REVIEWED THIS MONTH
NEVADA MS1000 SCANNER

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UP THE AMAZON

A Journey From The Mouth To The Source
By Boat, Plane And Short Wave Radio

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★ BANDSCAN
★ SATELLITE TELEVISION
★ SSB UTILITY LISTENING
★ PROPAGATION

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New Models With Even More Facilities!

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* Receives AM - FM - Wideband FM
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Each set is supplied with:
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* UK spec. charger
* Three antennas - VHF, UHF, short wave telescopic
* Carrying case, belt clip, shoulder strap
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£269

**NEW Nevada MS1000 Mobile/Base Scanner**
An exciting new scanner with all the specifications of the HP200 above plus:
* Switchable audio squelch
* Tape recorder output socket
* Automatic tape recorder switching circuit switches tape recorder on when a signal is present
* All metal case for improved EMC compatibility

£279

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Send in £2 now for our LATEST CATALOGUE with full details of our complete product range (includes a £2 voucher).
Cover Mike Richards G4WNC tests the new Nevada MS-1000 scanner.

Twenty years ago Dick Moon voyaged up the Amazon. On page 20 he looks at the s.w. radio stations along the length of that river. Our cover picture shows a typical scene on the Amazon from the collection of Susan I. Cunningham ABIPP

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...GOOD LISTENING
Dear Dick

As promised at the Blackpool Rally, I am writing to clarify the position regarding the Novice Licence Training Scheme and c.w. I must confess to being somewhat surprised by the comments in your Editorial in the March issue of Short Wave Magazine.

It is unfortunate that no distinction was made in the RSGB video, between the requirements for the Novice Class A Licence and those for the Novice Class B Licence. The omission was not intentional and I am sure that responsible members of the amateur radio press such as yourself will ensure that the necessary clarification is made.

Novice Licence instructors will, in cooperation and consultation with the Training and Education Advisory Group, determine that students have successfully completed an approved training course. This course includes a c.w. experience which involves students in being made aware of c.w. operating skills over a year before they can get a Novice Licence. On top of that, an otherwise experienced and technically competent amateur will also have to pay an extra licence fee for the privilege of being insulted with a Novice callsign!

The reason given for this gross insult to Class Bs is that, as the RAE has no section covering practical operating, a Class B must prove his operating skills over a year before he can be granted a Class A Licence.

What a load of rubbish! If this is necessary, why can someone who has just passed the RAE take the 12w.p.m. Morse Test and immediately be granted a full Class A Licence? A Class B Licence holder is just as technically competent as a Class A - the only difference is the 12w.p.m. Morse Test. Is this another case of the RSGB trying to impose their ideas by the back door?

On a personal note, I do not object to the use of the 12w.p.m. Morse Test to gain access to the h.f. bands. In fact, I firmly believe that unless you have to work to gain a privilege then that privilege is not really worth having. A properly graded licensing structure, such as is current in the States, would be a very good thing for this country's amateurs and would not be that difficult to implement. If Class Bs must have 12 months operating experience before they can get a Novice Licence then a potential Class A should have to do the same before being granted a full Class A Licence.

SWM SERVICES

Subscriptions

Subscriptions are available at £19 per annum to UK addresses £21 in Europe and £22 overseas. Subscription copies are despatched by Accelerated Surface Post outside Europe. Airmail rates for overseas subscriptions can be quoted on request. Joint subscriptions to both Short Wave Magazine and Practical Wireless are available at £32 (UK) and £37 (overseas).

Components for SWM Projects

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

The printed circuit boards for SWM projects are available from the SWM PCB Service.

Back Numbers and Binders

Limited stocks of most issues of SWM for the past five years are available at £1.50 each including P&P to addresses at home and overseas (by surface mail).

Binders, each taking one volume of the new style SWM, are available at a price £4.50 plus £1 P&P for one binder, £2 P&P for two or more, UK or overseas. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate.

Orders for p.c.b.s, back numbers, binders and items from our Book service should be sent to PW Publishing Ltd., FREEPOST, Post Sales Department, Enelco House, The Quay, Poole, Dorset BH15 1PP, with details of your credit card or a cheque or postal order payable to PW Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in sterling.

Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Poole (0202) 665524. An answering machine will accept your order out of office hours.

It has now been officially confirmed that Morse is not a requirement for the granting of a Class B Novice Licence. As you will see from the letter below, written by David Jackson G4HYY, Chairman, Training & Educational Advisory Group of the RSGB, the video is misleading - although as far as I understand there are no plans to correct the sound track - the Society are relying on statements in the Novice Handbook to put the record straight!

However, an Information Sheet about to be released reveals the arrangements for existing holders of Amateur Radio Licences to be granted a Novice Licence. Obviously if you hold an Amateur Radio Licence (A) you have already passed a Morse Test to a higher standard than that demanded for an Amateur Radio (Novice) Licence (A) and you already have access to the frequencies allocated to the Class A Novices. What is very disturbing, though, is the ruling that for a full Class B licence holder to obtain a Class A Novice Licence requires that not only must they pass the 5-word per minute Morse test but that they must have held a Class B Licence for 12 months before they can be granted a Novice Licence. On top of that, an otherwise experienced and technically competent amateur will also have to pay an extra licence fee for the privilege of being insulted with a Novice callsign!

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D JACKSON G4HYY
CHAIRMAN, RSGB TRAINING AND EDUCATION ADVISORY GROUP.
Dear Sir
I first took an interest in s.w.l. in the 1930s. Then during the war I was for six years a Wireless Operator in the Royal Signals. Subsequently other pressures prevented me from returning to s.w.l. until 1980 when I temporarily 'retired'. This phase lasted for about a year during which I was listening on a Russian-made Vega Spidola costing about £35 with a 1m whip antenna. Even with this simple equipment I pulled in such stations as Radio Grenada, RAE Buenos Aires, Radio Tashkent, Radio Afghanistan, etc.

I am now, at the age of 70, thinking of returning to the hobby. I do not have television, which is boring and in any case a passive 'hobby'. I listen to Radio 4 but many of their programmes are repeats. With s.w.l. one is exploring new horizons and there is great pleasure in receiving QSL cards.

I recently purchased a copy of some of your magazines to find out what sets are currently available and I noted that prices range from around £100 to over £1000 with specifications to match. The top end of the market is well beyond my purse and although I could possibly go up to £500, do I really need to? The features I require from a set are sensitivity and selectivity; manual tuning with a good bandspread; a frequency range of approx 1.6-30MHz; RT and c.w. reception; i.c.d. frequency display and the facility to record transmissions. I am not concerned to have scanning or memory facilities. I am quite happy to search the wavebands manually and even if I cannot capture as many stations as those with electronic aids at least I get the pleasure of doing the job myself. And what would I do with the time I might save by going electronic?

Having set out my requirements and thereby disclosed myself to be a bit of a Luddite may I ask you, or any of your readers, to be kind enough to offer me any advice to help me choose the right equipment.

H G STACEY
BROMLEY
KENT

Dear Sir
I have just read with great interest the article in the February edition concerning the Pye radio.

I am afraid that I cannot agree with all the points made by G2BZQ concerning 'table-top' radios and today's portable transistorised radios is size.

The old type were very much larger, using as a result a larger speaker in a roomy cabinet. This resulted in a much smoother, but boomy, sound. Almost any decent transistorised radio connected to a similar system would produce the same sound.

I do not wish to enter any argument regarding valved and transistorised equipment, each has its own function to perform. Valved radios, by the nature of their electronic emission, generate considerable heat. The emissions of the valves are continually being reduced, are more susceptible to mains interference, hum, and are less efficient on high frequencies than transistors. However, collect valved radios and still use them, but this is not the reason for my writing in.

I was recently asked to get back into working condition a Pye 1101. This is a slightly earlier model than that described by G2BZQ. Being a universal AC/DC receiver it employed a large 'mains dropper'. The valves are wired in series being UCH42, UF41, UL41, UY41 and a dial lamp. Being in series they must all have the same valve current, i.e. 0.1 amps. The sum of their heater and dial lamp voltages is 133 volts. This means that with a 240 volt mains supply then 107 volts at 0.1 amps must be dissipated. This requires a 1070Ω resistor with at least a capacity of 10 watts.

From all this it may be apparent that the 'mains dropper' had blown. On AC/DC systems this was a very common occurrence. For a radio of this age it would be almost impossible to obtain a similar or correct replacement. I decided to use some 'new' technology from valved televisions. They also, to reduce the cost of large and heavy mains transformers, ran the valves on half wave d.c. From alternating current theory it can be shown that the heating effect is approximately 70% of a.c. This means that the voltage to the valves must be increased in proportion. The 133 volts required is now 133×0.7, i.e. 190 volts. The amount to be 'dropped' is now 240-190, i.e. 50 volts. The value of the required resistor is now 5000Ω at 5 W. This was more readily obtainable and for good measure I included a thermistor in the heater chain. As a result the radio 'sprang' into life and has been working well ever since.

A MOULDER
RAINHAM, ESSEX

Dear Sir
Filmgoers will recall Citizen Kane at the end of his life mumuring 'Rosebud' which referred to a childhood toboggan. Probably most of us who are getting on in years have a 'Rosebud' of one kind or another. Mine is the rather less euphorious 'Fred Eisemann', which was a small mains m.w./f.m. wireless bought in the early 40s. It cost £3:17s:6d old money, had three or four valves, and was amazingly powerful for its size. Of American origin, it was designed to work off 110 volts, but the mains heater and dial lamp voltages are proportion. The 133 volts required is now 133×0.7, i.e. 190 volts. The amount to be 'dropped' is now 240-190, i.e. 50 volts. The value of the required resistor is now 5000Ω at 5 W. This was more readily obtainable and for good measure I included a thermistor in the heater chain. As a result the radio 'sprang' into life and has been working well ever since.

END on a slightly different matter: a 'Walkman' radio 1938 vintage was made by Marconi. I had one, and it was the size of an average novel, used miniature valves and drove a pair of headphones (mono of course). It whistled a lot but worked well.

MICHAEL CORNELL
MANNINGTREE
ESSEX

Letters
**Short Wave Magazine**

**April 27/28:** The RSGB will be holding their National Amateur Radio Show at the National Exhibition Centre, Birmingham.

**May 12:** The Yearly OPP Convention will be held at the Preston Centre, Monks Dale, Yeovil. Admission is £1.50 and includes a programme. All the usual traders will be there. Refreshments are also available. There will be four lectures during the day.

**Railway Rallies:**

- **Midland ARS** Drayton Rally. Peter G6DRN. Tel: 021-443 1189.
- **May 17:** The Parkanah Rally will be held at the Silverwood Hotel, Lurgan, Co. Armagh. Doors open at 10:30am, trade stands, grand stand and breakfast, bar, Repeater Group, etc.
- **May 26:** The 15th Annual East Suffolk Rallies. Wellington Arms, 28th - RF Measurements, Jim G3WV (0454) 850410. 7th - The Way Ahead by R.E.J. Seymour. 22nd - Construction & You? Calculating QRA/QTH/NGR, etc.
- **Southdown ARS:** 1st & 3rd Mondays. £1.50 entry. Chatsley House for Disabled Ex-Servicemen, Southciff, Bosley Road, Eastbourne.

**Club Secretaries:**

Send all details of your club’s up-and-coming events to: ‘Grassroots’, Lorna Mower Short Wave Magazine, Enefo House, The Quay, Poole, Dorset BH15 1PP

**Sutton & Cheam RS:** 3rd Thursdays, 7.30. Downs Tennis Club, Holland Ave, Sutton. May 1, 20th - Natter Night, May 21 - Club Quiz with Coulsdon Youth Night.

**Bedford & District ARC:** 1st & 3rd Thursdays. 7.30pm. Bedford's Antiques Centre, St. John's Avenue, Bedford. April 26 - Social, May 23rd - Natter Night - 9th Night on the Air with G3LTH, 16th - Alignment Night with G3LTA. Kathy Bradford. (0242) 476222.

**Lahenhead & DARC:** 1st & 3rd Thursdays. 7.30pm. The Orwell Hotel Lodge Hotel, Polworth Terrace, Ipswich. May 8 - Safety & the Amateur, Construction Competition & DF Tune-Up, 22nd - DF Hunt. P.J. Dick GM4DTH, QTHR.

**North Devon ARC:** 3rd Wednesdays, 7.30pm. St. Andrews Church Hall, Herbert Road, Barnstaple. April 24 - Youth Night, May 1 - Early Bird by Rick Watts.

**Three Counties ARC:** 1st & 3rd Mondays. £1.50 entry. High Tech Industrial Locations in the Three Counties by R.E.J. Seymour, 22nd - Construction Night, Dave G4AVC.
Amateur Radio Video

Those who’d like to know more about amateur radio will be pleased to hear that a new video has just been released. The video is called Amateur Radio for Beginners and has been distributed to most amateur radio clubs. If you haven’t received a copy myself and can report that it’s a very professional production that covers the subject well. The presenter is Jim Bacon (the Anglia Weather Man), who’s also a licensed amateur with the callsign G3YLA. As the tape was sponsored and produced by Yorkshire Television, the quality is excellent. The manufacture of the video tapes has been sponsored by Icom (UK) - one of the major importers of amateur radio gear.

The video covers the whole sphere of amateur radio from the simplest of modes right through to satellite communications. It also features many young amateurs, some with radio stations at school!

If you’d like to copy the video, try the local amateur radio club - they should be able to arrange a viewing. An alternative would be to get your teacher and see if he or she can arrange to borrow a copy from a local club. If you’d like your own copy, you need to send a donation of £10.00 minimum to the RSGB Project YEAR fund. The address for this or other amateur radio enquiries is: Radio Society of Great Britain, Lambda House, Cranbourne Road, Potters Bar, Herts EN6 3JE.

Antenna Contest Results

I had a very good response to the active antenna competition in the March issue. Deciding the winners was really difficult as everyone made a very good effort. In the end, the two best reasons for wanting an antenna connection. The attraction is that it’s cheap and very easy to connect-up. In spite of its simplicity and cheapness, it’s a good, general-purpose plug for receiving and can be reliably used up to u.h.f. - indeed u.h.f. television is where you will most commonly find it. Probably its greatest weakness is that it is not really suitable for frequent insertion and removal.

For a better quality r.f. connector that’s good enough for test equipment, the BNC is a good choice. Most of the more common versions are made for use with good quality 6.3mm diameter coaxial cables. One of this plug’s main advantages is that it offers a constant impedance. This technical term, in effect, means that the plug exactly matches the size of the cable screen and inner core. The result is that the signal loss through the plug is extremely low, right up to 1.300GHz - a GHz (gigahertz) is 1000 MHz. Because of this the BNC plug is ideal for use with scanner antennas.

Like the BNC plug, the N-type connector is a constant impedance type so can be used at extremely high frequencies. The main difference between the two is that the N-type can handle higher power signals. This makes it a popular choice for v.h.f. and u.h.f. transmitters.

The next plug I want to look at is the 5-pin DIN plug. Probably the first thing I wanted to explain is the word DIN. This isn’t a loud noise, but the initial letters of the German standards institute - like our British Standards Institute (BSI). You’ll find the 5-pin DIN plug used for audio connections on many hi-fi units and most portable radios. The main use is for the connection to an external tape recorder. Because this plug is just one part of a German standard, there are standardised ways of connecting the plug. This means that, say, a tape recorder plug for one system will normally work on a different system - obviously very useful.

One odd point to note about this plug is the way the pins are numbered. If you look at the back of the plug the pins number from left to right as 1, 2, 3. However, when a 5-pin type was needed, two extra pins were inserted in the gaps - these were numbered 4 and 5. So, you see, the system is logical after all!

The last two plugs this month are the 3.5mm jack and the phone plug. The 3.5mm jack plug was developed from its big brother the 6.3mm of 14pin jack. This provides a two-wire connection with the signal normally connected to the tip and ground to the sleeve. The most common use is for connecting an external speaker to your receiver.

