-45.040	Forestry conservation
45.080-45.580	Local goverment
45.100-45.660	Local police
45.680-45.840	Highway maintenance
45.700-46.020	Local police, highway maint & special emergency
45.880-46.500	Fire departments
46.520-46.580	Local goverment
46.600-47.000	Goverment
47.020-47.400	Highway maintenance
47.440-47.680	Industrial
47.700-48.540	Power utilities
49.520-49.580	Industrial

Radio Communication Products from AOR

AR1500EX - The very compact AR1500EX hand-held wide range receiver offers all mode reception including **SSB** as standard. Newly designed printed circuit boards have been incorporated to ensure this new version offers the very best performance. Frequency range is 500 kHz ~ 1300 MHz without gaps (reduced sensitivity below approx 2MHz - all modes), **all mode** reception AM, FM(N), FM(W) & SSB (USB, LSB &CW - with BFO). The AR1500EX offers **full coverage** of the VHF, UHF and Shortwave Airbands plus Broadcast, Amateur band, Utility services etc. Many accessories included: NiCad pack, Charger, Dry battery case, DC lead, Soft case, Belt hook, DA900 VHF-UHF aerial, SW-wire aerial, Earphone, Comprehensive Operating manual... **Suggested Retail Price of £349.00 inc VAT. (UK Carriage free)**

AR2000 - this popular receiver continues and remains a firm favourite with listeners and enthusiasts.
There has to be a compromise in hand-held design when compared to base units such as the AR3000A receiver. However when compared to other wide range hand-held monitors on the market, the AR2000 provides the very best balance between sensitivity and strong signal handling. The AR2000 has a very wide frequency coverage from 500 kHz to 1300 MHz (1.3 GHz) with no gaps (reduced sensitivity below approx 2MHz - all modes). The modes available are AM (Amplitude Modulation), FM (Narrow Band Frequency Modulation - N.B.F.M.) and WFM (Wide Band Frequency Modulation). Any available mode may be selected at any frequency within the receiver's coverage. For your convenience the search banks have been preprogrammed at the factory to largely suit the UK band plan, this allows you to switch on the AR2000 and immediately enjoy hours of no fuss listening. Of course the AR2000 is supplied with an operating manual showing examples of programming etc. There are 1000 memories arranged in 10 banks of 100 channels, there are also 10 additional programmable search banks. Supplied with: High Capacity NiCad batteries, AC charger, DC lead, DA900 VHF-UHF aerial, soft case with carry strap, belt hook, earphone and operating manual.
Suggested Retail Price £309.00 inc VAT. (UK Carriage free)



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Note: Remember to remove the ABF125 from the aerial when monitoring signals other than VHF Airband or signal strength will be dramatically reduced.
Suggested Retail Price £24.50 inc VAT.
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AORSC is a powerful program for the IBM PC (and 100% compatible) computer, which allows you to control an AOR scanning receiver using a serial port (RS-232 interface) of the computer. Many facilities are offered to provide you with a high performance radio monitoring system. The software is priced at **£75.00 plus £2.00 P&P.** AORSC is supplied on both 3.5 & 5.25 inch media for installation onto a hard drive. A **DEMO disk** (without RS232 support) is available on a 3.5 inch disk for installation onto a hard drive,
Price is £3.00 *** **Windows software soon to be released** ***

ACEPAC3A For those with a larger budget, ACEPAC3A is also available for the AR3000A & AR3000 receivers. Installation is recommended on a hard drive but can be run from 3.5 or 5.25 inch floppies depending on machine compatibility. Features are similar to AORSC but ACEPAC3A has a more versatile spectrum graph type display. A descriptive leaflet is available to request. **Suggested Retail Price £139.00 plus £2.00 P&P**

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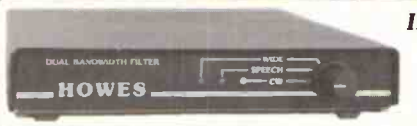

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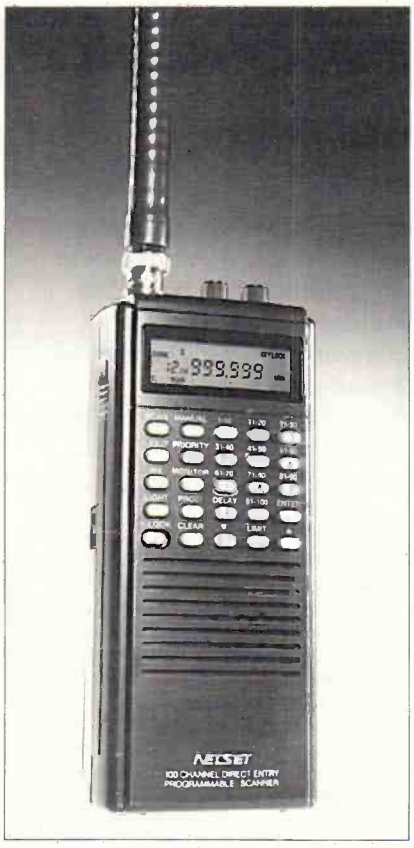
73 from Dave G4KQH, Technical Manager.

NETSET PRO-46

Hand-held scanners are always fun, but are they good performers? Here Mike Richards gives the low down on the PRO-46 from Netset.



The PRO-46 is a very smart, wide range, portable a.m./f.m. scanner that's ideally suited to a host of diferent monitoring requirements. From basic airband through to 'DianaGate' fans, the PRO-46's coverage is well planned. Powered by internal batteries and supplied with a neat 'rubber duck' antenna, it easily slips into a coat pocket. In addition to selective coverage from 66MHz through to 956MHz, the PRO-46 features automatic a.m. and f.m. switching. All this combined with the one hundred memory channels makes the PRO-46 an attractive receiver.

STARTING OUT

To help the operator get the best from the receiver it was supplied with a 27 page operating manual. This was well laid-out with good use of calculator style charts to lead the operator through the various key sequences. There was the usual trouble shooting section for when the thing just lies there beeping at you! The manual also listed the known 'birdies' or spurious signals. Knowing these can save a lot of frustration trying to identify bogus signals. It was interesting to note that there were just seven such 'birdies' quoted for the PRO-46.

General handling of the PRO-46 was very straightforward and required minimal use of the manual. The liquid crystal display featured all the important information and could be back-lit at the press of a button. This backlight remained on for around fifteen seconds before automatically turning off, which saves unneccesary battery drain. For those that want to use the PRO-46 as a base station, or maybe even mobile, there was provision to use an external power supply. The requirements were a very modest 9V d.c. at around 200mA, which could be supplied from a mains unit or a car battery adaptor. The only odd point about this was that it used a smaller than normal coaxial power socket.

The antenna connection was also well thought out with a good quality BNC socket on the top panel. This could be used either for the supplied 'rubber duck' or for an external antenna. If you use a good external antenna, it's as well to have some form of attenuation available. This is because the wide open front end of the PRO-46 can be prone to overload from strong local signals. However, in my experience, a little attenuation goes a long way to minimising the problem.

SCANNING AROUND

The main operating mode for this receiver is scanning, where it sequentially checks each memory channel for activity. The check, in this case, being for any signal that exceeds the manually set squelch threshold. The scanning rate appeared to be very rapid and was quoted at fourteen channels per second. Although the PRO-46 has a hundred memories, these were conveniently divided into ten banks of ten memories. This makes recall of the memory channels somewhat easier for the operator. You can use this system to group the memories according to the type of signal. As an example, an airband enthusiast could put all the local airport frequencies into one bank, whilst company frequencies may kept in another.