Plugs and Sockets

I'm sure many of you have wondered why there are so many different types of plugs and sockets. I hope I can shed a little light on the use of some more common types. Over the next few months, I'll also give details on how to connect-up some of these plugs and sockets.

Let's start with the common Belling-Lee coaxial plug. This plug is often just known as a TV plug because this is where it's most commonly used. Almost every television on the market uses this plug for the antenna connection. The attraction is that it's cheap and very easy to connect-up. In spite of its simplicity and cheapness, it's a good, general-purpose plug for receiving and can be reliably used up to u.h.f. - indeed u.h.f. television is where you will most commonly find it. Probably its greatest weakness is that it is not really suitable for frequent insertion and removal.

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Scanners Contest

This month I'm giving away three autographed copies of Scanners by Peter Rouse. This excellent book is a must for all scanning enthusiasts, so it’s well worth winning. To enter you need to be aged between 6 and 16 and answer the following questions: In electronic circuit diagrams what symbols are used for the following components?

1: Resistor. 2: Capacitor. 3: Inductor. 4: Diode. 5: Battery.

Please make sure you send your entries to me by May 22. Remember to include your name, address and age - good luck.
Changes at BARTG

The British Amateur Radio Teledata Group (BARTG) have announced that John Barber G4SKA has taken up the post of Chairman. John is a well-known RTTY contesting and has been on the BARTG Committee as Contests Manager for several years. They are also pleased to welcome Ted Batts G8LWY back onto the Committee after an absence of several years. Ted will bring his considerable packet expertise to the Committee. He was one of the first packet operators and currently runs GB3KP and is editor of the RSGB’s Connect International.

Frequency Changes

Radio New Zealand are changing their frequency schedule from 18000TC on May 12.

<table>
<thead>
<tr>
<th>Time</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>1800-2200</td>
<td>13.785MHz</td>
</tr>
<tr>
<td>2200-0730</td>
<td>17.770MHz</td>
</tr>
<tr>
<td>0730-1210</td>
<td>9.700MHz</td>
</tr>
</tbody>
</table>

Radio New Zealand International, Broadcasting House, Bowen Street, PO Box 2092, Wellington, New Zealand.

The NRD535

The NRD535 is the latest receiver to come from the JVC stable. Bernie, from ARE Communications, kindly sent me all the information on the preliminary draft specification for the set.

The frequency range is 100kHz to 30MHz with the reception modes being RTTY, c.w., s.s.b. (u.s.b., I.s.b.), a.m., f.m. and FAX. It has 200 memory channels (as has the NRD525), but the tuning steps are 1, 10 and 100Hz - ideal for fine tuning.

There are three i.f. stages, 70.455MHz, 455 and 97kHz. Its sensitivity ranges from 6 to 24dBµ, with the image rejection at 70dB or better.

For more details on the NRD535 h.f. receiver, contact: ARE Communications, 6 Royal Parade, Hanger Lane, Ealing, London W5A 1ET. Tel: 081-997 4476.

DXTV News

The ORF Austrian TV have now commenced stereo sound transmissions in the Vienna region using the 2-subcarrier system as favoured by West Germany. This system allows for stereo sound, 2-channel mono or dual language mono capabilities and it is intended that the whole country will be covered by mid-1992. The Belgium BRT-TV2 are currently transmitting NICAM stereo only over Egem Ch.E46 and Schoten Ch.E62 - Brussels Ch.E25 is the next to be converted for June and followed closely by Oostvleteren. When the test card indicates stereo sound, the BRT Radio 3 stereo programme is used.

Both Kenya and Uganda are planning improvements to their broadcasting services, Kenya is to install five new regional radio transmitters to improve reception ‘in the sticks’ whilst Uganda is to increase the power of their main Kampala transmitter in the capital from 50 to 100kW. Television programming is also being extended.

The Irish TV3 commercial channel hopes to go on-air at some time during 1991 though not the full service until late 92/early 93. Though the government had initially sought microwave distribution only (MMDS), TV3 have now gained access to u.h.f., which will mean a large viewing audience and a more assured commercial viability. Meantime New Zealand’s TV3, which has been suffering difficulties, has now been restructured and hopes to improve its programme performance and viewing figures. The channel nearly closed down when faced with aggressive competition from the other established New Zealand broadcasting networks.

The Czechoslovakian OK3 network is to be privatised and several international groups are interested in bidding for the network to gain a foothold into the Eastern European broadcasting field. There’s a new (and first) private TV network operating in Santiago, Chile. The main Ch.A9 station opened last Autumn under the ‘RED Televisa Megavision SA’ name and comprises a network of 21 transmitters, purchased from the second chain of the state broadcaster ‘Televison Nacional de Chile’.

Roger Bunney

GB5OATC Award

This award has been established to commemorate the Golden Jubilee Year of the Air Training Corps. To qualify for the GB5OATC award you need to supply a certified log extract of working, or hearing for s.w.l.s, six ATC stations.

The following details must be given for each QSO being submitted: date, time, frequency, ATC Squadron number and/or location.

The Award will cost you £1.22 (including P&P), which should be sent to: Ray Degg GOJOD, 42 Hawthorn Road, Cherry Willingham, Lincoln LN3 4JR.

Roger Bunney

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Roger Bunney
Further help is provided by 'Scratchboard', a workpad that allows designs to be quickly sketched for permanent record, while 'Matchboard' is a pre-drilled p.c.b. for producing a finished circuit.

While stocks last, Global are supplying free 'Scratchboards' and 'Matchboards' with all orders for their Experimenter 300 Breadboard.

A full range of breadboards is readily available and offers: no solder spill, dry joints or burns, quick cost effective development and testing, component lead sizes from 20 to 26s.w.g and standard 22s.w.g hook-up wire, plug-in 8 to 40-pin d.i.p. packages, including microprocessor, common and bussed tie-points for component leads and power connections.

The Experimenter 300 costs £5.95 excluding VAT.

Global Specialties, Rackery Lane, Llay, Wrexham, Clwyd LL12 0PB. Tel: (0978) 853920.


tuned in to Success

John Beaumont G3NGD (author of the series 'Educational Software for Basic Electronics') was taken by surprise recently when his students from last year's Radio Amateurs' Course presented him with a Trophy. This was to celebrate the 100% pass rate achieved by his students at North Trafford College. Many of the radio amateurs were complete beginners, which makes the 100% pass rate, many with credit and distinction, all the more impressive.

John introduced the RAE course at the college in 1977 and, to date, over a thousand people have been successful. The callsign of the college radio station is G4FXP and is active on both h.f. and v.h.f.

The photograph shows, l-r, Catherine Schofield, Jim Barton, John Beaumont and John Laughton.

The students are presently studying for the Morse Test so that they can apply for their A licences.

International Short Wave League

Mrs Evelyn May G1OFC, ISWL HQ, 10 Clyde Crescent, Wharton, Winsford, Cheshire CW7 5EA is the new Hon. Secretary of the International Short Wave League.

She will be pleased to hear from any short wave or broadcast band listeners and licensed amateurs seeking information on the League and their very efficient QSL Bureau.

The League also has a new Hon. Treasurer looking after the books - Peter Rayer ISWL G1ZLP, 6 Firbank Road, Charlminster, Bournemouth, Dorset BH19 1EL.

Satellite Newsletter

As much as we try, several weeks pass between information being written and the material actually appearing in print in these pages. David Thorpe is now producing an A4 format newsletter currently appearing on an approximate fortnightly basis with updated news and transponder sightings.

Available on a subscription basis within the UK (and overseas pro-rata), a sample copy is available from PO Box 112, Crewe, CW2 7DS, send a cheque or PO for £1.65 or, if island in time, their new club call GDPEP.

As well as having working displays of the popular gear, they will be showing all those accessories that they never have space to advertise. For those with any goods to sell there will be a Bring & Buy Stand. They will also be taking the opportunity to off-load some relics from their service department 'graveyard' that have accrued over the last few years. A great chance to purchase a 'dead body' at silly prices! But - first come, first served. For those that are interested in new equipment, there will be very special discounts to celebrate the new premises.

Free refreshments all day and a raffle drawn at 3pm.
When you are ready to graduate to real listening

Look to Lowe

The NRD-535. JRC do it again.

JRC have triumphed again with the introduction of their new NRD-535. Latest in the line of NRD receivers, the NRD-535 represents a true step forward in features, performance, and facilities for the dedicated listening enthusiast.

Apart from looking quite stunning in appearance, the NRD-535 is equally impressive in use. The smooth tuning is the first thing you notice and JRC have developed a direct digital synthesiser (DDS) system which tunes in 1Hz steps. This means that you simply cannot tell that you are tuning a synthesised radio except for the fact that the accuracy and stability are of laboratory standard. Whatever the frequency readout says, you can believe; and what's more the readout itself is absolutely brilliant in its clarity. There is of course the front panel keypad for swift frequency setting, so you can browse around with the tuning knob or go direct to frequency if you wish.

All mode reception covers AM, USB, LSB, CW, FM, RTTY, and even FAX, and there are IF filter bandwidths to suit the modes. Using the same range of accessory filters as the NRD-525 means that if you want to trade-up you can keep your existing filters and transfer them to your new 535.

When it comes to wi nkle out the weak stations from the noise, the NRD-535 excels. Pass band shift is provided so that you can slide the IF filter around the signal so as to eliminate the adjacent interference, whilst a totally new notch system gives tunable rejection with a 40dB notch depth, 10dB better than even the legendary NRD-525. Both of these features are included in the standard spec. but if you want to have full control over IF bandwidth, a Bandwidth Control board is available as an option.

For the keen broadcast DX-er, JRC offer an optional plug-in ECSS board which has to be used to be appreciated. The ability to “lock-on” to an incoming AM signal and then pick off either sideband makes the NRD-535 the only choice for the serious listener.

The serious listener will also be impressed by the 200 memory channels, each of which stores frequency, mode, bandwidth, attenuator setting, and AGC setting (that’s what I call comprehensive). The memories can be scanned of course and there are also comprehensive frequency sweep facilities under complete user control.

When it comes to user control, the NRD-535 is almost unique, because there are no less than 16 different functions which can be programmed from the front panel by the user, to “tailor” the receiver to suit their own particular needs. These cover everything from tuning rates to the precise BFO offset on CW, so everyone can have the receiver of his choice.

For the advanced user, the NRD-535 is fitted with computer control facilities, and an RS-232C interface is provided as a standard feature. The user manual contains comprehensive details on the 28 different receiver operations which can be computer controlled. You will need a computer or dumb terminal of course, but given a modicum of computer literacy, there is almost nothing which cannot be done by remote computer control.

All in all the NRD-535 is a truly excellent advance on the 525, and is worthy of carrying the JRC banner forward into the future. When you see that the price is the same as that of the NRD-525, you can only marvel at what JRC have done. See it soon.

NRD-535 HF Receiver £1115 inc. VAT
CMF-78 ECSS option £202 inc. VAT
CMH-530 RTTY option £104 inc. VAT

Send four first class stamps to cover the postage and we will send you, by return of post, your FREE copy of "THE LISTENERS GUIDE" (2nd edition), a commonsense look at radio listening on the LF, MF and HF bands. Its unique style will, I am sure, result in a "good read" but underneath the humour lies a wealth of experience and expertise. You will also receive detailed leaflets on our range of receivers and a copy of our current price list.
When it comes to scanners
Look to Lowe

The new WIN-108
The finest handheld airband receiver in the world

The new WIN-108 is the latest version of this world beating air band radio, which has been acknowledged all over the world as the best hand held VHF radio available.

Now covering 108 to 143MHz, and with all UK and European channels covered in the now standard 25kHz spacing giving 1400 channels for your use, the WIN-108 will give you total listening satisfaction, at home or out on the airfield.

Everything you need is provided by the WIN-108; 20 memory channels, memory scanning, frequency searching between your chosen limits, a priority channel which you can programme to any frequency in the airband, direct frequency entry from a simple keypad, up/down tuning, and so on and so on.

Best of all, the WIN-108 comes from a respected manufacturer and is backed by the best service in the business from Lowe Electronics.

Airband radios are getting quite complex, and many people are confused by the increasing numbers of apparently similar radios on the market. To help you choose, here is a check list of absolutely essential features you must have in an airband radio. If the radio you are going to buy has any of these features missing. DON'T BUY IT, because you will be disappointed.

THE QUESTIONS

1) Does it have frequency coverage from at least 108MHz to 137MHz for all new channels?
   (The WIN-108 covers from 108 to 143MHz.)

2) Does it have channel spacing of 25kHz?
   This is crucial, because all important frequencies are now using 25kHz channels. The old standard of 50kHz is totally useless. (The WIN-108 has 25kHz channels.)

3) Can you use ordinary pen cells if you want to?
   Having rechargeable batteries is all very well, but it doesn't help you at an air show when they run flat. You can always get a set of Duracells from somewhere. (The WIN-108 uses easy to obtain batteries.)

4) Can you search for new signals between user-programmed limits?
   If you have to search the entire Nav and Coms band all the time, it wastes valuable searching time when signals can be lost. (The WIN-108 has programmable search limits.)

So - four simple questions which you MUST ASK. For full details on the WIN-108 and all the other radios from our exciting range, simply ask for our airband information pack, which includes a free copy of our ever popular "Airband Guide".

Happy listening. (It will be with a WIN-108.)

THE LISTENERS' BOOK OF THE YEAR 1991 - £12.95

Never has a title been so well chosen as the "Passport to World Band Radio". This is the one book which seems to contain everything you need to know about listening to the amazingly diverse world of radio broadcasting. Let's just run through what this book contains:

Obviously it has a complete listing of all short wave broadcasters, not simply in order of frequency, but also listing by language and country of origin. And also the timing of broadcasts. Almost two hundred pages of such information would make the book worthwhile on its own, but you also have detailed reviews and comment from an acknowledged and respected authority on such matters covering no less than forty radio receivers ranging from the sublime to the gor-blimey. To add to all this, you also get over a hundred pages of general news, views and information.

The "Passport" is an absolutely indispensable companion to the short wave listener and the price is so reasonable for so much information. Get one soon before they are out of print.

The price for this constant companion? Slightly less than that for a pedigree dog. It's £12.95 for callers, or we can send it to you for an extra £1.55 for postage and packing.

*GLASGOW 041-945 2626. LONDON (EASTCOTE) 081-429 3256. LONDON (Heathrow) 0753 45255.
S. WALES (BARRY) 0446 721304.

*Closed all day Monday.

Short Wave Magazine, May 1991
A great advantage of using computers in schools and colleges is the ability to give every student a different question. This program makes it possible for the student, or teacher, to make up their own 'transformer calculations' and know that the correct answers can be obtained from the computer. In this way, students cannot copy from one another, provision is made for the 'high fliers' and more time can be spent helping those much slower to learn. The questions are presented on the screen in a similar manner to that normally drawn on a chalkboard in the classroom.

When the program is RUN a menu of options is listed on the screen as follows:  
1: Calculate primary voltage of a transformer  
2: Calculate secondary voltage of a transformer  
3: Calculate primary turns of a transformer  
4: Calculate secondary turns of a transformer  
5: Calculate primary current taken by a transformer.  
6: Calculate secondary current taken by a transformer.  
7: Calculate primary impedance of a transformer.  
8: Calculate secondary impedance of a transformer.  
9: Calculate turns ratio given input and output impedances of a transformer.  
10: Formulae and details required to perform the previous calculations.  
11: To EXIT the program.  
An example of a typical screen presentation and a listing of the formulae is shown in Figs. 5.1 and 5.2.