Selection of the appropriate banks to be included in the scan is done during scanning. Each of the numbered keys on the keypad has a memory range printed above it. All you do is press the appropriate memory band key to toggle it in or out of the scan, as appropriate. There's no limit to the number of banks that can be excluded or included. For further refinement of the scan, you could also lock-out individual memories.

When the PRO-46 detects a signal, the scan will pause for as long as the signal exceeds the squelch threshold. When the signals ends, the scan immediately re-starts. In order to cope with the gap between 'overs' in a simplex radio link, you can add a two second delay to any memory. This, fairly obviously, causes the scan to pause for two seconds after the signals disappears and is adequate to cope with most radio links. If you want to hold a memory for longer you just have to press MANUAL or turn the squelch control to minimum.

If you have a particularly important frequency you want to keep an eye on, you can use the PRIORITY feature. This provides automatic monitoring of memory one every two seconds. This happens regardless of the main mode selected. Needless to say, programming the PRO-46's memories was very simple.

COMPREHENSIVE SEARCH

Of course, having lots of scanner memories is all very well if you know all the local interesting frequencies. For us lesser mortals, the 'hot' frequencies first have to be found.

Although you can use a scanning guide or Alan Gardener's 'Scanning' column to get started, you will need to do some of your own searching. The PRO-46 is well set-up in this area and has a couple of interesting features to help find those elusive frequencies. The first is the **LIMIT** search mode. This enables the operator to start an intensive search between any two frequencies. The receiver automatically selects the appropriate mode and frequency steps. Once started, the PRO-46 continually sweeps between the upper and lower limits of the search, stopping only on signals that exceed the squelch threshold. The search speed of this mode was very fast with a claimed speed of ninteen steps per second.

As with the scaning mode, you can introduce a two second delay once a signal has been detected. To save you having to write down each useful frequency, the PRO-46 features a set of ten **MONITOR** memories. When the search stops on a signal, the number of the next available **MONITOR** memory will flash in the display. A single press of the **MONITOR** button then transfers the current frequency into that **MONITOR** memory. Once then search has finished, you can then review the **MONITOR** memories and transfer any interesting frequencies into the main memory system.

In addition to this **LIMIT** search, you could start a search from any of the main memory channels. This is done by pressing the **UP** or **DOWN** buttons whilst the required memory is selected. As this

CONTINUED ON PAGE 9

AOR 1500EX

COMPACT ALL-MODE HAND PORTABLE RECEIVER

As a relative newcomer to the world of short wave listening and scanning and someone who has just started, Radio Amateurs Course, Donna Vincent was a little apprehensive when asked to review the AOR-1500EX. But here's how she got on.

The AOR-1500EX is a hand-held, wide-range, monitor, featuring s.s.b. as standard, together with a.m., n.f.m. and w.f.m. modes. The 1500EX has a total of 1000 memories arranged in ten banks of 100 memories as well as an automatic memory feature to enable automatic storage of busy channels.

It comes complete with a single wide-band whip antenna, for v.h.f/u.h.f., an a.c. charger, internal NiCad rechargeable battery pack, dry battery case, 12V d.c. lead and a short wave wire antenna for use when receiving short wave broadcasts. There's also a soft carry case, belt hook, earphone and operating manual. You do have to supply your own plug for the charger.

FIRST IMPRESSIONS

My first impression of the AOR-1500EX (incidentally the EX stands for enhanced model for the UK market), was its solid, robust but reasonably compact size.

The controls and funtions are divided between the top and front panels. the top panel houses the **VOL** & **PWR** (volume and power) combined switch, **SQL** & **BFO** (squelch and b.f.o.), **DIAL** rotary tuning control, **LOCAL/DX** attenuator switch, **KEY LOCK** and **BFO** switches, together with the **EAR** (earphone) and **ANT** (antenna input socket).

The b.f.o. only functions when the receiver is in a.m. mode when the **BFO** switch is depressed and is used in conjunction with s.s.b. transmissions.

The front panel consists of a grid of 0-9 push-buttons as well as an **ENTER** and a dual purpose ° and **CLEAR** button. The other thirteen buttons are used for things such as changing modes, locking out certain frequencies, determining **STEP** size in multiples of 5kHz and programming. Also on the front panel are the **SEARCH** and **SCAN** buttons along with a rather useful **LIGHT** button which, when pressed, activates a light behind the l.c.d. I found this function especially useful when operating in bad light conditions.

SEARCHING

The 1500EX has nine pre-programmed serach banks covering all modes, upper and lower frequency limits. These are factory defaults, although it is possible to re-program these banks anywhere within the coverage range of 500kHz - 1300MHz.

Using the searching facility I found that, as a newcomer, the ability of being able to search through each of the banks very useful, although it does take rather a long time! When the receiver reaches a frequency that is active it automatically stops there until the channel becomes clear, unless the **HOLD** key has been activated.

It is also possible to manually tune the received frequency up and down using the rotary **DIAL** control by whatever tuning step has been previously programmed in.

If you only want to search specific banks this can be done by carrying out the following: **SEARCH**, **BANK**, **PROG** (No.), **LIMIT** (No.), **ENTER** (this is explained in the manual). This facility is particularly useful if you only want to listen to certain frequencies such as airband or marine.

You can store any interesting frequencies into the memory as you come across them when using the receiver in search mode.

SCANNING & MANUAL TUNING

If you want to use the receiver to listen to short bursts of communication, the 1500EX when in **SCAN** mode is capable of scanning a maximum of 20 channels per second. You can scan all 1000 memory channels apart from those that you have

MANUFACTURER'S SPECIFICATION

Receiver Coverage:		500kHz - 1300MHz
Receiving Modes:		a.m., f.m. (narrow) and s.s.b. with the b.f.o. switched on (u.s.b., l.s.b. & c.w.)
Number of memory channels:		900 plus 100 reserved for 'auto-memory' in bank 9 1000 total x (10 x 100)
Scan rate:		20 channels per second (approx)
Number of scan banks:		10 total. Bank 9 reserved for 'auto memory'
Scan delay time:		2 seconds (approx)
Search banks:		9 standard search banks plus one search bank for the automatic search pair of bank 9
Search rate:		Programmable in 5 & 12.5kHz steps to a maximum of 995kHz Search step size: (i.e. 5, 10, 12.5, 15, 20, 25, 50, etc.)
Priority channel (AUX):		Any one of the 1000 memories may be used as priority. Sampling is every 2 seconds (approx)
Receiver sensitivity:	f.m.	(narrow) 0.5µV or better for 12dB across most of the range
	a.m.	3.0µV or better for 10dB S/N across most of the range
	s.s.b.	1.5µV or better across most of the range
		Note: reduced sensitivity below approx 2MHz on all modes
BFO range:		Continuous -4 +6kHz (approx)
Antenna connection:		One 50ΩBNC socket on top case
Audio output:		>100mW @ 10% distortion
Power requirement		6V from built-in NiCad battery pack or 11 - 18V d.c. from CHG jack or 4 x AAA dry cells (dry case provided)
Power consumption:		100mA approx
Size:		55(w) x 152(h) x 400mm(d) approx excluding projections
Weight:		360g approx including NiCad pack
Display:		Liquid Crystal (l.c.d.) with switchable light for areas of low level lighting

locked-out. Specific banks can also be scanned using the program facility.

One thing that I found very helpful as newcomer was the fact that the 1500EX comes ready programmed. This meant that I was able to get stuck into listening straight away without having to program in any frequencies. This meant that I could discover if there were any frequencies that were of more interest to me that others.

Even though the 1500EX is supplied ready programmed you can manually tune the receiver via the keypad.

Using this feature you can enter any frequency, in any mode and alter the step tuning size as required.

OPERATING

Once I had finally got to grips with the operating procedure of the 1500EX I felt confident enough to put it to the test.

With the receiver in a.m. mode and by using the b.f.o. control I managed to listen to quite a few short wave stations including broadcasts from RFI and VOA Europe. These signals were vastly improved when I attached the short wave wire antenna instead of the standard whip antenna.

I also manged to receive signals closer to home. For example, I heard a couple of radio amateurs in Yeovil when I was using the receiver in n.f.m. mode. I was fascinated by the number of frequencies it was possible to receive and found listening to the airband and marine frequencies particularly interesting.

CRITICISMS

The only criticims I have of the AOR-1500EX are of the instruction manual and the **SEARCH** and **SCAN** buttons.

Even though thte manual works through the operating procedures in stages I fo und it a little difficult to understand. This meant that I had to read through the manual twice very carefully before I felt ready to begin using the receiver. However, I do not necessarily think that this a fault in the way the manual is written, it might just have been because I was a newcomer.

The **SEARCH** and **SCAN** buttons are printed in blue against the grey plastics casing which makes them difficult to see clearly especially in artificial light.

SUMMING-UP

I think the AOR-1500EX is an excellent little receiver and I throughly enjoyed being given the chance to use it. In fact I'm trying to persuade the Editor of *SWM* to let me hang onto it a bit longer!

With a retail price of £349 it may be a little too expensive for the enthusiast who's just starting out. However, with the wide range of facilities it offers, together with the sensitivity and versatility I think it's well worth every penny.

My thanks go to the Editor of *SWM* for introducing me to the fascinating world of scanning and short wave listening. Thanks also to **AOR (UK) Ltd., Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbyshire DE4 4BG. Tel: (0629) 825926** for the loan of the AOR-1500EX.

■

WHAT SCANNER

NETSET

PRO-46

CONTINUED FROM PAGE 7

search has no predefined limits, it continues up or down until the frequency limit of the receiver is reached. At this point, it cycles to the top or bottom limit of the frequency range and continues. The search direction can be reversed at any time by pressing the **UP** or **DOWN** buttons.

Whilst experimenting, I found an extra mode that was not referred to in the manual - direct frequency entry. This is particularly useful when you want to quickly try a specific frequency. Without the direct entry mode, you first have to program the frequency into a memory. The method I discovered was to fully open-up the squelch and key in the frequency followed by the **UP** or **DOWN** keys. This puts you into a direct search from the entered frequency. However, as the squelch is wide open, the receiver will remain on the entered frequency.

EXTENDED FEATURES

The power connections of the PRO-46 were very versatile and gave the operator a number of options. As mentioned earlier you could use internal batteries or an external d.c source. A particularly good point was it's ability to handle both NiCads and dry cells. When NiCads are being used, you can plug an external power source into the charge socket and so trickle charge the NiCads. All too often, you find that battery powered receivers don't really like the lower voltage provided by NiCads - the PRO-46 breaks that trend.

The PRO-46 also featured a recessed **KEYLOCK** button. As its name suggests, pressing this disabled the keypad and was a boon for true portable operation. There was also the commonly found **WX** key which initiated a search of the American weather report channels. The frequency range covered was 162.4 to 162.55MHz in 25kHz steps. Needless to say, this is of little value outside the USA.

PERFORMANCE

Throughout the review the PRO-46 showed it self to be a good performer. The audio quality was always very clean, especially on a.m. I was pleased to hear this, as many scanners seem to have particularly poor a.m. detectors. Whilst on review, I took the opportunity to make a few measurements. The low distortion was confirmed with measured results of 1.5% max. on f.m. and a very good 1% for a.m. The sensitivity was also well up to standard giving the following results for 12dB SINAD.

70MHz	0.18µV
127MHz	0.6µV
450MHz	0.5µV

As mentioned earlier, if these high sensitivities are combined with a good external antenna you may hit overload problems. The solution is normally achieved with the introduction of some attenuation in the antenna lead.

SUMMARY

The PRO-46 showed itself to be one of the better performers in the competitive portable scanner market. Its facilities were well organised and you don't have to keep referring to the manual to use it to the full. Overall then, a good receiver that is likely to appeal to a wide range of listeners. The current price is £199.99 from all Tandy outlets. My thanks to **Link Electronics, 216 Lincoln Road, Peterborough PE1 2NE. Tel: (0733) 345731** for the loan of the review model.

■

SPECIFICATION

Frequency Range:	66-88MHz 108-174MHz 406-512MHz 806-823.9375MHz 851-868.9375MHz 896.1125-956MHz
Sensitivity:	66-88MHz 0.5µV 108-136.975MHz 1.6µV 137-174MHz 0.7µV 406-512MHz 0.7µV 806-956MHz 0.8µV
Search Speed:	19 steps/channel
Scan Speed:	14 channels/second
Priority Sampling:	2 seconds
Delay Time:	2 seconds
IF Frequencies:	10.8MHz and 450kHz
Audio Power:	220mW max.
Built-in Speaker:	36mm 8Ω
Power Requirements:	4 AA batteries or -ve ground 9V d.c. adaptor
Dimensions:	151(H) x 66(W) x 37mm(D)
Weight:	220g

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VISITING YUPITERU ON THEIR OWN GROUND

Yupiteru are best known in the UK for high quality scanning receivers. However, on a recent visit to their headquarters in Tokyo, Mike Devereaux, MD of Nevada Communications, learnt that beside scanners, they manufacture telephones, radar detectors and audio visual equipment, all of which provided them with a staggering £146 million turnover in 1992/3.

The Yupiteru plant and engineering centre.

Final quality checks on an MVT-8000.

Yupiteru employ more than 500 people and recently completed the expansion of their plant and engineering centre in Okazaki City where the scanners are manufactured in almost laboratory conditions. The Production Plant resembles an operating theatre - they even wear white gloves! The company operates two other plants, one in Shenzhen, China with 1300 workers making telephones, the other in Penang, Malaysia where 350 workers make telephones and TVs, mainly for the Japanese and US markets.

Yupiteru sell their products in Japan and throughout the world, but it was interesting to note that the UK is their largest market in Europe for scanning receivers.

They first started producing scanners in 1984, shortly after Mr Kitamura, the current President, was appointed. He explained, "We put great emphasis on research and development to provide innovative products that we hope will shape the communications of tomorrow." He went on to add, "Technology is advancing so rapidly and being upgraded faster than ever, but we at Yupiteru never forget that however sophisticated we make our products they must be reliable and easy to use".

Certainly, it has been the reliability and ease of use that has made Yupiteru products so popular here in the UK.

Mike Devereux (centre) at the Yupiteru Head Office, Tokyo, with Managing Director Mr Ara (left) and Export Manager Mr Aoyagi (right).

LONG DAYS

On my two day visit, I was impressed with how hard the Japanese work. They are often still in the office at 8 or 9 o'clock in the evening.

From an early age, Japanese children are encouraged to study hard and most are expected to attend university. I was in Tokyo during the summer holidays, when many children would usually be at play. Not for the Japanese, however - this is an ideal time to send the children to summer school where they will cram for their school exams later in the year. The staff at Yupiteru headquarters were no exception - most of them had been to university prior to joining the company.