**Capacitors**

The second program this month is an aid for students when they are working with capacitors in the electronics workshop. The program offers four useful routines:

**Five-band Polyester Capacitors**

On entering the colours of a colour-coded capacitor, the computer calculates the capacitance in picofarads, the tolerance (%) and the working voltage. Also, a calculation is performed to give the maximum and minimum value that the capacitor could be. The codes are those in common use by companies such as RS Components, etc. (Fig. 5.3)

**Capacitors in series**

This routine allows a student to quickly find the 'total effective capacitance' of two or more capacitors connected in series.

**Variable capacitors**

It is sometimes required to estimate the capacitance of a variable capacitor. This is best done using a capacitance meter, but if one of these is not to hand, then this routine will give an approximation. (Fig. 5.4)

**Conversion of capacitance units**

If a student has difficulty in converting picofarads to nanofarads or to microfarads (or any combination of the three) then this program will come to the rescue.

**Addition of Odd Harmonics**

This program, number 10, is intended as a 'visual aid' plots the resultant waveform when odd harmonics are added to a sinewave of fundamental frequency.

When the program is RUN, the student or teacher can select demonstrations of:

1: Resultant waveform of adding the fundamental and third harmonic waves.  
2: Resultant waveform of adding the fundamental plus the third and fifth harmonic waves.  
3: Resultant waveform of adding the fundamental plus the third, fifth and seventh harmonic waves.  
4: Resultant waveform of adding the fundamental plus the third, fifth, seventh and ninth harmonic waves.  

The amplitude of the harmonics have an effect on the resultant waveform. The graphic screen, Fig. 5.5, shows three waveforms; the fundamental, the third harmonic and the resultant. It can be seen that when odd harmonics are added to a fundamental wave, the resultant starts to form a square wave.

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**Educational Software for Basic Electronics - Part 5**

In this issue, J.T. Beaumont G3NGD deals with a variety of subjects from transformers and capacitors to Lissajous Figures.
Lissajous Figures

Program 11 is to be used as a visual aid and is designed to show how an unknown frequency can be measured using Lissajous figures.

The Theory. With a sinewave of known frequency (fx) applied to the X-plates of the cathode-ray oscilloscope and another sinewave of unknown frequency (fy) applied to the Y-plates, then the unknown frequency (fy) may be measured in terms of fx, if fy/fix is a rational number. Under these conditions a stationary trace appears on the screen.

In addition to indicating frequency, the figures produced on the screen also indicate the phase relationship between the two signals.

It should be noted that some waveforms take a long time to be drawn. For this reason an interrupt has been included at Line 410. When the waveform appears to be complete pressing the SPACE will stop the program. To increase this time, the "FOR NEXT LOOP" maximum count number (800) at Line 360 should be increased.

To obtain the programs described in Part 5, send a 5.25in disk and mailer, together with two 1st Class stamps, to the Editorial Offices. We will copy the relevant programs onto your disk and return it. Later on this year, a set of disks will be available containing all the programs described in this series. Please note that we are only able to provide programs for the BBC computer. Alternatively, we can supply a copy of the printout if you send an s.a.e.

FOR YOUR BOOKSHELF

AN INTRODUCTION TO RADIO WAVE PROPAGATION
by J.G. Lee
published by Bernard Babani (publishing) Ltd
115 pages, 110 x 180mm. Price £3.95 plus 85p P&P
ISBN 0-85934-238-7

From the SWM Book Service
Radio wave propagation is one of the more important discoveries made in the early 20th century. Although technology lagged behind, early experimenters pursued this newly discovered phenomenon eagerly for, in understanding the physics of propagation, they were discovering more about the workings of the Universe.

Radio wave propagation has its origins in the world of solar physics. The sun's radiation produces the mechanism for the formation of the ionosphere. How the ionosphere is formed and how it provides DX communication is explained. Non-ionospheric propagation, including moonbounce and satellite communications is covered as well.

This book has been written with the average electronic hobbyist in mind. Technical language and maths have been kept to a minimum to present a broad, yet clear, picture of the subject. The amateur, as well as the s.w.l., will find explanations of the propagation phenomena which both experience in the pursuit of their hobbies.

THE RADIO LISTENERS GUIDE 1991
edited by Clive Woodyear
published by PDQ Publishing
56 pages, A5. Price £2.95 plus 85p P&P
ISBN 1-871611-02-4

Available from the SWM Book Service
This is the third edition of this essential guide for radio listeners. Simple to use charts and maps show the frequencies of all the radio stations in the UK, showing that there's more to life than just Radio 1. Informative articles deal with a wide variety of topics including RDS, the Sony Radio Awards and In-Car audio.

This book gives you all the frequencies you will ever need, when travelling around the UK or staying at home, including all the national, local and community stations. A section gives a brief run-down on foreign stations that can be received in the UK. Altogether a useful book to have with you in the car or when on holiday.

The Guide has been organised so that the various station types are listed separately. So nationally transmitting stations such as BBC Radios 1, 2, 3, 4 or 5 are listed separately from Independent local radio stations and so on. You will also find that, in the case of national BBC stations that also broadcast on the medium wave bands, these frequencies are separate from the station's v.h.f. f.m. entries.

To find a station, you must first decide which broad category it fits, eg., you wish to tune into Radio 4 and you live near Oxford, look under the section marked 'BBC FM Radio in England'. Then look at the map for this section to see which transmitter is nearest and tune into the frequency for that transmitter.

THE DXERS GUIDE TO COMPUTING edition 4.0
by George Wood. Published by Radio Sweden. 59 pages, 150 x 210mm.
Price £3.00 or 8 IRCs from Radio Sweden, S-105 10 Stockholm, Sweden.

The last fifteen years have seen an explosion in the spread of micro-computers. Across North America, Western Europe and the Far East, more and more businesses are relying on small computers at prices that would have been unthinkable just a few years ago.

Radio hobbyists, both short wave listeners and amateur radio operators, have discovered the usefulness of the microcomputer as well.

In Sweden Calling DXers, Radio Sweden's weekly electronic media magazine, they have mentioned many applications of computers in the radio listening hobby. But the constantly evolving technology and the development of new applications means the amount of material is enormous. They have put together this booklet, as a guide to what can be done with a small computer in the radio shack.
Make Your Reports Useful

G.P. Stancey G3MCK sends this open letter to a short wave listener, explaining what will help to ensure that he gets QSL cards in return for his reports.

Dear Peter

This morning’s post delivered your s.w.l. QSL from the bureau. First, let me wish you lots of pleasure in the super hobby of short wave listening and I hope you get many replies to your QSLs. You’re getting mine because I want to encourage you in the hobby and this is the reason that I am writing you this letter.

I imagine that you are not too pleased with the response you are getting to your QSLs. Perhaps you think this is due to unreasonableness on the part of the transmitting community, but have you ever considered that the problem may lie with you? I’ve told you why I am sending you my QSL and you will notice that I have not said anything about your card being of any value to me.

It may be a bit brutal, but many people only react favourably to events that are favourable to them. In other words, if your QSL is of value to them, they will reply. If it is of little value, they won’t. How do you think the card which you sent to me looks in that light? You told me I was RST 599 at 2000Z on 3.5MHz in Skegness when I was working a station at RST 599 in Scunthorpe! Have you told me anything new? Also remember the QSO took place nine months ago, so the news is hardly red-hot. Do you really think I will be motivated to send you a QSL?

You can motivate me to want to send you a QSL by ensuring that your QSL has some value to me. In other words, your QSL should tell me something I don’t know, but would like to know - and it should arrive at the right time. Let me give you some examples:

A report that tells me that my signals were heard in an unlikely place at an unlikely time.

A report that compares my signals with other stations, especially stations from my area.

A report that gives details of my signals over a period of time.

If you think carefully, other circumstances will come to mind. I use the word ‘report’ rather than ‘QSL’, because you may well find that a detailed letter will elicit a card more easily than just sending a QSL. Remember, your objective is to get cards to pin in your wall. The money you save on not having cards printed could well be spent on sending reports direct rather than via the bureau.

The other weekend, I erected a new antenna that appeared to be less than successful. After a week of few contacts, I took it down in disgust.

If, during the course of that week, I had received your QSL telling me you had heard me fruitlessly calling CQ, that would have been something really useful to me. It might have encouraged me to persevere with that antenna, which might really be a superb performer, but was just having an off-week.

The point I am making is that QSLs should be useful or interesting to the recipient and should also be received in a timely manner. This means that you should seriously think about QSLing direct as the bureau takes far too long. This will, of course, increase your costs, but if it improves your QSL return it may actually be cheaper in terms of pence per QSL received. The next point is that if you expect a QSL by return, enclose either an s.a.e. or IRCs, otherwise tell the recipient that you are happy to get his card via the bureau. This may seem one-sided, but life is not fair and if you want to improve your response to QSLs you just have to play the game.

I hope that you have found these comments helpful. Remember the message for improving your QSL return is:

* send something that the recipient will value
* send it in a timely manner
* above all use your common sense

Good luck with your s.w.l.ing

73 ex DX

Gerald G3MCK
The HP100E MkII is a channel, programmable, handheld receiver. Optional converters extend range from 150-300MHz and 600-1300MHz.

SMC are pleased to be able to offer the SONY range of Multiband Receivers. They feature all the latest technology allowing unequaled coverage of both broadcast and shortwave bands, yet remaining both compact and easy to use. All the models illustrated cover VHF broadcast, SW broadcast, and some models cover other bands as well.

The ICFSW7600 is a sophisticated portable receiver that combines power and flexibility with one-touch convenience. Freq. range AM 150-2999kHz and FM 76-108MHz.

The ICFSW1E is possibly the world's smallest shortwave radio, fully featured with a multiple tuning system and PLL synthesised circuitry for digital precision. AM 0.15-30MHz & FM 76-108MHz.

The ultimate Multiband receiver, the ICF2001D combines sophistication, shortwave technology with the ease and versatility of both digital and analogue tuning. Freq. range AM 0.15-30MHz, FM 76-108MHz and AIR 116-136.6MHz.

The NRD525 is a high-class, general coverage receiver with expandability looking to the future. Combining traditional technology unique to JRC with the most advanced digital technology gives superb performance whilst remaining extremely easy to use. The NRD525 covers 90kHz-34MHz and with an optional VHF/ UHF converter also covers 34-60, 114-174 and 423-456MHz. Modes of operation are CW, SSB, AM, FM and RTTY with optional demodulator.

Low radio receivers are available from Reg Ward & Co Ltd. Some Icom receivers available from most branches.

Yaesu's serious about giving you better ways to tune in to the world around you. And whether it's for local action or world-wide DX, you'll find our HF/VHF/UHF receivers are the superior match for all your listening needs. When you want more from your receivers, just look to Yaesu. We take your listening seriously.
ICOM
IC-R100 - WITH SSB!
IC-R100 Mobile/Base Receiver now with SSB!
WHY SETTLE FOR ANYTHING LESS!
For the enthusiast who prefers a more permanent installation, the IC-R100 is ideal, giving full frequency coverage of 500kHz-1800MHz and AM/FM/FM wide modes of operation. The IC-R100 boasts 100 memory channels to store your favourite stations and has features similar to the little pocket receiver. ONLY FROM US - WITH SSB!
£510 Inc. SSB
or 48 Monthly payments of £18.36

STANDARD C528
£349.00 or 48 Monthly payments of £12.57

FAIRMATE HP200
1000 Channels
500kHz - 600MHz
805MHz - 1300MHz
Receiving Modes:- AM/FM/Wideband/FM Selectable stops 5kHz -995kHz.
Improved Stability over HP100 and AOR1000 comes with: Ni-CADs, carry case, belt clip, earpiece, DC Cable and 3 antennas.
ONLY £269

LOTs OF SECOND HAND ITEMS AT REALISTIC PRICES!
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BUT NOW WE’VE GOT SOMETHING YOU MAY FIND STRANGE
RESERVED PARKING FOR OUR CUSTOMERS
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7 DAYS TO CHANGE YOUR MIND!

ICOM IC-R7000HF Receiver
500kHz - 2GHz
Now available on super credit terms. 48 Monthly payments of £35.98. Cash/cheque/credit card price:
£999
Yes, 500kHz to 2GHz CONTINUOUS receive in one unit. Using the ICR7000 multimode facilities. This probably makes the “Two in One” ICR7000HF Receiver the most versatile scanner available today. Because of the enormous frequency coverage. It has 200 mode sensitive channels for increased flexibility.

ICOM IC-726 HF
Transceivers for both mobile or base - the 726 HAS 6 meters inc.
PHONE FOR OUR PRICE YOU WILL BE AMAZED

The New Amazing IC-R1 Scan Receiver
Now at a new amazing price!
£359
48 Payments of £12.93 per month.
Frequency range 100kHz to1300MHz no gaps AM or FM. Also available on easy terms.
NOW AVAILABLE WITH SSB £399.00

A GREAT DEAL!

FAIRMATE HP200

PHONE FOR OUR GREAT PRICE!
The FT747 HF Transceiver SSB/CW/AM (and optional FM) 100 watts pep output on all HF bands and general coverage on receive 100kHz-30MHz. Dual VFO 20 memories.

PHONE FOR OUR GREAT PRICE!
The FT700R II £395
2 METRE TRANSVERTER TOKYO HX240
Transverter £239
WITH AUTO SWITCH £259
With the HX 240 feed in 3 to 10 watts on 2m and transmit on 10-15-20-40 or 60 with 40 watts output.

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WSA 1ET. England
Tel: 081-997 4476 Fax: 081-991 2565
Model Engineers at Chalk Pits

Many readers have other interests besides radio. In this, the first of an occasional series on other hobbies, Ron Ham looks at Model Engineering.

Although I was, until recently, the Hon. Curator of the Vintage Wireless Exhibition at the Amberley Chalk Pits Museum, Sussex, my favourite event of the season is the annual 'Model Engineering and Steam Day', held last year on September 9. Apart from a long standing 'armchair' fascination for the subject, I often meet radio people among the exhibitors and find model engineers using techniques associated with the world of radio-communications.

Amateur and the Fair

The 1990 event was no exception and as I talked to exhibitors about the various items - Meccano, scale model radio-controlled boats and miniature steam railway and road locomotives, I met Doug Roseaman G8FLL from Chippenham, who normally makes miniature fair-ground shows. This time he was proudly displaying his recent acquisition, a 1920s Fair-set complete with gallopers, park-swings, striker and switch-back. Doug, seen in Photo. 1 holding his normal work with part of his fair, is looking for more information about it before starting the intricate renovation work.

Showman's engine by Ernie Balson & Graham Stride.

Evershed & Vignoles chart mechanism controls the organ.

Frequency Idenit

At one end of a temporary pool, set up for the model boat display, I spotted a board, labelled 'MARINE SECTION', with a dozen coloured segments and a number of matching, clip-on clothes pegs. Each peg represented a radio channel, the missing ones showing the channels in use at the time. For easy poolside identification the appropriate coloured peg is clipped to the antenna of each operating transmitter.

The Paper Chart Organ

The sound of organ music attracted me to a beautiful model showman's engine, and the organ motor were powered by a dynamo at the front, belt-driven from the engine. Then came a big surprise. The air supply to each organ pipe was controlled, like a pianola roll, by the chart mechanism from an Evershed & Vignoles pen recorder, Photo. 3, just like the one I used for many years on my radio telescope. Chatting to Ernie and Graham about the design of this unit I learnt that they actually calculated and cut each individual slot in the paper roll by hand. And I thought that radio constructors were dedicated, hi!

Editor's Footnote.

Some of you will know that my relaxation comes from this hobby. All my working life I have been involved with electronics and radio - which have fascinated me since the age of about eight. However, it is work and I believe that you have to get away from it sometimes - for me this means cutting metal in my workshop or driving my 5in gauge steam loco. I know that other hobbies with radio connections are pursued by readers, including stamp collecting, photography - even flying and I hope to cover these in future issues.

Dick Ganderton.

G8VFH takes G4WNC for a ride behind 'Peggy'.

Photo. G4LFM.

Short Wave Magazine, May 1991
BEARCAT SCANNERS
Recently appointed as the UK distributors for this high quality product range — we offer the complete selection of mobile and base scanners with full service back up.

BEARCAT 760XLT
New Model with 900MHz Coverage
With 100 memory channels and coverage of the UHF band, the 760XLT is ideal at home or in the car. Pre-programming of preset bands is possible for fast access. Freq. Coverage 66-88, 136-174, 406-512 MHz £235

BEARCAT UBC 175 XLT

BEARCAT UBC 200 XLT
Handheld
Top of the range handheld easy to use and very sensitive. Features 200 memory channels, ideal for civil airband, marine, pbr and 900 MHz. UHF band (Coverage 66-88, 118-174, 406-512 MHz £229

BEARCAT UBC 100 XLT
Baby brother of the 200XLT with the same performance but only 100 channels of memory - ideal for airband reception. Coverage 66-88, 118-174, 406-512 MHz £199

SONY RADIOS
We are the main short wave stockist
Sony ICF SW1E Short Wave + VHF, world's smallest s/wave radio £149.95

COMMUNICATIONS RECEIVERS
Asa Digital Airband Radio
This new low cost receiver is designed for aviation enthusiasts featuring a digital display for accurate reception and tuning. Coverage 85-108MHz FM, 118-136MHz AM, 162-165MHz weather 530kHz-1.55MHz £59.95

Low Noise Pre-Amplifiers
Model M75
For base and handheld scanners.
• 25—2100 MHz
• Low noise GaAs FET
• Selectable filters for improved performance
• Variable Gain Control £69.95

COMMUNICATIONS RECEIVERS
Low Noise Pre-Amplifiers
Model M100
Same spec as M75 but with full RF switching, may be used with transceivers on transmit up to 5 watt o/p power £79.95

Model M50
A new low cost pre-amp without filters or gain control. Offers low noise GaAs FET at 20 dB fixed gain £49.95

AOR SCANNERS
AR 3000 wideband scanner 100 kHz to 2036 MHz with no gaps Now available £765

AR 2002 popular base scanner with coverage 25-550 MHz, 80-1300 MHz and 20 memory channels £467

AR 2800 NEW MODEL
500 – 600 MHz, 805 – 1800 MHz All modes available shortly. Call for details!
NEW - JUST ARRIVED
BLACK JAGUAR ACCESSORIES
and military airbands plus lots from the mains/car using facility to power the set selectable AM/FM and the explains why it is still so to be the most sensitive
25/50 kHz Channel spacing version that is set to take off in the UK! A small but sensitive airband radio
VT 125 AIRBAND RECEIVER
All models have full service backup - naturally!
prices and introduce new models for the UK! Working direct with Yupiteru enables us to reduce
MODEL 5D (8.1 mm) £1.40 per MTR
Loss at 1 GHz for 10 mtrs is 1.3 dB exceptional low loss and is good for frequencies up to 3 GHz.
LOW LOSS JAPANESE COAX Essential for optimum performance with wideband UHF scanners. We have directly imported this cable which has
BCA3 Mobile Antenna Charger £14.95
BCA6 Mains Slow/Fast Charger £14.95
BJ1 Car Supply (Mk111 version only) £14.95
SA7 UHF Stub Antenna £5.95
Squartie Antenna £6.75
Telescopic Antenna £6.75
Mobile Mount £6.95
Base Mount £5.95
BJT Car Supply (Mk111 version only) £14.95
BAC2 Mains Slow/Fast Charger £14.95
MVT 5000 HANDHELD This handheld has received many rave reviews we found it particularly sensitive at 900 MHz. Features include 100 mem. channels coverage (25-550 MHz, 800 - 1300 MHz) Supplied complete with all accessories and that 1 year guarantee.
Includes express delivery
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This device is useful for those readers who are not too familiar with frequencies and wavelengths. Of course, it is by no means a precision device - perhaps a memory jogger is a better description, says John L Alton.

Feel sure that there are quite a few people, like me, who have returned to radio listening in our retirement. In my case, a career spanning some 38 years in the RAF effectively precluded any serious practical radio activity. However, my youthful interest prevailed and I now have an R210 'civilianised' in accordance with Tom Harrison's article (SWM Jan 90, etc) and the recent one by Bryan Robertson (SWM July 90). In passing, may I pay tribute to both these gentleman for their assistance when I needed guidance.

From early attempts to produce a computer program to provide direct readings from the R210 scale with the converter fitted, it soon became apparent that this was not feasible within a scale that could be of convenient size or with figures that could be easily read. The R210 receiver has seven switched wave bands, 1, 1.5, 2.3, 2.3, 2.3, 2.3 & 2.3MHz wide. The total coverage is thus 14MHz (2 to 16MHz). Related to a complete circle of 360°, each 1MHz will subtend an angle of 360 - 14 = 26° to the nearest whole number. In terms of the seven bands, this will give angles of 26, 39, 59, 59, 59, 59 & 59°.

Construction

The full size reproduction of the frequency converter can be photocopied - for your own use only, of course - and mounted between two sheets of Perspex. A Perspex pointer is then fitted, with a small nut and bolt through the centre of the scale as a pivot. You now have a 'ready-reckoner' for use in the shack. If you do not have access to photocopying facilities and you do not want to mutilate your favourite magazine, a full-size copy is available from the Editorial Offices. Just send four First Class stamps, together with your name and address, of course.
My trip started when I boarded a 10 000 ton luxury liner at Belém, the largest town on the river, situated at the outlet on the Atlantic Ocean. Three stations operate from this city, of which Radio Clube do Pará on a frequency of 4.885MHz is the easiest to hear. More difficult is Radio Marajóara on 4.955MHz and Radio Cultura do Pará on 5.045MHz.

About 200km away, on the northern bank, is Macapá, situated right on the Equator. Here, Radio Difusora, with a 10kW output, transmits on 4.915MHz. Reception is difficult as it is usually masked by Radio Anhanguera from Goiânia, 2000km further south.

 Casting off from Belém, the ship negotiated the numerous winding channels before emerging into the main river, at times so wide that it was impossible to see the banks. After a few hours, we passed the town of Santarem, settled by the Confederates returning from the American Civil War, where Radio Rural may be heard, with careful listening, on 4.765MHz.

The next port to be passed is Parintins, on the borders of Amazona State and Para State. Radio Alvorada on 4.965MHz with an output of 5kW is a difficult catch.

Further up stream, Itacoatiara, the home of Radio Difusora Itacoatiara, was soon reached. Broadcasting in the difficult 120m band on a frequency of 2.34MHz conditions would have to be exceptional to log this one.

A further 100km west and we reached the ship’s final destination, Manaus, once the centre of the Great Rubber Boom of the 1920s. Several stations operate from this city. The easiest, with an output of 250kW being Radio Cabocia on 4.845MHz. Radio Difusora de Amazonas is also regularly heard on 4.805MHz, but Radio Baré on 4.855MHz with only 1kW will be very difficult. Radio A Crítica on 5.935MHz would be another excellent catch. In the 31m band, Radio Rio Mar puts out a 7.5kW signal on a frequency of 9.695MHz.

On to Peru

After three days of travel, I was now 1200m inland and regretfully had to say farewell to the comforts of the cruise liner. The next leg of my trip took me, by air, to Iquitos, just inside the Peruvian border.

Shortly, after take-off, we passed over Coari, home of Radio Educação Rural, which transmits a hard-to-hear signal of 1kW on 5.035MHz.

Benjamin Constant is the last Brazilian port on the river and has an outlet in Radio Nacional Tabatinga on a frequency of 4.815kHz.

A few minutes later, the plane began its descent for Iquitos, the world’s furthest inland port, and accessible only by water and air. Extremely hot and humid, Iquitos is the world’s centre for the distribution of tropical fish. Several stations operate from Iquitos, the easiest to hear being Radio Atlântida on 4.790MHz. La Voz de la Selva is also readily heard on 4.825MHz, but Radio Eco on 5.012MHz with only 1kW is virtually impossible.

During my stay in Iquitos I made a trip by dug-out canoe to visit one of the primitive Indian tribes living deep in the jungle where radio is still unknown. After spending a few days in this very humid town it was time to move on to my final destination, Lima. The last station, situated near the source of the Amazon is Radio Sideral at Pucallpa, but with an output of 1.5kW on 9.755MHz, is purely local.

Unforgettable

My Amazon trip was an unforgettable experience over a period of ten days, and although an enthusiastic s.w.l. could probably cover the same journey from the comfort of his own shack in a fraction of the time, he or she may well find the trip much more frustrating. Just as the dense jungle hides the animals and birds from the eyes of all but the most experienced traveller, so many of the stations along the way are buried by interference and hidden under atmospherics.

If you should care to try this exotic journey by short wave radio, Table 1 lists all the active frequencies of the stations along the way and will guide you along the route. The station details have been checked against the entries in World Radio TV Handbook. Happy travelling.
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Repairing an HRO

Chas. E. Miller discusses an HRO he returned to its former glory, and takes the opportunity to talk about some other allied topics, such as the strange way the Americans chose to identify their valves.

Many communications receivers have chequered careers, so it was pleasant to encounter an HRO that had been in the same family for 40 years. This set had been bought by the present owner’s father just after the war and had given him good service for at least two decades. In recent years, however, it had fallen on evil times, as my initial examination showed only too clearly.

The main fault lay in the power supply unit that had evidently suffered a burned-out mains transformer. Someone had removed the original and pushed into the available space an RS Components ‘economy’ replacement. These are extremely well-made and, when used within their ratings, are utterly reliable. In this particular instance, the demands that would have been made by the HRO would have been far too great and would have brought about over-heating and eventual failure. As it happened, the replacement job appeared never to have been completed or, if it had, it had been partially dismantled again shortly afterwards. Thus the transformer was presumably spared the over-loading that would have otherwise come its way.

The original HRO used valves with heaters rated at 2.5V and prodigious amounts of amps, but subsequent models used 6.3V UX-based types. The HRO-5 employed metal Octal valves and this point presents me with an opportunity to apostrophe on the subject of valve numbering.

Valve Numbering

The original range of Octal valves that appeared in the mid-1930s was prodigious amounts of metal-shell types. It is important to bear in mind that the entire envelope itself was of steel and was not glass, sheathed in aluminium, as in the well-known EF50/VR51 and certain Marconi-Orram valves of the immediate post-war period. The metal Octals had three-figure numbers such as 6K7, 6J5, 5Z4, etc. Subsequently, glass-envelope variants were produced, initially with conventional curved-glass bulbs such as been used for the UX range. Type numbers for these had the suffix G for glass, e.g. 6K7G. The next development was a smaller glass envelope of tubular aspect about half the size of the G bulb. The suffix for this was GT, thus giving 6K7GT.

Regarding American valve numbering in general, men of powerful intellect to whom the intricacies of differential calculus and Sanskrit are merely child’s play have grappled with the problem of understanding the system, only to have to be led away by kindly attendants in white coats. The fact of the matter is that there is no consistent method of identifying the type of valve. To demonstrate the perversity of the numbering we have only to look at a later development of Octal bottles. The 6K7, which was a variable-mu r.f. pentode, and several other valves in the original range, had top-cap control grid connections. For certain applications, it was more convenient to have all the connections brought out to base pins and so single-ended versions of the valves were produced. With fiendish ingenuity, a letter S was added to the type numbers of valves thus modified, making a single-ended metal 6K7 into an 6SK7. The small-glass variant was called 6SK7GT. There was no single-ended version of a G valve. Numerous other valves were issued in single-ended form with the ‘S’ added to the type number but lest anyone should gain the impression that this was a logical sequence of events, let them beware making the assumption that any valve with an S in its name is a single-ended version of a normal...
The 6L7 is a pentagrid mixer valve for frequency-changing stages whilst the 6SL7 is a high-mu double triode (which, incidentally, uses all eight base pins). The 6SN7 is another double-triode as is, indeed the 8N7, but whilst the former is a medium-mu type for voltage amplification, the latter is a very powerful valve for Class B operation in which mode it will deliver 10W output.

Finally, we return to the subject of heater voltages. Since a 12K7 is a 12.6V heater equivalent of the 6K7 and the same is true of many other valves, it must be safe, must it not, to assume that all valves starting with 12 follow the same rule? Not quite, characteristically the American threw in a 'rogue' and, inexplicably, the 12.6V version of the 6B8 is known as the 12C8...

**Returning To The HRO**

The total consumption of the heaters may be calculated at 2.85A @ 8.3V, plus 0.15A for the pilot lamp, a total of 3A. Oddly enough, National's own power supply unit is rated to deliver only 6.2V, so if we are to be pedantic about it, the current consumption would fall by about 5mA. Since mains transformers delivering 6.2V are thin on the ground this anomaly may be ignored.

The h.t. output is rated as 230V @ 75mA, the latter figure being rather surprisingly low considering the number of valves in the receiver (the 6V6 output valve normally draws around 50mA, leaving only 25mA for the other eight). Of these, the four 6K7s alone might be expected to consume around 8mA apiece, so it would seem prudent to cater for a total h.t. current of more like 100mA. In fact, mains transformers tend to fall into categories whereby there are those intended for use in ordinary '4 + 1' domestic receivers drawing around 2A heater and 575mA h.t. current and those for larger sets and small amplifiers requiring some 3.5A I.t. and 120mA h.t., so one of the latter examples will have a good safety margin all round. It must be added that the h.t. voltage provided by the latter will probably be at least 50V higher than for the smaller type of transformer as (say) 300V as against 250V. This has to be taken into account since an excess of h.t. will do no good and may possibly be harmful.

**Power Supply**

The original transformer in the HRO power supply unit was encapsulated in pitch, but whoever had repaired it last had cleaned all this stuff out and simply dropped the replacement into the hole that was left with no pretence at fastening it down. The new transformer to be fitted was too large to go into this space, but there is ample room at the rear of the unit beneath the rectifier valve holder, where it could be bolted down securely. It should be noted that neither side of the heater winding is earthed directly, the return being made via a large "hum-dinger" mounted in the receiver itself.

Alongside the original mains transformer housing is a large h.t. smoothing choke, also set in pitch. This proved to be in good order but the main smoothing capacitors (condensers) were in need of replacement. An 8µF + 15µF double unit was employed with the first section as reservoir. In combination with the choke, this provided a hum-free h.t. supply of just under 250V at the output terminals, on load. Given that the transformer was capable of delivering at least 100mA it was felt unnecessary to reduce the voltage further. However, 250V should be taken as a definite upper limit and resistors employed to drop higher outputs, not forgetting that the wattage ratings will probably be >2.5W. The space within the unit will permit such resistors to be mounted on tag strips well away from other components.

The connections from p.s.u. to receiver are via a 4-pin UX-type socket mounted on the front of the p.s.u. and a length of 4-core cable from the set carrying the appropriate plug. It was found that the heaters in the receiver were receiving power only intermittently, traced to a poor contact within one of the pins on the plug.

This showed no signs of ever having been disturbed, so one can only assume that it was never soldered properly in the first place. A good method to ensure a sound joint is to invert the plug so the pins are uppermost and to apply the soldering iron to each in turn, feeding thin cored solder directly into the openings at their ends. There was no recurrence of trouble after this work had been done. Curiously enough, another instance of poor workmanship was discovered in one of the coil sets that failed to give any signals. To narrow down the search, the usual test for negative voltage on the grid of the local oscillator was applied, indicating that all was well here. Next, the meter lead was applied to the section of the gang capacitor used to tune the mixer control grid (a handy place to inject signals) upon which some stations became audible. Transferring the lead to the section tuning the grid of the second r.f. amplifier increased the level of the signals but there was nothing from the antenna tuning section. It is easy to gain access to the coils themselves for the screening cans are held in position by small screws passing through slots into semi-captive nuts. It is necessary only to loosen the screws to permit the cans to be removed. One of the leads from the antenna coil to the stud contacts was seen at once to be disconnected and it was again difficult to believe that this had not been so from the start. Soldering it into position restored normal operation.