RUMOURS

Just before I concluded my visit, I asked Mr Aoyagi, Export Manager of the International Division, if the rumours of an MVT-8100 base version of the popular MVT-7100 scanner were true. He replied quite firmly, "We have no plans for any further scanner products at the moment", but then added, with a glint in his eye, "However, as a manufacturer of radio and telecommunications equipment, we have plans for new products in the near future".

Yupiteru are continually looking to the future and are certainly well informed of events in the UK market - as I left the headquarters I noticed several copies of *Short Wave Magazine* in the Export Office! ■

HAVE SCANNER, WILL TRAVEL

In a recent edition of Short Wave Magazine, *the Editor asked for people with experience of taking scanners abroad and for any hints, tips or problems that they'd experienced. Andrew Linney relates some of his experiences.*

I've been heavily into scanners for several years and travel a fair bit whenever I get the opportunity. I've taken a Fairmate HP-200E hand-held scanner on several excursions by various methods, i.e., plane and ferry. Up to now, I haven't had any trouble at all in getting the radio through customs in any of the places I've visited. Mainly I think, because to most people it looks like a mobile phone or posh radio. In fact, a trick that I generally employ is to set the scanner to Radio One or some other radio station in the normal v.h.f. broadcast band and lock the radio so that it can't be altered accidentally. Then, I turn the volume down as I get to the check-in gate. I usually trigger the metal detectors as I always carry a Swiss Army Knife in a pouch on my belt.

As a result of the Lockerbie Bombing, airport security now want to see radios working, so they must have batteries fitted - otherwise they can get really interested. If you put Radio One in or whatever, and as I say, lock it and turn the volume down, when you go through the gate, present them with the scanner and turn it up. Once they hear Steve Wright or whatever, they pop it through the X-ray machine and that's it. - you're through.

I went to the USA in January 1991 and the Gulf war had just started going flat out, so security at Heathrow was stricter than usual, with the Army tanks patrolling the surrounding approach roads and troops running around in the terminals as well as the normal Hunter/Delta armed patrols. I was sat for a good couple of hours listening merrily to various suspect packages and general activity until we checked in.

They paid particular interest to us as well, seeing as we had Arabic stamps on the passport from a Tunisian holiday a few years before, but the scanner went through, no problem.

If you take a scanner to the States then call into a Radio Shack (Tandy) over there and ask for a local listing. We were there on a fly-drive holiday in Florida and called in several as we toured and asked them for any information They gave us a photocopy of the local action from the Highway patrols to Coast Guard, Fire Department to the Secret Service! Also a good book to obtain from this shop is called *Police Call*. This covers the state you're in and neighbouring states and gives you the spot frequencies for every service you'll ever want to know. It also comes in useful in high sun spot activity when you're back home, as I've heard Police and Fire Departments from the States on 33 to 40MHz during these times. If the 28MHz band (10m) is open with American stations, then it's worth listening a bit higher up.

I've also taken the rig with me to Amsterdam on a couple of occasions, once by boat and once by plane. In fact, in Schipol airport in the arrival lounge they sell them and sweepers for bug detection. The only thing to listen to once you're in a non-English speaking country is the air band (unless you speak the local lingo of course).

The most unerving experience I've come across was at Tegel Airport in Berlin on the way out. On the way in was no problem, but coming out I was beginning to think it was a bad idea. When I was there it was just a year to the day, near enough after the wall had come down, so things were a bit more relaxed then in previous years, I think. The guard was showing more than a passing interest in it, but again, I'd got it tuned to the local radio station of the v.h.f. American Forces Radio Berlin, or something along those lines, and so got away with it. AFN Berlin was about the only thing worth listening to as such. I do speak a little German but unless your fluent in the host language than it's really a waste of time as they don't use tourist lingo in their normal comms. As in, they don't need a double room with a shower or a steak well done so to speak. Only the air bands use English in general.

In Berlin, I was there wandering around the old Russian section of the city with a high tech radio receiver capable of monitoring their traffic. Had it have been a couple of years earlier, I'd have left it at home. Otherwise, I'd probably be somewhere in Moscow or thereabouts as a special guest of the KGB. But that's the closest I've come to regretting taking it. So, basically, if your scanner has got w.b.f.m., tune it into a domestic station and lock it until you've got through customs. Just use your common sense and don't have their armed security or whatever blasting out of the radio as you go through.

I've taken mine through East Midlands, Manchester, Heathrow, John F. Kennedy, Orlando International, Schipol Amsterdam, Tegel Berlin airports and Dover, Calais, Hollyhead and Dun Loaghaire Ferry Ports.

Use your common sense in the use of the rig and you should have no trouble. Go up to the nearest Cop and tell him to turn his radio up as their comms are shouting at him and you'll get what you deserve!

Happy travels. ■

WHAT SCANNER

Compiled by Elaine Richards

Scanners are available from a wide range of sources, many advertisers in Short Wave Magazine *will be able to give you advice as well as technical help whilst you choose which radio is the one for you. I've drawn up a list of all the dealers who stock scanners that I could find, my apologies if I've left anyone out. It's often worth talking to your local radio dealer to see if he can supply the scanner you've been looking for, most are always pleased to help a customer. The following pages contain many of the most popular scanners, some now are only available on the second-hand market, but that doesn't mean that they are second best. I've tried to include as many scanners as possible, but as new models and makes seem to appear on the market monthly, there are bound to be some that have slipped the net. If you know of a good scanner that hasn't been included, please drop me a line so that it can be included in any future scanner studies. Prices were correct when the article was written, although those scanners only available on the second-hand have the 'when new' price shown.*

DEALERS

Avon

AMDAT, 4 Northville Road, Northville, Bristol BS7 0RG. Tel: (0272) 699352.

QSL Communications, Unit 6, Worle Industrial Centre, Coker Road, Worle, Weston-super-Mare BS22 0BX. Tel: (0934) 512757.

Bedfordshire

Welland Communications, 33 High Street, Bedford MK40 1RY. Tel: (0234) 364004.

Buckinghamshire

Communications Centre (Photo Acoustics Ltd.), 58 High Street, Newport Pagnell, Bucks MK16 8AQ. Tel: (0908) 610625.

Cambridgeshire

Link Electronics, 216 Lincoln Road, Peterborough PE1 2NE. Tel: (0733) 345731.

Cheshire

CB37, 15 Middlewich Street, Crewe CW1 4BS. Tel: (0270) 588440.

Flightdeck, 192 Wilmslow Road, Heald Green, Cheadle, Cheshire SK8 3BH. Tel: 061-499 9350.

Cornwall

Skywave, Slades Road, St. Austell, Cornwall PL25 4HG. Tel: (0726) 70220.

Derbyshire

AOR (UK) Ltd., Adam Bede High Tech Centre, Derby Road, Wirksworth, Derbyshire DE4 4BG. Tel: (0629) 825926.

Lowe Electronics Ltd., Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 580800.

Riley's TV Services Ltd., 125 Langwith Road, Hillstown, Chesterfield S44 6LX. Tel: (0246) 826578.

Devon

Reg Ward & Co Ltd., 1 Western Parade, West Street, Axminster, Devon EX13 5NY. Tel: (0297) 34918.

Essex

Waters & Stanton Electronics, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835.

Fife

Jaycee Electronics Ltd., 20 Woodside Way, Glenrothes, Fife, Scotland KY7 5DF. Tel: (0592) 756962.

Hampshire

Nevada Communications, 189 London Road, North End, Portsmouth, Hants PO2 9AE. Tel: (0705) 662145.

South Midlands Communications Ltd., SM House, School Close, Chandlers Ford Ind Est., Eastleigh, Hants SO5 3BY. Tel: (0703) 251549.

Hereford & Worcester

SRP Trading, Unit 20, Nash Works, Forge Lane, Nr Stourbridge, Worcs. Tel: (0562) 730672.

Ireland

Radcom Electronics, Midleton Enterprise Park, Midleton, County Cork. Tel: 021/632725.

Kent

Icom (UK) Ltd., Unit 8, Herne Bay West Industrial Estate, Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 741555.

The Flying Shop, Biggin Hill Airport, Westerham, Kent TN16 3BN. Tel: (0959) 576370.

Lancashire

Microgate Services Ltd., Metcom House, Bradley Lane, Standish, Wigan WN6 0XQ. Tel: (0257) 472866.

London

ARE Communications '92, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. Tel: 081-997 4476.

ASK Electronics Ltd., 248 Tottenham Court Road, London W1P 9AD. Tel: 071-637 0353.

Haydon Communications, 132 High Street, Edgware, London HA8 7EL. Tel: 081-951 5782.

Lee Electronics, 400 Edgware Road, London W2. Tel: 071-723 5521.

Martin Lynch, 286 Northfield Avenue, Ealing, London W5 4UB. Tel: 081-566 1120.

South Essex Communications Ltd., 191 Francis Road, Leyton, London E10 6NQ. Tel: 081-558 0854.

Norfolk

The Short Wave Centre Norwich, 95 Colindeep Lane, Sprowston, Norwich, Norfolk NR7 8EQ. Tel: (0603) 788281.

Nottinghamshire

Radio Amateur Supplies, 3 Farndon Green, Wollaton Park, Nottingham NG8 1DU. Tel: (0602) 280267.

Staffordshire

J.W. Staton & Sons Ltd., 15 Brunswick Street, Newcastle, Staffs. Tel: (0782) 616702.

Tyne & Wear

Supertech, 32 Russell Way, Gateshead Metro Centre NE11 9YZ. Tel: 091-493 2316.

West Midlands

Amateur Radio Communications, 38 Bridge Street, Earlstown, Newton-le-Willows, Merseyside WA12 9BA. Tel: (0925) 229881.

Aviation Hobby Centre, 1st Floor, Main Terminal Building, Birmingham International Airport, Birmingham B26 3QJ. Tel: 021-782 2112.

Castle Electronics, Unit 3, Baird House, Dudley Innovation Centre, Pensnett Trading Estate, Kingswinford, West Midlands DY6 8XZ. Tel: (0384) 298616.

Quantek Electronics, 3 Houldey Road, Birmingham B31 3HL. Tel: 021-411 1821.

SRP Radio Centre, 1686 Bristol Road South, Rednall, Birmingham B45 9TZ. Tel: 021-460 1581.

Yorkshire

Air Supply, 83B High Street, Yeadon, Leeds LS19 7TA. Tel: (0532) 509581.

Alan Hooker, 42 Nether Hall Road, Doncaster, South Yorkshire DN1 2PZ. Tel: (0302) 325690.

Javiation, Carlton Works, Carlton Street, Bradford, West Yorkshire BD7 1DA. Tel: (0274) 732146.

WHAT SCANNER

HAND-HELD SCANNERS UP TO £50

STEEPLETONE SAB-11 PORTABLE RADIO

Frequency Range: 108-135MHz
Modes: a.m., f.m.
Memories: n/a
Scan Speed: n/a
Search Speed: n/a
Features: Budget priced airband radio, receiver airband frequencies and normal f.m. and m.w. radio programmes. rotary controls, no l.c.d. readout.
Reviewed
Price: £14.95

STEEPLETONE SAB 9 MK II PORTABLE RADIO

Frequency Range: 108-175MHz
Modes: a.m., f.m.
Memories: n/a
Scan Speed: n/a
Search Speed: n/a
Features: Also receives national f.m., m.w. and l.w. stations, rotary control for normal tuning plus fine tune control.
Reviewed:
Price: £24.95

HAND-HELD SCANNERS UP TO £100

COMMTEL COM 102

Frequency Range: 66-88, 138-174, 380-450, 470-512MHz
Modes: f.m. **Memories:** 10
Scan Speed: 8 channels per second
Search Speed:
Features: Compact hand-held, liquid crystal display indicates channel, frequency and all other key modes
Reviewed:
Price: £99.95

REALISTIC PRO-38

Frequency Range: 68-88, 136-174, 406-512MHz
Modes: f.m.
Memories: 10
Scan Speed: 10 channels per second
Search Speed:
Comments: Reviewer said, "is a simple 10-channel device that has been optimised for simplicity of operation and portability.
Reviewed: *Short Wave Magazine* October 1988**
Price: £99.95

REALISTIC PRO-41

Frequency Range: 68-88, 137-174, 406-512MHz
Modes: f.m.
Memories: 10
Features: Direct keyboard access to frequencies, keyboard lock and audible low battery indicator.
Reviewed:
Price: £99.95

HAND-HELD SCANNERS UP TO £150

NETSET PRO-44

Frequency Range: 68-88, 108-136.975, 137-174, 380-512MHz.
Modes: f.m.
Memories: 50
Features: Keyboard access to frequencies, keyboard lockout and low battery indicator.
Price: £149.99

BEARCAT UBC-50XLT

Frequency Range: 66-88, 136-174, 406-512MHz
Modes: f.m. **Memories:** 10
Scan Speed: 10 channels per second
Features: A simple two-digit display provides both memory channel indication and frequency allocation by pressing a review button on the front panel, direct frequency entry.
Price: £109.95

HAND-HELD SCANNERS UP TO £200

NETSET PRO-46

Frequency Range: 68-88, 108-174, 406-512, 806-960MHz
Modes: f.m.
Memories: 100
Features: Keyboard access to frequencies, has monitor memories and frequency search.
Reviewed:
Price: £199.99

YUPITERU VT-125UK

Frequency Range: 108-142MHz
Modes: a.m.
Memories: 30
Scan Speed: 20 channels per second
Comments: Reviewer said, "A very attractive and capable air band receiver. Its small size is bound to make it very attractive to operators who like to listen on location".
Reviewed: *Short Wave Magazine* August 1991*
Price £169.00

RCV WIN-108

Frequency Range: 108-142.975MHz
Modes:
Memories: 20 (two banks of 10 channels)
Comments: Reviewer said, "Fiddly buttons for those with larger hands. the set shows the selectivity to have a pleasing value".
Reviewed: *Short Wave Magazine* December 1988**
Price: £175.00

YUPITERU VT-150

Frequency Range: 142-170MHz
Modes: f.m.
Memories: 30
Scan Speed: 20 channels per second
Search Speed: 20 steps per second
Comments: Reviewer said, "For the enthusiast who combines an interest in aviation with both amateur and marine band listening...is an ideal compliment to the other receivers in this range. In styling, sensitivity and audio quality this receiver is well worth every penny".
Reviewed: *Short Wave Magazine* March 1993*
Price: £189.00