**Beat Frequency Oscillator**

The only other job necessary on the receiver was to re-tuning the b.f.o. to provide resolution of s.s.b. The b.f.o. main tuning is by a small variable capacitor on the front panel of the set with its connections made via a cable-form containing several other miscellaneous leads. Only slight readjustment of the pre-set capacitor shunted across the variable was required to achieve resolution at the mid-point of the latter. The standard test here is to receive the RAF VOLMET s.s.b. transmissions that may be assumed to be of good frequency stability and

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This cutaway drawing shows the construction of a typical metal Octal valve. (RCA):
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The practical construction projects that follow in the rest of this series will use soldering techniques rather than the Veroblock used in the last series. Part 1 describes a useful item for the short wave listener’s station, so that the Veroblock need not be ‘pensioned off’ and go to waste.

For serious listening, most short wave listeners will install an outside antenna (aerial), which is a simple way to increase the sensitivity of the receiver. Usually such outside antennas are random end-fed wires. That is, they consist of a length of wire running from the receiver to outside the building and as high and long as is possible within the available space. Some readers may recall the ‘wireless poles’ often found at the bottom of garden in the 1930s, 40s and 50s with a wire running from a pulley at the top of the pole to the eaves of the house and then down to the radio set.

Ideally, an antenna should be matched to the receiver and the frequency in use. Many radio amateurs use tuned antennas, where the element, or elements, of the antenna are cut to match a favourite band or frequency. The simplest example is the half wave dipole. But most short wave listeners want to be able to monitor a large portion of the short wave spectrum with just one antenna and in such circumstances an end-fed long wire is the simplest effective answer.

Simply plugging the long wire into the antenna socket of a receiver will increase the sensitivity, but the wire will almost certainly not match the frequency and the input impedance of the receiver. Most receivers have an antenna input impedance of 50Ω and a piece of wire used as an antenna is most effective if its length relates to the wavelength of the station received. (Complex ideas which can be explored further by reading a good book on antenna design) So, the long wire is very much a compromise antenna for short wave listening.

**Antenna Tuning**

Fortunately it is not too difficult to improve this situation using an antenna tuning unit (a.t.u.), often called a Transmatch in American books. An a.t.u. is a combination of capacitance and inductance placed between the antenna and the receiver. These are used to cancel inductive and capacitive reactance that may be present at the end of the antenna: see the section on resonance in Part 3 of this series (SWM December 1989). A simple way to put it is that the a.t.u. enables the receiver to ‘see’ an impedance of 50Ω at the end of the antenna at the frequency in use.

Thankfully, most a.t.u. circuits are quite simple. The three commonest types of a.t.u. circuit are shown in Fig. 1.1. The simplest is the L Match (the circuit looks like the letter L), which consists of one inductor and one capacitor. The capacitor may be at the receiver or antenna side of the inductor depending upon the length of the antenna and the frequency. The T Match and the Pi Match (with circuit shapes like a T and X) both use a single inductor with two capacitors. Although some a.t.u. circuits in books may look complex, most of them will be based on one of these three basic circuits. Much of complexity will be due to the fact that an a.t.u. has to have methods of varying the inductance and the capacitance.

**A Practical Circuit**

The circuit diagram of a practical a.t.u. that can be built using the Veroblock and some of the parts from the crystal set (the variable capacitor and the ferrite rod) is shown in Fig. 1.2. Compare Fig. 1.2. with the L Match in Fig. 1.1(a). They are the same circuit with a variable capacitor C1 and inductor L1, which can be varied with tappings on the coil. This inductor must be wound and then down to the radio set.

The first stage is to wind the inductor, L1. This is wound on a paper sleeve, in the same way of the crystal set inductor. The coil has a total of 20 turns with three tapping points. The tappings are made in the same way as in the crystal set by pulling a loop of wire out from the coil as you wind and twisting it together. These tapping wires must be scraped clean of enamel to make a good contact when they are plugged into the Veroblock. Begin the coil by fastening one end of the wire to the paper sleeve with adhesive tape, wind 2 turns and make a tapping, then 3 turns and a tapping, 5 turns and a tapping and complete the coil with a further 10 turns. The winding is close-wound - the turns touching each other - but the ferrite rod must be able to slide in and out of the coil.

The layout of the a.t.u. on the Veroblock is shown in Fig. 1.3. Note the two wires that are passed over the ferrite rod. These are arranged to loop over the rod and help to hold it in place in addition to being part of the circuit. The receiver and antenna ends of the circuit are joined to sockets to connect the receiver and antenna leads. I used the cheap and easily available phono sockets but any appropriate sockets could be used.

The wire coming from 19B, the top of C1 on the circuit

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Project

**Continuing Along the Right Lines - Part 1**

Following on from his popular series in SWM last year, George Dobbs G3RJV offers more projects for the beginner.
diagram, has a free end that acts as a three-way switch. By pushing it into the hole adjacent to the tappings X, Y or Z, it can select the required tapping. With the free end of this wire withdrawn from the board, the whole of L1 is in the circuit. This simple switching arrangement, together with the ability to slide the ferrite rod in and out of the coil, allows a wide range of inductance to be selected.

**Using the ATU**

The tuning procedure is really very simple. The inductor L1 and capacitor C1 are adjusted for the loudest signals at the required frequency. A general rule of thumb is that the lower the frequency in use, the higher the inductance required (the actual amount depends upon the length of the antenna). Tapping X is the least inductance, followed by Y and Z, connecting the tapping lead to the finish of the coil for maximum inductance. The ferrite rod also alters the inductance - pushing it further into the coil increases the inductance.

Begin by connecting the receiver and the antenna to the a.t.u. Set the variable capacitor, C1, at about half mesh. Then adjust the inductance using the tappings and sliding the rod in and out of the coil slowly to peak the signals being received. The final peaking of the signals is done with C1. With a little practice, it soon becomes very easy to match the antenna and the receiver with the a.t.u.

Ideally, whenever the frequency of the receiver is changed, the a.t.u. settings require adjustment. In practice, once set up the a.t.u. should be effective across any single amateur or broadcast band with just a little retuning of C1. If bands are being changed or large frequency changes are being made, the whole tuning procedure must be performed. More sophisticated a.t.u.s have markings on the capacitor and inductor settings so these can be noted for future tuning on the same frequency.

The L Match configuration with the capacitor at the antenna end of the circuit works for most lengths of outdoor antenna in the average garden over the short wave spectrum. If difficulty is experienced in getting the a.t.u. to work with a particular antenna, the connections on the receiver and antenna can be reversed to put the capacitor at the receiver end of the a.t.u.
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Lots of information available about everything, please ask. Prices include VAT and p&p by return.
Nevada MS-1000 Scanner

The latest release from Nevada Communications - the MS-1000 scanner is reviewed here by Mike Richards G4WNC.

The scanner market is probably one of the most competitive in the hobby radio business so any new scanner has to be good to survive. The Nevada MS-1000 is one of the new breed of scanners that features extremely wide frequency coverage. In this case, the range extends from 500kHz through to 1300MHz with just one gap between 600 and 800MHz. To make the best use of this wide range there are some 1000 programmable memories. So let's take a closer look.

Getting Going

The first thing that's needed is a good manual and this was supplied as a twelve page A5 booklet. Despite its somewhat small size, the manual covered the operation well. There were only four diagrams and they were used mainly to illustrate panel and display layouts. Most of the operational instructions were covered by simple step-by-step examples. These proved to be perfectly adequate in practice.

The MS-1000 required an external 13.8V d.c. supply rated at 180mA minimum. This could easily be met by using the vehicle's battery when operating mobile. For base station use a 240V a.c. adaptor was supplied with the review model. The power connection was made via a standard 3.5mm coaxial power socket on the rear panel.

One of the problems with scanners such as the MS-1000, is that the small internal speaker cannot do justice to the higher quality transmissions. This can be rectified by connecting an external speaker using the 3.5mm jack on the rear panel. Inserting a plug into this socket also disconnected the internal speaker.

I was very pleased to see that the antenna connection used a good quality BNC socket. This is a neglected area on so many scanners and is vitally important for successful u.h.f. operation.

For those with a desire to record signals off-air, there was one particularly useful feature. This was the provision of a remote tape switching jack on the rear panel. This 3.5mm jack gave access to a relay contact that closed 3 seconds after the squelch was opened. This contact could easily be extended to the remote socket provided on many portable recorders. The result was that the recording process could be fully automated with no gaps between signals. This was great for monitoring stations with intermittent transmissions.

Frequency Entry

Despite its diminutive size, the MS-1000 boasts a good range of frequency selection options. The simplest way to tune to a particular frequency was to use the direct entry system. In this case the required frequency was typed-in using the numeric keypad on the front panel. Once selected, manual tuning was provided by a rotary control mounted concentrically with the squelch. As you would expect, the control operated using a number of click stops. The versatility of this rotary tuning system was further enhanced by the provision of user programmable tuning steps. These could be set anywhere from 5 to 995kHz in 5 or 12.5kHz steps. This is a truly remarkable adjustment range that makes manual tuning a real pleasure. Setting the required step was also very simple - you just hit STEP.
entered the step size on the numeric keypad. I must admit that I've never really been happy with scanners that use UP and DOWN buttons as the only form of manual tuning so the MS-1000 scores highly with me!

**Programmable Memories**

The heart of any modern scanner is the memory system and the MS-1000 is very well set-up. There are a total of 1000 user programmable memories available that are divided into ten bands of a hundred memories each. This is very convenient for separating areas of interest, i.e. air band, marine band, etc. Besides holding the frequency, each memory can retain the operating mode, i.e. f.m., a.m., etc. Storing and recalling memories used a very logical key sequence.

Once a number of favourite frequencies have been stored in memory, the scanning features can be brought into use. The basic scanning mode allows either all memories or selected banks to be scanned. One notable feature was the extremely high scan rate of twenty channels/sec. This was a great help when monitoring spasmodic transmissions such as those found on the air band.

One essential feature of any scanner is the ability to lock out specific channels. The MS-1000 included this feature plus an option to lock-out complete banks if required. In fact the operator could set the scan to operate over any bank combination.

The MS-1000 also featured a user programmable priority channel facility. With this the operator could set any channel as the priority channel. This channel was then automatically checked for activity every two seconds during scan or search operations. This feature proved to be very effective due to the short time taken to check the priority channel. When monitoring a station with priority scanning activated, all that could be detected was a small blip in the reception quality. This was one of the most effective priority scans I have encountered.

**Search Banks**

Besides all the scanning options, the MS-1000 featured ten search banks. It's these search banks that are so useful for finding new frequencies. With the MS-1000 the search banks aligned with the ten memory scanning banks mentioned earlier. When entering a search frequency range you could also specify the mode and frequency steps. There were also options to look-out up to 1000 individual frequencies from the search. As you can see the search facility was very well thought out. The only other search/scan facility worthy of note was the Delay/Hold. With this the operator could set the action of the MS-1000 once a signal had been detected. The Delay option caused the MS-1000 to wait two seconds after the signal disappears then continue the scan or search. When using HOLD the search or scan is abandoned when a carrier is detected. With both options a signal is detected when the squeal is lifted. By operating the AF SCAN switch the scan would only stop on modulated carriers - very useful for avoiding birdies and spurious carriers.

**Performance**

Evaluation of the performance of the MS-1000 was carried out both in a operational environment and in the lab. For the measured performance I used e.m.f./2 to describe the input voltage and 12dB SINAD for the measurement threshold. The a.m. sensitivity gave a best result of 0.7µV and a worst case of 3µV both for 12dB SINAD. On narrow band f.m. this improved to 0.5µV throughout most of the operational range. The wideband f.m. gave a result of 3µV, again for 12dB SINAD. These were very good results that compare well with other scanners on the market. Whilst in the lab I also took the opportunity the check-out the audio distortion. The a.m. and narrow f.m. results were identical at 1.6% total harmonic distortion whilst the wide f.m. produced a very good 0.9%. Both these figures were the best obtainable.

For the on-air performance I started by trying the supplied antennas - a 890mm telescopic whip and an 80mm rubber-covered, fixed length unit. Whilst these were fine for operating static mobile from a hill top, base station users would be well advised to invest in an external antenna system.

Moving into the shack, I used the MS-1000 with my discone antenna for u.h.f. and v.h.f. monitoring, changing over to a long wire for the h.f. bands. The general ease of operation I found to be very good, with most of the functions requiring a logic sequence of key presses. This is important to avoid having to constantly refer to the manual.

The only front panel layout problem that I encountered was with the operation of the rotary tuning knob. With my rather fat fingers, I found that I occasionally altered the squeal setting whilst tuning! From an operational point of view, all the features worked well up to expectations - except for one. The AF SCAN should have prevented the scan from stopping on unmodulated carriers, but in practice this was not the case.

Unfortunately, I didn't have time to investigate the reasons for this, so it may just have been a problem with the review model.

**Summary**

I found the MS-1000 to be 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.

The MS-1000 can be obtained from [Nevada Communications, PO Box 70, Portsmouth, Hants](http://www.nevada-communications.com) and costs £279. My thanks to Nevada for the loan of the review model.
Review

Specification

Frequency Range:
- Low Band: 500kHz to 600MHz
- High Band: 800MHz to 1.300GHz

Modes:
- a.m., f.m., wide f.m.

Tuning Steps:
- 5 to 995kHz (5 or 12.5kHz multiples)

Memories:
- 10 banks of 100 (1000 total)
- 1000 search lock-out memories

Sensitivity:
- Low Band: a.m. (500kHz-2MHz) 10μV 20dBQ
- a.m. 0.7μV-1.0μV 10dB S/N
- f.m. 0.5μV 12dB SINAD
- w.f.m. 1.0μV 20dB S/N
- High Band: f.m. 0.7μV-1.0μV 12dB SINAD

Scan Speed: 20 chan/second or more

Search Speed: 20 freqs/second or more

Antenna Impedance: 50Ω

Audio Output: 500mW

Power Source: 13.8V d.c,
- 240V a.c. with optional p.s.u.

Current Consumption: 180mA

Size: 120 (W) x 50 (H) x 203mm (D)

Weight: 750g

Printed circuit boards for SWM constructional projects are now available from the SWM PCB Service. The boards are made in 1.5mm glass-fibre and are fully tinned and drilled. All prices quoted in the table include Post and Packing and VAT for UK orders.

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Telephone orders: (0202) 665524
Despite the poor weather and often overcast skies in January and February, Patrick Moore (Selsey) managed to observe and draw, the major sunspot groups that were present on the sun’s disc on January 31 and February 10-11. Patrick has special projection apparatus attached to his telescope for this purpose, so don’t give it a try without getting proper advice, otherwise you may seriously damage your eye-sight or worse.

With 12in of snow on the ground, CdMr Henry Hatfield (Sevenoaks) went to his observatory at 1157 on February 11 and, with his spectrehelioscope, located 1 sunspot group, 12 filaments and 7 quiescent prominences. Under similar conditions at 1200 on the 14th, he had a quick look and saw 5 groups, one with two medium sized flares, 14 filaments and 8 small quiescent proms. At midday on the 16th, he found 3grps, 10fsand 9qps. Ron Livesey (Edinburgh), using a 2.5in refracting telescope and a 4in projection screen, located 5 active areas on the sun’s disc on February 1, 13, 15 and 22. On days 4, 6, 7, 16, 21 and 24 and on the 10th, 8 on the 15th and 18th and 10 on the 14th. "The Royal New Zealand Astronomical Society, Aurora section confirms that on January 31 two sunspot regions combined and set off a flare starting at 0153UTC reaching maximum at 0230 and ending at 0335UTC," wrote Ron in his February report to the British Astronomical Association.

Auroral

Ron Livesey received reports of visual aurora from observers in Denmark and/ or Scotland describing what they saw as ‘glow or unspecified form’ for the overnight period on February 7, 9, 11 and 26, 'homogeneous arc or band' on the 12th, ‘rayed arc or rayed band’ on the 1st, ‘ray bundles’ on the 1st, 8th, 13th and 20th and ‘active movement, flaming, etc.’ on the 20th.

Doug Smillie (Wishaw) noted weak auroral tones on the signals from the 14MHz Lenwick beacon (GB3LER) on the 1st and 2nd and a station in the Faeroes (DY6FRA) at 1800 on the 1st. Ern Warwick (Plymouth) logged a weak auroral warning from the German beacon DK0WFC on 10.144MHz at 2210 on February 19. There was 'fast-fading' on the 28MHz signals from the beacons in Bulawayo (Z21ANB) and the USA (KC4DPC) on February 5 and January 31 respectively and the South-African beacons Z6SPW, on 28MHz, on the 5th and Z6SDN/B, on 14.1MHz, at 1927 on the 14th. In addition, he reports hearing ‘echoes’ on Z6SPW on January 30 and February 16. None of these reports are surprising especially when the large groups were present on the sun’s disc.

Magnetic

Using various magnetometers, Tony Hopwood (Worcester), Karl Lewis (Saltash), Ron Livesey, David Pettit (Carlisle) and Doug Smillie reported active conditions on days 1, 9 and 11.

Bob Cooper Jr. ZL3AAA (Houhora, New Zealand) has studied propagation since 1950 and among the many interesting items in his letter of March 5, I found the following paragraph setting the stage for his detailed report of conditions on February 10: “As regards Sporadic-E link-up on the south end, there is a high degree of ‘coincidence’ between alpha-index numbers and Sporadic-E; and this is a blessing in disguise. The reported ‘A’ index number at 1000 on the 10th was 14. Double digit ‘A’ numbers often portend (a) improved 50MHz ‘F’ layer activity, AND, (b) markedly improved frequency for Sporadic-E.”

International Beacons

First thanks are due to Chris van den Berg (The Hague), Bob Cooper, Gordon Foote (Abingdon), Henry Hatfield, John Levesley G0HJL (Bromsgore), Ted Owens (Maiden), Fred Pallant G3RNM (Storrington), Ted Waring (Bristol) and Ern Warwick for their 28MHz beacon logs. I combined their efforts to produce the chart in Fig. 3.

Bob Cooper VPS/DK6EDX, copied signals from the two UK beacons G0MVL (28.214MHz) and GB3RAL (28.215MHz), at his residence in the most northerly part of New Zealand on the days indicated in Fig. 3. Bob also hears the Canadian beacons VE3TEK and VE6YF on most days from 1900-2400 and 1900-0200 respectively and rarely hears the Bulawayo beacon Z21ANB. Gordon Foote added KA1NSU to the list this time which he logged daily around 1900 on 28.259MHz. Ern Warwick copied "de WS2B/BCN FN32 POESTENKILL, NY ROCKY BEACON" on 28.238MHz at 1500 on February 17 and, during the period, frequently heard signals from K6BAK (Italy) on 24.915MHz and PY2AM (Brazil) on 24.931 and 18.100MHz, OH2B (Finland), Z6DN/BCN (S.Africa) and 4X6TB/ (Israel) on 14.100MHz and DK0WFC (Germany) on 10.144MHz. Others to look for on 14MHz are L4UA (Argentina) and W6WX in the USA. Fred Pallant reports that GBMY was hearing ZL2MHF (New Zealand) at 0900 on February 22 using his quad antenna beaming in that direction. At 1903, Fred found LU1UG (Argentina) on a new frequency of 28.212MHz. Bob Cooper can hear VK2RSF and ZL2MHF via backscatter when the band is open or when Sporadic-E is present. Ern Warwick heard DF0THD (Germany) on February 1 and, for the firsttime W6WX, on the 14th and 15th on 28.200MHz. Our old friend E6ALU was heard by Henry Hatfield on the 23rd.

Troposphere

The slightly rounded atmospheric pressure for the period January 26 to February 25 can be seen in my television column elsewhere in this issue. However, the weather buffs among you may like to see that my outside thermometer, Fig. 4, displayed a minimum of 12°F (-11°C) around 0500 on February 7 and for your records, I measured 4.02 and 58.7 mm of rain in January and February respectively.
T

The bulk of enquiries I have had so far concern antennas, despite the comments I made in the February issue.

My personal choice is the full size G5RV, which is a dipole constructed of wire with a special ribbon feeder of fixed length, which is then terminated for connection to standard 50Ω coaxial cable (in my case I make the connection via a 1:1 Balun). I had wrongly assumed that most readers would be familiar with the antenna as, at most exhibitions and rallies, just about every amateur radio dealer seems to sell them. How do you make a G5RV and the 1:1 balun? Quite frankly it is hardly worth the bother because you can buy the antenna and balun for roughly £5.00. He asks the reader to check out any of the regular advertisers in this magazine for prices.

The final note on the topic of antennas is for anyone in a flat or similar accommodation where no outside antenna is permitted. Loft antennas or active types are probably the best bet and I will look at those in more detail in the future. Meanwhile, you may care to check some commercial designs from firms such as Dressler and Datong and kitversiones from Maplin, Cirkit and C M Howes. As a further matter of interest, I was faced with a similar problem when living in a flat a few years ago. The company that owned the building strictly banned any kind of antenna, washing line or anything else being attached to walls or walls or the roof. For five years, I worked with a 15m long wire which no-one even spotted. It was made from fine enamelled wire wound from an old miniature transformer and was virtually invisible. It ran from a window box to the roof of a garage and gave surprisingly good results via an antenna tuner.

What You Have Heard

Your letters are now flowing in at a regular rate and I am delighted that many of you have checked out some of the frequencies shown for the NASA Shuttle launches. Paul H. of Newbury reports hearing voice traffic from the Shuttle Columbia and Mission Control on 5.16MHz. He listened to several hours of conversation and has now had a QSL card from W5RRR at the Johnson Spaceflight Centre at Houston in Texas who were rebroadcasting the Shuttle audio. This is interesting because the list in the February edition (taken from KD2ED's Spaceneeds) showed this frequency as a secondary EIR night channel. W5RRR is an amateur station and part of ALINS (AMSAT Live Information Network System) and normally operates on 5.16 and 14.280MHz. Why they should have changed to a non-amateur frequency was not explained in the QSL.

Cliff Stapleton of Torquay has been monitoring civilian and military air traffic. His log includes the RAF on 4.743, 6.743 and 9.034MHz. He's also heard Canadian military traffic on 15.033 and USAF on 11.176 (usually very active; listen out for Croughton in the UK which is sometimes called by the callsign 'Mainsail'), 13.216 and 13.246MHz. Cliff also logged South American Airwavs on 17.925MHz.

Numbers Stations - Spies or Lies

Some readers (including the 'Laughing Cavalier' from London) have asked about the so-called 'numbers stations' that are claimed to be sending coded messages to spies. This is certainly a common belief amongst the national media and hobbyist magazines in America. The claim is that these spoken messages, which consist of nothing more than two, three, four or five digit number strings, are spy transmissions that can easily be received on simple, portable h.f. receivers which can be bought anywhere. I have to say from the outset that I have always been sceptical about these claims. Now anyone with even a simple receiver has probably heard these transmissions. In the UK, the most powerful have been those with the lady announcing the numbers in German. These transmissions have been attributed to East Germany and my scepticism has increased because there is nothing to stop the transmissions coming from anywhere. Perhaps the mystery has just deepened.

Other curious aspect of these transmissions is that no matter what language they are in (some voices are distinctly American) they all seem to operate at around the same frequencies. Try tuning 5.015, 6.840, 7.404 and 7.415MHz particularly at night. Languages you are likely to hear are the German, Russian, English and Spanish. Claims have been made in some American magazines that these transmissions are from the American CIA, Russian KGB, Israeli Mossad and Cuban DGI intelligence agencies. The station that signs Papa November on 7.404MHz is very easy to hear and usually repeats its callsign four times before transmitting a series of musical tones and then the numbers. You are likely to hear a variety of modes used; a.m., s.s.b. and c.w.

New Receivers

I have just spent three weeks in America and can give you news of two new interesting receivers that should be available here in the UK fairly soon. The first is the new NRD-535 which is an improved version of the 525. JRC have tidied up the look of this up-market receiver and added some new refinements such as fully variable i.f. bandwidth and ECCS phase-locked loop a.m. detector. No price had been announced but it will obviously be over £1000 in the UK.

By comparison the new AR2500 scanner from AOR should attract a lot of attention (another Lowe import when it arrives). This is essentially a 16 channel scanner covering 1-1500MHz. The specification looks quite good but what was not clear from magazine advertisements was how s.s.b. was resolved. It may be that rather than u.s.b./l.s.b. switching it only has a b.f.o. control. My experience so far of these combined h.f./v.h.f./u.h.f. types of receivers is that their h.f. performance is not Ideal. Some models appear to suffer quite badly from overload problems and their s.s.b. filters are usually cheap ceramic types.

That's it for this month. Loggs (please include times as well as frequencies), questions (that can be answered in the column) and so forth to the usual address. Complaints, letters and similar unpleasantries to the Editor and no, before any more of this sort, the authorities have not been in touch with us yet.

Abbreviations

| a.m. | a.m. modulation |
| c.w. | continuous wave |
| h.f. | high frequency |
| i.f. | intermediate frequency |
| l.s.b. | lower sideband |
| m | megahertz |
| MHz | megahertz |
| QSL | acknowledgement of contact |
| s.s.b. | single sideband |
| v.h.f. | ultra high frequency |
| v.h.f. | upper sideband |
| v.h.f. | very high frequency |
| Ω | ohms |
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- Mag-mount +4.5db 70cm:

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Dominican Republic

Radio Barahona, mentioned last time, has been logged by a number of DXers and the station has now issued some QSL letters. The station is owned by Empresas Radiodifusiones, SA, based in Santo Domingo. Radio Barahona uses 1kW on 4.930 MHz and is one of several stations owned by the company - the rest are on m.w. and f.m. Radio Barahona's programme airs Saturday evenings in Spanish and includes news, music, religious and educational programmes and commercials.

New Activity in Nicaragua

Decades ago, Nicaragua was one of the more active of the Central American countries on short wave. However, the number of active stations has dwindled down to a precious few even before the Sandinista regime came into power. After that, all that was left was the government outlet. Now, perhaps, a turn-around has started.

Plans for several new stations were announced a few months ago and one has already come on the air. Radio RICA (Radio Informaciones de Centro America) based in Managua opened initial transmissions on 4.901 MHz, then appeared on 4.526 MHz before settling on its assigned frequency of 4.920 MHz, a spot used by Radio Quito in Ecuador. The sign on is sometime after 1:30, but before 12:00 (it seems to vary) and the schedule runs to 02:00.

Radio Nicaragua International - a privately owned station despite its official-sounding name - also plans to open a short wave frequency. The government expects to have its station officially -sounding name - also plans to operate by the middle of the year.

Also in Costa Rica, Radio Lira, operated by Adventist World Radio, should have four more transmitters in operation now - two of 20kW and two of 6kW The middle frequency will, of course, present problems with the powerful Venezuelan Ecos del Toro active on that spot.

RFPI: All Shook Up

Radio For Peace International in Costa Rica was jolted by several earthquakes last December. Fortunately, the transmitters were not damaged, although some damage occurred to the studios and the telephone service was out for a time. The ex-pirate station Radio Newyork International, mentioned last time as being aired over WWCR, is now also on RFPI. The programme airs Saturdays at 2230-0300 on 13.630 and 21.565 MHz and Sundays at 0900-0700 on 7.365 and 13.630 MHz.

Also in Costa Rica, Radio Lira, operated by Adventist World Radio, should have four more transmitters in operation now - two of 20kW and two of 6kW. They'll be used for expanded broadcasting in the 45,31 and 25 metre bands.

Radio Reloj, which has recently been up on 4.839 MHz, has slipped back to its longtime spot on 4.832 MHz, Radio Valera in Venezuela on 4.630 MHz, which used to be a source of interference to Radio Reloj (and vice versa) seems to have gone off the air, hopefully not for good.

The control room at KNLS, Anchor Point, Alaska, which broadcasts in Russian, Japanese, Mandarin and English.

Also from Central America - San Pedro Radio on Honduras has returned on its station which runs until closing just before 0600, a schedule that seems reduced from its former days.

South American Notes

Radio Belgrano in Argentina is heard now and then in what appears to be another reactivation. The frequency is 11.78 MHz and the sign on is reported near 1300 and 1400, running only until 1900. So far, it has proved a difficult log for listeners in North America.

Several old-time Ecuadorians, some silent on shortwave for several months, others for several years, have started up again. La Voz del Rio Tariquni from Cuenca on 3.285 MHz, Radio La Libertador, Saquisili on 4.900 MHz, Radio Guayaquil on 4.911 MHz, Radio Guayaquil, from Quito, Ecos del Oriente in Lago Agrio on 3.270 MHz and Gndas Quevedanas on 3.325 MHz are all broadcasting from Guayaquil. Eismoras Gran Colombia is heard by many North America DXers.

Colombian Clandestine

Radio Patria Libre, thought to be operated by the ELN guerrillas in Colombia, has disappeared from the airwaves. This happened shortly after the national army waged and won a campaign against the headquarters of another Colombian guerilla army - FARC, the Revolutionary Army Forces of Colombia. The army says it destroyed a radio transmitter. Whether it was the Patria Libre transmitter isn't known. El Pueblo Responde, the station that was seen by many South Americans to be around in the country, is still heard at least variably at 1300 and 1400, running only until 1900. So far, it has proved a difficult log for listeners in North America.

KTBN Replaces KUSW

KUSW aired its last broadcast on December 26. Not quite a full three year run for this station. Trinity Broadcasting's KTBN took over the facility on the 18th and began a 24 hours per day religious format, airing the audio portion of Trinity's satellite TV network that is aired on cable TV and by several Trinity-owned TV stations. Reports on KTBN are confirmed with a card showing the KTBN satellite TV network.

Colourful Bonaire QSLs

Trans World Radio, Bonaire this year. One of the series of four QSLs being issued by Trans World Radio, Bonaire this year.

One of the series of four QSLs being issued by Trans World Radio, Bonaire this year.

The popular CBC-TV program 60 Minutes did a story on BBC Monitoring recently. One scene has been commented upon by many listeners: A monitor picks up the telephone and asks that something be done about the poor reception he's experiencing! Wouldn't it be nice if cures for our own reception problems were available? Reports may be sent to KTBN, PO Box 18147, Kearns, Utah 84118. One story making the rounds has it that KTBN raised the $2 million it needed to buy KUSW in a matter of a few hours. They simply went on TV, placed a microphone in front of a short wave set tuned to KUSW's rock and roll and told listeners this is what their donation would get rid of!
Since this column started, several letters have been received from readers asking for more information on what makes up a receiving system for use within the normal domestic environment for tracking TV satellites in synchronous orbit. I’ll try to briefly discuss the main points and I’m only just scratching the surface of a very major subject but I would recommend readers to beg, borrow or buy The Satellite Book (by Amstred), Swift Publications 1991, which thoroughly covers all that the enthusiast and engineer will need to know.

The obvious place to start is the digital decoding equipment that must be accurate in profile to within 1mm for maximum efficiency, and remain accurate across an extreme temperature range with mechanical stability in the extreme winds and on the walls of suburban England for the normal domestic environment for the UK and Scotland. A few letters have been received from readers regarding the profile accuracy together with shadowing, feed assembly matching which will relate to the efficiency of the parabolic assembly which will typically lies between 60-70%.

Minimal Shadowing

The ‘Offset’ dish features the electronic package fed from one side, rather than in the centre of the dish. It’s rather like a section from a large parabolic dish with the focus still at the centre though with much of the dish cut away, using only part of the dish profile as a reflecting agent. The surface of the dish therefore suffers minimal reflection. When viewed from the focal point it is mounted from a single feed to the edge of the dish, rather than in the centre, of the dish. The ‘Prime Focus’ dish features a parabolic assembly which will typically lie between 60-70%.