UNIDEN BEARCAT UBC-100XLT

Frequency Range: 66-88, 118-174, 406-512MHz
Modes: f.m.
Memories: 100 (5 banks of 20 channels)
Scan Speed: 15 channels per second
Search Speed: 25 steps per second
Features: 30 minute memory back-up retaining all stored frequencies in the event of battery exhaustion, automatic selection of both step size and mode is accomplished by the microprocessor.
Price: £199.95

YUPITERU MVT-3100

Frequency Range: 143-162.025, 347.7125-452, 830-960MHz
Modes: f.m.
Memories: 100
Scan Speed: 30 channels per second
Search Speed: 40 steps per second
Features: Comes complete with a full range of accessories, including an UK charger
Price: £199.00

HAND-HELD SCANNERS UP TO £250

REALISTIC PRO-43

Frequency Range: 68-88, 118-174, 220-512, 806-999, 9875MHz
Modes: a.m., f.m.
Memories: 200
Scan Speed: up to 25 channels per second
Search Speed: up to 50 steps per second
Features: Direct keyboard access to frequencies, triple conversion receiver, memory back-up.
Price: £249.99

REALISTIC PRO-39

Frequency Range: 68-88, 108-174, 380-512, 806-960MHz
Modes: f.m. **Memories:** 200
Features: Keyboard access to frequencies, memory back-up circuit, hyperscan search and scan.
Price: £219.99

WHAT SCANNER

HAND-HELD SCANNERS UP TO £300

BLACK JAGUAR BJ200

Frequency Range: 26-29.995, 50-88, 115-178, 200-280, 360-520MHz
Modes: a.m., f.m. selectable
Memories: 16
Comments: Reviewer said, "The receiver is so easy to use that my initial reservations about its few facilities, e.g. only 16 memories and an inability to store band limits (unlike my base receiver) melted away when I realised just how easy it is to operate. It takes me longer to remember which number band I want to search on my base receiver than it does to program the Black Jaguar fresh each time!".
Reviewed: *Short Wave Magazine* November 1993*
Price: £239.00

COMMTEL COM203

Frequency Range: 68-88, 118-174, 380-450, 470-512, 806-960MHz
Modes: f.m.
Memories: 200
Scan Speed: 25 channels per second
Search Speed: up to 50 steps per second
Features: Built-in power save circuit, key lock switch to avoid accidental operation, easy-to-read l.c.d. with back lighting, direct frequency entry.
Reviewed:
Price: £213.00

COMMTEL COM204

Frequency Range: 68-88, 118-174, 220-512, 806-999.9875MHz
Modes: a.m., f.m.
Memories: 200
Scan Speed: 25 channels per second
Search Speed: 50 steps per second
Comments: Built-in power save circuit, band selection for a.m./f.m., back-lit l.c.d., triple conversion receiver.
Reviewed:
Price: £249.00

REALISTIC PRO-32A

Frequency Range: 68-88, 108-174, 380-512MHz
Modes: a.m., f.m.
Memories: 200 (10 banks or 20 channels)
Scan Speed: up to 8 channels per second
Search Speed: up to 8 steps per second
Comments: Reviewer said, "is a very compact portable scanner...and sophisticated scanning modes. Its neat lines conceal a lot of features".
Reviewed: *Short Wave Magazine* November '87**
Price: £249.95

UNIDEN BEARCAT UBC-200XLT

Frequency Range: 66-88, 136-144, 148-174, 420-450, 470-512MHz
Modes: f.m.
Memories: 200 (10 banks of 20 channels)
Scan Speed: 15 channels per second
Search Speed: 25 steps per second
Comments: Reviewer said, "Is a very good radio for somebody who is new to scanning. Although it does not cover as much of the frequency spectrum as other scanners, it is very easy to use program, and offers an almost ideal breakdown of memory channels, it is also very competitively priced".
Reviewed: *Short Wave Magazine* August 1993*
Price: £249.95

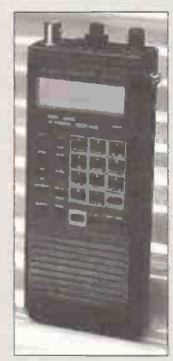
UNIDEN BEARCAT 100FB

Frequency Range: 66-88, 138-174, 406-512MHz
Modes: f.m.
Memories: 16
Scan Speed: 15 channels per second
Search Speed: 15 steps per second
Comments: Reviewer said, "for monitoring local activity it was ideal and also proved very useful during mobile microphone setting-up tests. Its scanning rate, being much faster than my amateur rig, became very useful whilst looking for contacts on either 144 or 432MHz bands."
Reviewed: *Practical Wireless* September 1989*
Price: £253

SONY AIR-7

Frequency Range: 150kHz-2.19MHz, 76-136, 144-174MHz
Modes: a.m., w.b.f.m., n.b.f.m.
Memories: 10
Comments: Reviewer said, "is very easy to use. The memory functions are not quite self-evident, but are readily understood fromthe operating instructions leaflet... has good sensitivity adn adequate selectivity on all bands".
Reviewed: *Practical Wireless* November 1986**
Price: £299

FAIRMATE HP-100E MKII



Frequency Range: 25-550MHz, 830MHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 1000 (10 banks of 100 channels)
Scan Speed: 20 channels per second
Comments: Reviewer said, "proved itself to be a very competent and easy-to-use little scanner. It's technical performance was well up to the standard one would expect from this type of reciver but the layout and features put it one step ahead of a lot of the competition.....highlight the provision of the rotary tuning control".
Reviewed: *Short Wave Magazine* February 1990*
Price: Approx £299

YUPITERU VT-225

Frequency Range: 108-142, 149.5-160, 222-391MHz
Modes: a.m., n.b.f.m.
Memories: 100 (10 banks of 10 channels)
Scan Speed: 20 channels per second
Search Speed: 20 steps per second
Comments: Reviewer said, "One final and pleasing aspect is the quality of sound reproduction. That, together with a well thought out list of feautres comparable with top flight equipment makes the scanner a pleasure to use".
Reviewed: *Short Wave Magazine* April 1992*
Price: £269.00

HAND-HELD SCANNERS OVER £300

SONY ICF-PRO80

Frequency Range: 150kHz-108MHz, 115.15-223MHz (with converter)
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.
Memories: 40
Comments: Reviewer said, "is a novel set, limited by its design and perhaps only moderate overall performance. It is aimed, perhaps, at the listener who wants more than either just short wave of v.h.f. scanning, but a combination of the two".
Reviewed: *Short Wave Magazine* March 1988**
Price: £350

YUPITERU MVT-7100

Frequency Range: 530kHz-1.65GHz
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.
Memories: 1000 (in 10 banks of 100)
Scan Speed: 30 channels per second
Search Speed: 30 steps per second
Comments: Reviewer said, "a superb receiver. It's very sensitive, has extremely wide-band coverage and is just the right size for a hand-held receiver."
Reviewed: *Short Wave Magazine* April 1993*
Price: £399.95

ALINCO DJ-X1D

Frequency Range:100kHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 100 (2 x banks of 40 plus 20 holding)
Comments: Reviewer said, "is packed with useful features designed to make like easy for the listener. Although its high sensitivity can be a boon when operating, you could have problems with external antennas if you don't use an attenuator".
Reviewed: *Short Wave Magazine* October 1992*
Price: £329

AOR AR-1500EX

Frequency Range: 500kHz-1.3GHz
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w.
Memories: 900 + 100 reserved for auto memory
Scan Speed: 20 channels per second
Search Speed: 20 steps per second
Comments: Reviewer said, "One thing that I found very helpful as newcomer was the fact that the 1500EX comes ready programmed. This meant that I was able to get stuck into listening straight away without having to program in any frequencies. This meant that I could discover if there were an frequencies that were of more interest to me that others".
Reviewed: *Short Wave Magazine* November '93*
Price: £349