Orbital Slot News

With the successful launch, via an Ariane 4 rocket, and orbital positioning of Eutelsat II F2 at 10° East, so various satellites on the earlier 15° East and now moved to 19° East and new moved to it will track accurately down to 0° degrees elevation, East or West. The setting up of a Polar/Horizontal mount is when first confronted time consuming. If I found frustrating but once mastered alignment can be fairly quick, care taken at this time will optimise reception in the long term. Instructions in the various text books (again I recommend the above John Breeds, or the Satellite Television Installation Guide by the same author) should be carefully followed. The gain incidentally of a 900mm dish is 39dB, 42dB for a 1.2m and 44dB at 1.5m diameter - all at 11.7GHz.

HDTV use: ID will carry backup for 18 and four additional DBS frequency transponders. The new Norwegian TV10 cable programme that downlinks from Intelsat I West VA F12 operates at weekends Fri-Sun from 2000 to 0000 for the Norwegian market only. It is likely that the market will track accurately down to 0° degrees elevation, East or West. The setting up of a Polar/Horizontal mount is when first confronted time consuming. If I found frustrating but once mastered alignment can be fairly quick, care taken at this time will optimise reception in the long term. Instructions in the various text books (again I recommend the above John Breeds, or the Satellite Television Installation Guide by the same author) should be carefully followed. The gain incidentally of a 900mm dish is 39dB, 42dB for a 1.2m and 44dB at 1.5m diameter - all at 11.7GHz.

Russian Network 1 clock via Horizont 15 at 14°W, 3.675GHz (C Band).

High-definition TV, known as HDTV, offers improved image quality compared to existing analog systems. With the launch of satellites specifically designed for HDTV distribution, this technology has begun to make a significant impact on the television industry. The Russian Network 1 clock via Horizont 15 at 14° West, 3.675 GHz (C Band) is one example of this technology in action.

HDTV signals offer higher resolutions, improved color accuracy, and increased detail, making them a preferred choice for high-end television production. The use of satellites in HDTV distribution enables content to be transmitted over long distances, providing a reliable and efficient means of broadcasting to a wide audience. With advancements in satellite technology and the increasing popularity of HDTV, the future of television broadcasting looks promising.

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

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downlinking from the BS3s bird across the Japanes mainland and giving up to 24 hours of programming daily. Their 'A Mode' digital broadcasting service provides sampling at 32kHz and a dynamic range of 80dB though their future 'B Mode' service will give higher quality 48kHz sampling and a >90dB dynamic range.

And further notes - Scientific Atlanta are installing a completely digital Intelsat A station in the Oman; discussions have been carried out in Jakarta, Indonesia with the Chinese over the possible launch of the next Palapa bird-Indonesia's own satellite - by Chinese rocket.CNN is now being transmitted on both Israeli cable systems and in the Lebanon/Syrian and North Jordan area, the latter over the Middle East Television service. Signals are derived from the HorizonC-Band CNN feed from 40° East; the BTI has signed an agreement with PanAmSat Feed two daily news slots via PAS-1 at 45° West from their USA News bureaux; and Mexico is seeking tenders for two new satellites - Solidarity I & 2 to provide C and Ku-band services, replacing the ageing Morelos I / I birds that have been operated since 1990. Both are basically, one of the requirements for Solidarity 2 is an L-Band transponder.

**Eutelsat II F2 10° East**

The official detail for the above satellite as of the 4th week of March 1991 is as follows:

- RA: 0.9725° vertical W
- RAI Due 11.066G vertical W
- to be ann. 11.1586G vertical W
- TVE Inter. 11.150G horizontal H
- TVE video feeds leased for O2S etc on 10.986, 11.080G, hor, W.
- A French video feed, also on 11.575GHz vertical W.
- Magic Box Star 1 11.167GHz vertical W
- Magic Box Star 2 11.596GHz horizontal W
- TRT-TV 11.568GHz vertical W
- Canal Courses 12.564GHz vertical H NB. The 'W' and 'H' refer to the wide beam or high gain beam footprints from the Eutelsat series II craft.

**Reception News**

With the end of the Gulf War, news feed activity has fallen off markedly, though the Jerusalem Capital Studios still maintain activity on 10° East (11.765GHz) with European traffic most days. For some days in early March the Magic Box feeds on the same bird carried 24 hour test cards before programme transmissions started, though Star 1 programming was carried on both downlinks (11.12 and 11.83G vertical). The newly launched Astra 1B arrived on station 20/21st March and tests are expected within a day or two to confirm footprint pattern radiation. A beacon was noted on the 20th at 11.56GHz confirming its on-station status. Following narrowband tests to check its foot-print coverage, video tests are likely in early April.

**Format viewing enthusiast's RTI's recent Tutti Frutti transmission over Astra 1A in 3D was a great success. Without the special glasses the picture (unlike earlier TV experiments) was perfect. With the glasses some very convincing 3D effects of the female form were very evident!**

British Telecom offered up on Eutelsat II F1 a corporate video presentation during the evening of the 20th March with test signals in B Mac and clear throughout the day prior to pictures from the studio - 'Imagination TX' British Telecom Centre Studio 1. 'A UK 35. Acton' feed was logged 22nd March 11.64GHz vertical early pm over ECS 7° East. BBC news feeds have been monitored by David Thorpe (Crewe). Over PAS 1 at 45° West the BBC, signals strong, suggest checking 11.476GHz. David also reports in his 'Transponder' publication that a news feed has been monitored on several occasions on Intelsat VAF 10 24° West normally in NTSC 525-lines, look on 11.072GHz.

Our old friend Ken Kirkley down in Botswana is still struggling with his 4.9m wide dish to receive European Ku-band TV traffic, it is known that a £6m one will bring in Astra below the equator, so far Ken has seen no signals. An 8 metre diameter dish in Harare, Zimbabwe will give entertainment quality Sky TV as reported by a local dealer.

Mystery signals were logged on the 11th March over 10° East with a caption on colour bars reading 'BA 2' 11.675GHz horizontal at 2145 hours, is this British Aerospace? The same evening and satellite saw a suspected new Spanish feed testing at 11.20GHz vertical. Paul Sanson from Weybridge is using an Echosat 5500 with 900mdish and logged the BBC outside broadcast feed over PAS-145W ex Los Angeles on March 17 of the British Academy Awards for BBC 1 though carried to the UK in NTSC 525 lines. Earlier in the month motor racing fan Bob French in Rugby watched the Arizona Formula 1 practice sessions live in full over the new Eutelsat II F2 126Hz transponder - the North Atlantic circuits are becoming very active and its worth keeping a watch - particularly PAS-1.

Finally Alex Gordon from the Scandinavian Scansat Broadcasting group has written giving much information on their European operation which I'll detail later, one point worthy of note, Scansat operate a mobile uplink vehicle 'Comink Skybus', if you receive the identification 'SWE-2' over 13° East, that's what it is!
Lee Electronics

This is a small selection of our range of scanners

AR-1002

With the new generation of Scanner, we are looking at innovation. The strange looking liquid crystal display not only shows the frequency, mode and so on, it is also a panadaptor! For those of you who are new to scanning I had better explain what that is. The vertical line on the left hand side of the display is to show signal strength and the horizontal line along the bottom is the frequency range. This range can be set to 100, 250 or 1000kHz. The frequency displayed at the top is the frequency at the centre of the line. In other words, if the displayed frequency is 145.50MHz and the width of the display is set to 1000kHz then the left hand side would be 145.00MHz and the right hand side would be 146.00MHz. Now comes the Magic. Every time a signal comes up within that frequency range (i.e. 145-146MHz) it will show up as a spike on the display. The height will show the signal strength and the position will indicate the frequency. By simply turning the tuning knob a cursor can be slid along to line up with the new signal and its exact frequency will be displayed at the top of the screen! To receive the new signal, just press a button and that signal becomes the one that is heard and the display will shift to place it in the middle of the screen. The width of the spikes is governed by the setting of the step size (10, 25 or 25kHz) so you can see that it is possible to monitor the activity on up to 100 channels simultaneously. If, for instance, you are looking for a specific signal but you only know the band that it is in and not the spot frequency, just set up the appropriate band edges and then sit back and watch the display. Any signals that then appear can be instantly spotted and tuned to in seconds. That’s what a panadaptor can do for you!

As for the rest of the scanner, it covers 50 to 904 995MHz with AM and FM (wide & narrow), it is powered by 13.8V dc and it measures just 180mm W x 180mm D x75mm D.

£249.00

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At last a base station/mobile version of the popular AR-9000K, with all the features and better performance. Frequency ranges 60-88, 108-136, 137-174, 220-280, 300-380, 406-470, and 830-555 MHz. AM or FM available on any frequency 100 memories. Everything in fact that you need in a scanner, and from the best maker in the world.

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ICOM OPEN DAY SATURDAY MAY 18th

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IC 1000 MOBILE WIDEBAND RECEIVER
AOR 1000 HANDHELD SCANNER
IC 72 GENERAL COVERAGE RECEIVER
IC 7000 MULTIMODE RECEIVER
HF 225 GENERAL COVERAGE RECEIVER

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BLACK OR WHITE DIGITAL WITH ALARM............£43.50
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Just some of our many products are listed above. Send an SAE to receive our latest catalogue.
The long spell of super conditions seems to have ended at the time of writing, with 'low normal' as a bit of an anticlimax. Perhaps the best way to keep up with the vagaries of propagation is to listen in to RSGB's News Bulletins, on Sunday mornings on 3.5, 7.045 and also on 14MHz spots. The bit you really want is usually at the end of the session devoted to propagation, with the first part looking at the week in retrospect. The SWM RadioLine also carries regular propagation reports and for more detail on short-notice DX, you should be listening to the PWL Wire.

The Mail Bag

So, let's have a peep at the mail, with Bill Williams leading off. On 3.5MHz, Bill found G2AJY, ZB2AL, CE2CC, CE2RG, HK4KYP, HK8MJU, L6JEFUP, PT72BW and VP2EES. A 2MHz morning tea-time session on March 2 resulted in 9K2AL, AP7KAI, BV2FA, FE0EK, HL1AAW, JBASJFT, J3C2LMW, JH4BUP, T1CSW, KV8FWB and VO8PR. As for 21MHz, he found A71AL, HK3MNO, FW1IU, JJ2NUI, PP2JF, T23YL, VE3ITP, W1FDH, VO1KU, K1UN/M, VK4HF, VO1TA and VO282D, mostly 28MHz gleanings.

Pete Baker writes a letter from Newcastle. He also picked up the Tripoli-in-OD-DQ question, and mentioned the 1/2BHR in France. Peter is up to 273 countries confirmed since 1977, gleaned with an R-1000 receiver, end-fed wire and a.t.u. The list confirms that Peter is indeed an avid s.w.l. In the section devoted to propagation, Peter is pleased with his new toy, although as he says there must still be some DX out there. On 5MHz, Jeff ranged right up to the US phone band to find W4JW, KC1GDD and VO1LF. As for 1.840MHz but didn't quite get above 2MHz, GM4CAZ/P was a storming signal from GM4CAZ/P was a storming signal from Shetland Is with a full quarter-wave vertical at the Pows. Net closed down, and knocked off some 23 or more stations. GM3XYM/M confirmed his contact with GM3CAZ/P and then put out a CQ call, claiming to be 'lost in the veil of Garri in the Western Highlands!'

Many of your letters ask what is DX? A specialiston this band is R.F. Merrill of Dunstable. About 80 assorted UK Europeans calls were logged in on c.w. One Sunday evening, N2RM counted away for fifteen minutes before Europe woke up to his presence, when he worked a string including SM6CW, G3FBP, O60X, DX5J and QO8P. Additionally, a weak 5W above plus one W5 were noted on 1.840MHz but didn't quite get above the noise. On the sideband front, GM4CAZ/P was a storming signal from Shetland Is with a full quarter-wave vertical at the Pows. Net closed down, and knocked off some 23 or more stations. GM3XYM/M confirmed his contact with GM3CAZ/P and then put out a CQ call, claiming to be 'lost in the veil of Garri in the Western Highlands!'

John Heys is somewhat of a dab hand with antennas and makes an interesting point. He has a half-wave dipole which, like most of the breed, favours some directions over others. John says he has got useful results by strapping the feeders together and operating the antenna as a Yagi. He finds this a technical against a good ground - but the 'good' in this case being quite important. Of course, the changing from the normal dipole connection to this arrangement enables him to 'fill in' any gaps in coverage.

Finale

Right at the last moment, I received a letter from Harold Wood, who reports receiving a QSL card from OD5RH showing his details as Hani Ran OD5RH, PO Box 8, Tripoli, Lebanon, plus, on the back of the card, an address in Washington DC! Harold says he is now well confused! Probably it will be found that the address in Washington DC is for a USA QSL Manager. Many of your letters ask what is unacceptable about the 3X1SG operation, as the the QSLs are in. The story is a simple one - originally, all QSLs were to run in the ILA magazine. Details of ILA from their office at 1 Jersey Street, Hafod, Swansea SA1 2HF.

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I was way back in June 1948, while checking a Philips combined radio and television receiver, that I first saw the chaos a Sporadic-E disturbance could cause to 45-line pictures at 45MHz. I have been fascinated by propagation ever since. The 4in screen was covered in fluctuating criss-cross patterns and a variety of foreign voices were coming from the loudspeaker. I have referred to this because, by the time you read this at the end of April, we will be at the beginning of the 1991 Sporadic season. We’ll be looking forward to seeing those test-cards and snippets of programmes again from Scandinavia, through most of Europe to the Mediterranean sea. You can expect a Sporadic-E disturbance to start suddenly, spread to a peak when some signals will be fighting others for predominance on the screen and then fade away as quickly as it came. Your best checking points are Chs. E2 and R1 on your TV dial if your scanner to 40.25MHz or 48.75MHz respectively and listen for the synchronising pulses to appear.

Should I Start TVDXing?
I am often asked by radio enthusiasts with other listening interests after reading the reports in this column each month, ‘how do I get started with DXTV?’ The latest request came from one of our many young readers, Paul Beach (London), who has taken the magazine for several years and is particularly interested in receiving French and Italian pictures. What bothers me is encouraging any reader to install equipment for DXTV and then finding that he or she is disappointed with the subject. Unlike recommending a communications receiver which has something to offer all of the time, DXTV is a random business and there simply isn’t any activity until some form or atmospheric disturbance takes place. Therefore, before spending any money on equipment for this work I suggest that you to keep the following points in mind.

What Do I Need?
For long distance television reception, you require a 625-line television receiver, or a converter for a v.c.r., with tuners covering the v.h.f. Bands I (46-48MHz) and II (175-230MHz) and the u.h.f. Bands IV & V (471-608 MHz & 615-856MHz). Most suitable receivers have their dials calibrated with the European channel numbers, E2-4, E5-12 and 21-69 respectively. First, try your library for the World Radio TV Handbook and, in the TV section, see which nearby countries operate in these bands and what system their networks use.

Under normal atmospheric conditions, TV signals from foreign countries are unlikely to be received in the UK, however, such signals do appear, in Bands I and II, when Sporadic-E is present and in Bands III, IV and V during Tropospheric openings. Although there are random Sporadic-E disturbances throughout the year, the main season is between May and September, peaking in June and July. Briefly, tropo-openings are most likely to occur at anytime while the atmospheric pressure is high, (say above 1030mb) and the prevailing weather is fine and clear.