YUPITERU MVT-7000

Frequency Range: 8MHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 200
Scan Speed: 16 channels per second
Search Speed: 20 steps per second
Comments: Reviewer said, "is a very attractive portable scanner with a fine overall performance. The attenuator was very effective, reducing spurii to a minimum. The audio quality was well adjusted for speech communications and there was plenty of output power for portable use".
Reviewed: *Short Wave Magazine* August 1991**
Price: £369.00

AOR AR-2000

Frequency Range: 500kHz-1.3MHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 1000 (in 10 banks of 100 channels)
Scan Speed: up to 20 channels per second
Search Speed: up to 40 steps per second
Features: Easy to operate, with factory preprogrammed search banks suitable for UK users. Has improved frequency stability and less unwanted harmonics, especially in the v.h.f. marine band.
Price: Approx £309

ICOM IC-R1

Frequency Range: 100kHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 100
Scan Speed: up to 20 channels per second
Search Speed: not stated
Comments: Reviewer said, "The buttons are very small and the rotary tuning knob is, of course, minute. The l.c.d. is small but is relatively easy to read and is very comprehensive".
Reviewed: *Practical Wireless* July 1990*
Price: £395

FAIRMATE HP-200

Frequency Range: 500kHz-1.3GHz
Modes: a.m., f.m., w.b.f.m.
Memories: 1000 (10 banks of 100 channels0
Scan Speed: 20 channels per second
Search Speed: less than 40 steps per second
Features: selectable 100dB attenuator, keypad or rotary tune controls **Price:** £309.00

MOBILE/BASE SCANNERS UP TO £150

UNIDEN BEARCAT UBC-142XL

Frequency Range: 66-88, 136-174, 406-512MHz
Modes: f.m.
Memories: 16
Scan Speed: 15 channels per second
Search Speed:
Comments: Reviewer said, "Is very easy to set up and use, though caution may be needed in computer environments. It is almost certainly aimed at the marine monitoring enthusiast, and its lightweight and low power consumption seem to make it ideally suited for a life on the waves".
Reviewed: *Short Wave Magazine* May 1993*
Price: £117.00

MOBILE/BASE SCANNERS UP TO £200

REVCO RS-3000

Frequency Range: 26-30, 68-88, 118-176, 380-512MHz
Modes: a.m., f.m.
Memories: 50
Comments: Reviewer said, "sensitivity of the test sample tallied pretty much with the quoted figures and these are roughtly what I would expect on a middle-of-the-road scanner. The strong point is the programmable mode. It has plenty of memory channels and some features that are only found on more expensive machines."
Reviewed: *Short Wave Magazine* June 1988**
Price: £199

WHAT
SCANNER

COBRA SR-925

Frequency Range: 29-54, 118-174, 406-512MHz
Modes: f.m.
Memories: 16
Comments: Reviewer said, "I found the scanner very easy to use... it doesn't have some of the more complex options available, but that didn't make it any less of a useful piece of equipment".
Reviewed: *Short Wave Magazine* April 1990*
Price: Approx £160

UNIDEN BEARCAT UBC-760XLT

Frequency Range: 66-88, 118-136, 138-174, 406-512, 806-952MHz
Modes: a.m., n.b.f.m..
Memories: 100 (5 banks of 20 channels)
Scan Speed: 15 channels per second
Search Speed: 15 steps per second
Features: Keyboard has been divided into two parts, PROGRAMME that allows you to command any frequency within its range on all 100 memory channels and OPERATION that controls scan. lockout, priority, delay, hold, the service searches as wellas the programmable search functions.
Reviewed:
Price: £199.00

UNIDEN BEARCAT UBC-175XL

Frequency Range: 66-88, 118-174, 406-512MHz
Modes: a.m., f.m.
Memories: 16
Scan Speed: up to 15 channels per second
Search Speed: up to 15 steps per second
Comments: Reviewer said, "attractive scanner that achieves welcome simplicity of operation without compromising the technical performance."
Reviewed: *Short Wave Magazine* December '87**
Price: £180

UNIDEN BEARCAT UBC855XLT

Frequency Range: 66-88, 108-174, 406-512, 806-956MHz
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.
Memories: 50
Features: Programming in either scan or search modes is made very easy with a simple-to-use keypad and large l.c.d.
Reviewed:
Price: £195.00

MOBILE/BASE SCANNERS UP TO £300

REALISTIC PRO-2021

Frequency Range: 68-88, 108-174, 380-512MHz
Modes: a.m., f.m.
Memories: 200
Scan Speed: up to 8 channels per second
Search Speed:
Comments: Reviewer said, "is a very capable scanner equipped with a good range of facilities, its strong points being the well organised 200 memories and the good audio quality".
Reviewed: *Short Wave Magazine* August 1988*
Price: £219.95

NETSET PRO-2032

Frequency Range: 66-88, 108-174, 380-512, 806-960MHz **Modes:** f.m.
Memories: 200 (10 banks of 20 channels)
Features: Direct keyboard access to frequencies, easy-to-read l.c.d., memory back-up
Price: £219.99

REALISTIC PRO-2006

Frequency Range: 25-520MHz, 760MHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 400 (in 10 banks of 40 channels)
Scan Speed: up to 26 channels per second
Comments: Reviewer said, " was a very smart and capable modern scanner. The facilities covered all the basic requirements with one or two useful extras. These faciltiies were also easy-to-use, makes it particularly attractive to the newcomer".
Reviewed: *Short Wave Magazine* February 1991*
Price: £299.95

NEVADA MS-1000

Frequency Range: 500kHz-600MHz, 800MHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 1000 (in 10 banks of 100 channels)
Scan Speed: 20 channels per second
Search Speed: 20 steps per second
Comments: Reviewer said, "a very compact easy-to-use scanner with a very respectable performance. It's equally at home both in the shack and in the car. The comprehensive range of memory storage options are worthy of note and should prove more than adequate for most operators".
Reviewed: *Short Wave Magazine* May 1991**
Price: £279.00

SIGNAL R-535

Frequency Range: 108-142.995 & 220-399.975MHz
Modes: a.m., f.m. **Memories:** 60
Features: An airband set that covers both v.h.f. and u.h.f. signals that can be computer controlled. Frequencies are selected by using four front panel buttons and then stored in the memories. Frequency as well as channel and operating mode information easily read on a green back-lit liquid crystal dot matrix display.
Price: £265.00

UNIDEN BEARCAT 800XLT

Frequency Range: 29-54, 118-174, 406-512, 806-912MHz
Modes: f.m. **Memories:** 40
Scan Speed: up to 15 channels per second
Search Speed: up to 15 channels per second
Comments: Reviewer said, "although featuring fairly basic scanner facilities, was actually a pleasure to use as everything worked so well. The very wide frequency coverage was also very welcome, but I will remember it for its excellent audio quality particularly on the air band."
Reviewed: *Short Wave Magazine* March 1989**
Price: £229

UNIDEN BEARCAT BC-950XLT

Frequency Range: 29-956MHz not continuous
Modes: a.m., f.m.
Memories: 100 (5 banks of 20 channels)
Comments: Reviewer said, "scanning facilities were well organised and if the service search was to be adapted for the UK it would be very popular indeed".
Reviewed: *Short Wave Magazine* July 1988**
Price: £229

WHAT SCANNER

MOBILE/BASE SCANNERS UP TO £500

REALISTIC PRO-2004

Frequency Range: 25-520MHz, 760MHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 300 (10 bansk of 30 channels)
Scan Speed: up to 16 channels per second
Search Speed: up to 16 steps per second
Comments: Reviewer said, "Neatly designed and built in a matt black plastics case, the sloping front panel carries the controls and display panel. The l.c.d. is clear and easily read and shows which channel and frequencies are being scanned, monitored or programmed, as well as the status of the channel and the operational mode of the receiver".
Reviewed: *Short Wave Magazine* April 1987**
Price: £330

AOR AR-2001

Frequency Range: 25-550MHz
Modes: a.m., n.b.f.m., w.b.f.m. **Memories:** 20
Scan Speed: 5 channels per second
Search Speed: 1MHz in 6 seconds
Comments: Reviwer said, "receiver sensitivity is good and even with its own telescopic antenna it compared well with dedicated portable rigs on the 144MHz band".
Reviewed: *Practical Wireless* May 1984**
Price: £325

JIL SX-200N

Frequency Range: 26-88, 108-180, 380-514MHz
Modes: a.m., f.m. **Memories:** 16
Scan Speed: up to 8 channels per second
Search Speed: up to 10 channels per second
Reviewed: *Practical Wireless* October 1981**
Price: £325

REALISTIC PRO-2005

Frequency Range: 25-520MHz, 760MHz-1.3GHz
Modes: n.b.f.m., w.b.f.m. **Memories:** 400
Scan Speed: up to 16 channels per second
Comments: Reviewer said, "represents an improvement over the previous model and its overall performance was very good for a scanner of this type....the sound squelch was particularly useful".
Reviewed: *Short Wave Magazine* September '89**
Price: £339.95

AOR AR-2800

Frequency Range: 500kHz-600MHz, 800MHz-1.3GHz
Modes: am., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w.
Memories: 100 (10 banks of 100 channels)
Scan Speed: up to 20 channels per second
Search Speed: up to 20 steps per second
Features: Keypad or rotary frequency control, internal battery for portable use. **Price:** £429.00

KENWOOD RZ-1

Frequency Range: 500kHz-905MHz
Modes: a.m., n.b.f.m., w.b.f.m. **Memories:** 100
Comments: Reviewer said, "is a very well thought out wideband scanning receiver. The memories can store not only the frequency and mode but also a seven character message".
Reviewed: *Short Wave Magazine* April 1988**
Price: Approx £459

YUPITERU MVT-8000

Frequency Range: 100kHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 200
Scan Speed:
Search Speed: up to 20 steps per second
Features: Frequency entry via a simple front panel keypad, metal case and liquid crystal display with backlight, keypad illumination for easy use.
Reviewed:
Price: £389.00

AOR AR-2002

Frequency Range: 25-550MHz, 800MHz-1.3GHz
Modes: am., n.b.f.m., w.b.f.m.
Memories: 20
Scan Speed: 5 channels per second
Search Speed: 1MHz in 6 seconds
Comments: No new scanners of this type are being made, so keep an eye open for some good bargains, Reviewer said, "There is a useful l.e.d. S-meter and a tuning knob for those who prefer this to UP and DOWN buttons."
Reviewed: Practical Wireless December 1985*
Price: £499.00

COMMTEL COM205

Frequency Range: 25-50MHz, 760MHz-1.3GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 400 (10 banks of 40 memories)
Features: Direct frequency entry, easy-to-read front panel display with electroluminescent back lighting with dimmer switch, 10dB attenuator switch.
Reviewed: **Price:** £344.00

MOBILE/BASE SCANNERS OVER £500

MOBILE/BASE SCANNERS OVER £500

ICOM IC-R7000HF
Frequency Range: 25-999.999MHz, 1.025-1.99999GHz
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.
Scan Speed: up to 7 channels per second
Comments: Reviewer said, "is clearly a very competent v.h.f./u.h.f. scanning receiver with the performance and handling to put it in a class of its own".
Reviewed: *Short Wave Magazine* December 1989**
Price: Approx £989

YAESU FRG-9600

Frequency Range: 60-905MHz (up to 460MHz for s.s.b.)
Modes: a.m.(wide), a.m. (narrow), l.s.b., u.s.b., n.b.f.m., w.b.f.m. **Memories:** 100
Features: An all-mode scanning receiver with computer control capabilities allowing operators to add virtually unlimited customised control functions in software. It has seven tuning/scanning rates.
Price: £625

ICOM IC-R9000

Frequency Range: 100kHz-2GHz
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w., f.s.k.
Memories: 1000
Comments: Reviewer said, "The large 5in c.r.t. display shows, apart from the frequency readout, memory lists, a dual clock, weekly and daily timers and an external video input. It can also be iused as a spectrum 'scope, displaying signals up to 100kHz from the receive frequency, with a sensitivity of approximately 1μV and a dynamic range of 60dB, or as a terminal monitor".
Reviewed: *Short Wave Magazine* April 1989**
Price: £4950.00

ICOM IC-R100

Frequency Range: 500kHz-1.8GHz
Modes: a.m., n.b.f.m., w.b.f.m.
Memories: 100
Features: 15dB pre-amp enhances weak signals in the 50-905MHz range, 20dB r.f. attenuator reduces excessively strong signals
Price: £629.00

ICOM IC-R7100

Frequency Range: 25MHz-2GHz
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m.
Memories: 900 (9 banks of 100 channels)
Features: rotary and direct keyboard entry are available for fine tuning , built-in clock, multiple scan functions, high sensitivity and reliable frequency stability. **Price:** £1395.00

YAESU FRG-100

Frequency Range: 50kHz-30MHz
Modes: a.m., l.s.b., u.s.b., c.w., f.m. (optional)
Memories: 50 (tuneable)
Comments: Reviewer said, "Can be very deceptive in that its wealth of unusual features are not obvious from a simple scan of the front panel....the more I used the receiver the more I grew to like it. I was particularly impressed with the main l.c.d., which proved extremely clear in all lighting conditions."
Reviewed: *Short Wave Magazine* April 1993*

AOR AR03000A

Frequency Range: 100kHz-2.036GHz
Modes: a.m., l.s.b., u.s.b., n.b.f.m., w.b.f.m., c.w.
Memories: 400 (4 banks of 100 channels)
Scan Speed: 50 channels per second
Search Speed: 50 steps per second
Comments: Reviewer said, "It's incredible how AOR have managed to fit so much into such a small case. A quick check in the lab showed the sensitivity of the set to be very good up to 1GHz."
Reviewed: *Short Wave Magazine* January 1990*
Price: Approx £949

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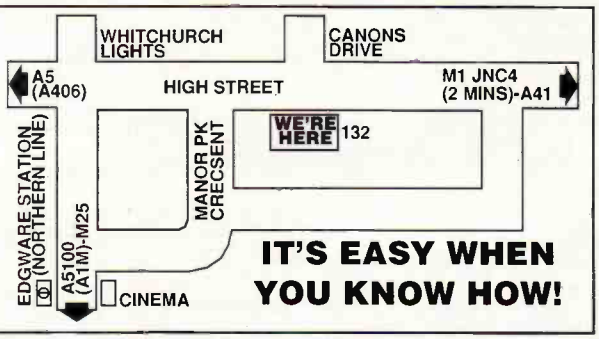

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