I suggest that you send 75p to David Martin at Aerial Techniques, 11 Kent Road, Parkstone, Poole, Dorset BH12 2EH, for his latest catalogue of suitable receivers and antennas. David is an enthusiast as well as a director in the firm. It is also worth writing to HS Publications, 7 Epping Close, Derby DE3 4HR to get the gen on the D-100 TV converter and possibly purchasing the books, Guide to World-wide Television Test Cards, by the proprietors, Keith Hamer and Garry Smith, (£4.95) and TV DX For Beginners, by enthusiast Simon Hamer (New Radnor) (£2.95). A TV DXers Handbook, by fellow columnist Roger Bunney (£5.95). Some of these are also available from the SWM Book Service.

Please note, that because of the various television systems used in other countries, the sound and picture are not always together and do remember, that you may wait days or perhaps weeks without receiving DXTV signals, but when the bands are open, the subject is fascinating as no doubt your have seen by the reports that I receive each month.

Back now to the winter of 1991 and during an ‘F2’ opening around 0830 on February 18, Simon Hamer watched a strong smear signal from Australia (DDQ-0) on Ch. A0 (46.25MHz). He heard synchronising pulses from China (CCTV) and the USSR on Chs. C1 and R1 (both 48.75MHz) respectively and New Zealand (TVNZ) on Ch. 1 (45.25MHz). Later, he saw Dubai, Iran and possibly Zimbabwe on Ch. E2 and the USSR on Ch. R1. If that wasn’t enough, he rounded the event off with an unidentified 525-line signal from North America on Ch. A2 (55.25MHz).

John Woodcock (Basingstoke) made a quick check on Band I in the mornings and afternoons on most days during the month prior to March 8. He frequently heard utility stations from Europe at the low end of the band and from the USA on the February 18. John thinks there was an ‘F2’ opening on March 4 when he received unidentified and unlockable pictures in the band.
While a couple of those brief winter Sporadic-E openings were in progress, Russ Burke (Northampton) received pictures from Italy (RAI UNO) on Ch.1a (53.75MHz) at 1820 on January 2 and Spain (TVE1&2) on Chs. E2 and E4 (62.25MHz) between 2245 and 2300 on the 14th. The former event only lasted for 5 minutes.

Bob Cooper Jr. ZL0AAA (Houhora, New Zealand) received Australian video on 16.170MHz between 2106 and 2200 on February 10 via Sporadic-E and again at 0357 on the 11th. Also on the 11th he logged a New Zealand TV carrier on 45.240MHz via 'F2' backscatter at 0454 and Russian video at 0454 and 0739.

**Picture Archives**

“The near miss” with my camera is a test-card from Sweden TV4, Fig. 1, on Intelsat VA F12, 1°W,” wrote satellite TV enthusiast, Les Jenkins from Sussex. He also logged a caption, “shown only 30 seconds before start of local ox!”, Fig. 7 and Irkutsk ‘general TV’, Fig. 8, which he saw in his hotel room. Both were in the afternoon on Ch, RS(93.25MHz) and it’s worth remembering that the synchronising pulses on this frequency and the associated sound channel on 99.75MHz are often heard on our Band 2 receivers during some of the massive Sporadic-E openings of June and July.

**Tropospheric**

The slightly rounded atmospheric pressure readings for the period January 26 to February 25, Fig. 14, were taken at noon and midnight from the chart of the continuously recording barograph installed at my home in Sussex. While the atmospheric pressure was falling on February 19, Simon Hamer received Band III pictures from stations in Denmark (DR) on Ch. E8, Norway (NRK) on Chs. E5 and 11 and Sweden (SVT1) on Ch. E6. He also saw pictures in the u.h.f. bands from Belgium (BR1&2), Denmark (TV2-Hedensted), Germany (DFF, NDR1&3, WEST3, WDR1 and ZDF) and Sweden (SVT2).

**SSTV**

Activity in the world of slow-scan television is very different to DXing in the broadcast TV bands mentioned earlier. For instance, the requirement is a good quality communications receiver (which has plenty to offer as well as SSTV), some form of decoder like a computer and software, a display and possibly a printer. Among the popular frequencies allocated to slow scan within the h.f. amateur bands is 14.238MHz, where many stations can be ‘heard’ transmitting pictures.

Briefly, the audio signal, a shrill and fast variable tone, is fed from the receiver’s audio output into the decoder and with slight adjustment to the receiver tuning the picture slowly builds up on the display. During a six week period prior to March 4, John Scott (Glasgow) tuned between 14.227 and 14.235MHz and received idents and captions from stations in Belgium (ON4ABP), England (G4XDK), France (F6G10), Germany (DL1SSBL), Holland (PA3AII) Fig.9, Spain (EA2J0) Fig.10, Switzerland (with a special prefix HE1BYO) and Yugoslavia Y21UO.

Sometimes callsigns are not easy to read, as in the case of the ‘Flintstones’ drawing, Fig. 11, received by John, so please forgive any errors that he made in reading the call-letters. Over in Holland, P de Jong copied a Polish amateur (SP3AMZ) exchanging pictures with a station in Japan, Fig.12 and a ‘group’ logo from Y21UO, Fig.13.

**Abbreviations**

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<tr>
<th>Ch.</th>
<th>channel</th>
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<td>DXTV</td>
<td>'long distance' television</td>
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<td>in</td>
<td>inch</td>
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<tr>
<td>MHz</td>
<td>megahertz</td>
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<tr>
<td>SSTV</td>
<td>slow scan television</td>
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<tr>
<td>TV</td>
<td>television</td>
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<tr>
<td>u.h.f.</td>
<td>ultra high frequency</td>
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<tr>
<td>v.c.r.</td>
<td>video cassette recorder</td>
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<tr>
<td>v.h.f.</td>
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**Fig. 14:** Barometric chart for the period covered by this month’s column.
This is the closed season for aviation, so as there’s not too much to report by way of your letters this month I hope you’ll indulge my historical ramblings that follow.

If you are going to a display or other event, let me know date, time and a meeting place; I’ll publish it here in case any other readers would like to meet up with you. It’s not yet clear which military displays will take place, so I’m surprised to note that Focke-Wulf Fw200 Condor in 1938.

Aircraft that you’ve experienced that the Herald, 747 and C-130 are the only long, Paul, so I’m surprised to note that accept. The remainder of your list is interesting types, including the CL-44 was stuck on the runway until it could be taxied off.

Antonov’s tow bar had broken and it was stuck on the runway to clear. Meanwhile, the Antonov’s tow bar had broken and it was stuck on the runway until it could be taxied off. Paul has certainly flown in some Paul Hilton provides some history, as remarked on before, the An-225 experienced problems at Farnborough last year. Paul Hilton (Newbury) noticed that a Concord ended up on an extended sightseeing tour of southern England while waiting for the runway to clear. Meanwhile, the Antonov’s tow bar had broken and it was stuck on the runway until it could be taxied off. Paul has certainly flown in some interesting types, including the CL-44 Yukon (Canadian adaptation of the Britannia, with hinged cargo-loading tail). If you can spare the documents on this, my Museum, I’d be delighted to accept. The remainder of your list is long, Paul, so I’m surprised to note that the Herald, 747 and C-130 are the only aircraft that you’ve experienced that I’ve missed out on! I did fly a Hercules simulator, though. I do enjoy reminiscing about the mixture of older types (Trident, 707, Viscount, Comet, etc.) and it seems that there is less variety nowadays when most airliners are E-777 or DC-10.

In March, J. Cooper (Bransholme) had the problem of identifying signals on 440-460kHz. Paul knows of c.w. transmissions in this band from the Canadian Coastguard Ice Advisory Service; if they are the ones responsible for J. Cooper’s observations then they would only be expected to be received in the UK at night and probably with a reasonable antenna.

Fellow columnist Paul Essery GW3XFE (Newtown, Powys), better known for ‘Amateur Bands Round-up’, identifies the radio mast (March ‘Airband’) as definitely non-aeronautical, so enough said on this subject.

So that we know what an n.d.b. looks like, Allan Lewis (Kelsall) sends the photo of the Whitegate beacon mentioned in previous issues. You were lucky to watch the landing on 06 at Manchester from the cockpit of your 737 while returning from holiday, Allan! GW3XFE has an interesting background, including working for Coscor on secondary surveillance radar transponder. These are the airborne devices that respond to the interrogation pulse sent out by ground-based radar. The information that the transponder sends back contains the four-digit squawk code and can also show altitude. The cockpit ends of a Coscor SSR 1601/3 (Trident) and 1601/4 (VC-10, complete with BOAC label!) are on display in my Museum and I see that Paul was involved with these.

History
SSR is still known as IFF (Identification Friend or Foe) in some places (I noticed this in France) as it was developed from this wartime system. Allied aircraft sent out interrogation pulses and awaited a reply from possible target aircraft. A reply from the target’s transponder indicated a friendly aircraft, as the enemy did not have IFF. If any case we knew what codes to generate. Hence it was important that no IFF sets ever fell into enemy hands, and in this way the codes remained secret. wartime IFF sets were fitted with explosives so they could be destroyed in the event of a crash on enemy territory. Even today, aircraft remaining buried after a crash can become an explosive menace if excavated.

Delving in to this history reminds me that radio beam navigation was developed by the Germans during the war. A highly directional antenna array would transmit a narrow beam, modulated on one side by dashes and the other by dots. Only when flying precisely along the centre of the beam would the modulation be heard to merge into a continuous tone.

An aircraft on reconnaissance duty crash-landed whilst testing beam reception and the receiver was recovered intact. The receiver seemed to work in the manner of a known form of early blind landing aid, but was more sensitive than would be needed to follow a beam near to the runway. This gave the clue that accurately-shaped low-distance radio beams might be in use.

The RAF eventually found such beams and usually succeeded in jamming them, even using medical diathermies as makeshift transmitters. Unfortunately, the day the beam was pointed at Coventry the RAF failed to locate it and the resulting devastation from unhindered, accurately-guided bombing was well known. Paul Hilton provides some history, too. Paul Hilton’s collection.

The Whitegate non-directional beacon. Allan Lewis.

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The RAF eventually found such beams and usually succeeded in jamming them, even using medical diathermies as makeshift transmitters. Unfortunately, the day the beam was pointed at Coventry the RAF failed to locate it and the resulting devastation from unhindered, accurately-guided bombing was well known. Paul Hilton provides some history, too. The photo shows a Lufthansa Focke-Wulf Fw200 Condor dating from 1938 at either Vienna or Munich Paul’s step-father is in the foreground. D-A7HR is named Saarland, but is it the first example of the Fw200 which bore the same name but was registered D-AERE? Can anyone else solve this? Thanks for the photo, Paul; it must be especially interesting for you to have a documented family connection with even a brief encounter with aviation history.

Frequency & Operational News
GASIL 2/91 from the CAA reports various aerodrome frequency changes, and I have tried to summarise a long list which is almost like a timetable at certain airfields. Other information comes from CAA AIC 10/1991: Blackbushe - preferred entry/exit lanes abandoned as they appeared to increase traffic congestion;

Abbreviations
AIC Aeronautical Information Circular
Am Antonov
B Boeing
BOAC British Overseas Airways Corporation
CAA Civil Aviation Authority
c.w. continuous wave
DC Douglas Commercial
ft. feet
GASIL General Aviation Safety Information Leaflet
kHz kilohertz
kW kilowatts
MHz megahertz
n.d.b. non-directional beacon
NOTAM NOTice to AirMen
QNH Altimeter setting which gives height above sea level
RAS Royal Air Force
SSR Secondary Surveillance Radar
VOLMET VOLUMe METeorological report
v.d.r. very high frequency omni-directional radio range
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Coventry Radar - 122.0MHz by arrangement, closed Tue 1200-1600 for maintenance
Coventry Approach - 119.25 MHz Mon-Fri 0700-0050 & Sat-Sun 0830-2000
Duxford Aeronautical Flight Information Service - 122.075MHz replaces 123.5MHz
London (Stansted) zone - 122.55MHz. Radar not always available on 125.55MHz. Transit traffic should try 126.95MHz for radar, but route clear of zone if no response
Northrepps Air/Ground - new frequency 129.825 calloign 'Cromer Micro'
Norwich - runway 04/22 reinstalled
Paul Hilton elucidates the current hand-off procedure when aircraft leave the Dover sector (London Airways 134 9MHz) for Maastricht Control, whilst heading for the Koksy v.o.r. in Belgium. Either 132.2 or 132.85MHz are used by Maastricht.
Roy Patrick (Derby) obtained information on New York VOLMET from the authority that transmits it. Roy's main interest over the last 55 years is listening to shortwave broadcasts for which he now has a Lowe HF-125, long wire and a.t.u. New York VOLMET is on 6.604, 10.051 and 13.270MHz, and 3kW output is run to a rhombic antenna. The transmitter is 72km east of JFK on Long Island. Transmissions are on the hour and at half-past each hour.

The next three deadlines (for topical information) are May 17, June 14 & July 12.
**scanning**

Alan Gardener
PO Box 1000, Eastleigh, Hants S05 5HB.

---

Yes - yet another new scanner! The Shinwa SR001. Rather a strange name, but that's nothing compared to the receiver itself. Most of the front panel controls would normally expect are missing, the main functions being selected by means of a hand-held infra-red remote control, a bit like a TV channel changer. Now, I could understand this if the scanner was designed for use as a base station, but the size and construction makes it more suitable for use in a car. However, I'm not too sure about how to operate it when driving!

The styling of the unit reminded me of the Kenwood RZ-1, in that the look is similar to an up-market car radio, with the die-cast chassis performing an almost identical function and, suggesting the high frequency end, suggesting some of the range. This is particularly true at either end. A blanking plate covers the die-cast chassis performing an 'N' type mounted on a short flying lead, the other is a chassis mounted 'BNC' allowing remote switching when the scanner is not in use. A black plastic case covers a slot in the rear panel, which accepts an optional RS-232 computer control board.

**Performance**

The r.f. performance is moderate, with the sensitivity tailing off at either end of the range. This is particularly true at the high frequency end, suggesting that it was originally only intended to stretch as far as the Japanese personal radio band at around 900MHz. One plus point is the high frequency first, that should help minimise problems from image frequency interference.

Overall, the unit is neat and certainly catches the eye, but just can't get used to the infra-red remote control. However, I am sure that there must be an application for it - somewhere. The price has not been set at the time of writing, but if you would like further details then contact: Martin Lynch, The Amateur Radio Exchange Centre, 286 Northfield Avenue, Ealing, London W5 4UB Tel: 081-566 1120.

**Antennas**

The subject of antennas seems to feature regularly in readers' letters. I don't really find this too surprising as it is often possible to obtain a considerable improvement in reception for very little financial outlay.

John Combes of Dorking has sent me details of an inexpensive antenna that he has made for the v.h.f. and u.h.f. airbands. He has mounted this in the roof space of his house and says that it gives a dramatic improvement in reception when compared to the antenna supplied with his AR1000. The elements are made from wire coat-hangers that are first straightened out and then cut to length. Connection to the 50Ω coaxial cable is made via a large 'chocolate block' style connector that forms the centre insulator. The whole antenna is then suspended from the apex of the roof with nylon garden twine. The design John developed, is based on a principle commonly used for multi-band short wave antennas, that of connecting several different frequency dipoles in parallel with each other. Providing that the frequency of operation of each dipole is sufficiently removed from the others, and also providing the elements can be kept physically separate from each other, then the performance should be comparable to that of a single dipole operating at its resonant frequency.

Each element has to be cut to the correct length for the frequency of operation. This can be determined from the formula: 75000 = the frequency of operation (MHz) x length of the element in millimetres. So, the first stage of construction should be to choose the frequency ranges required from the antenna. A dipole will normally give a good impedance match 10-15% either side of its design frequency. For example, a dipole tuned to 100MHz should work reasonably well from 85 to 115MHz, but one tuned to 400MHz will give a much larger span of 340 to 460MHz. By a careful choice of frequencies, it should be possible to obtain good results on most of the commonly used bands. John produced three pairs of elements in his design, but I would think that six pairs is the practical limit. John chose frequencies of 130, 275 and 350MHz giving lengths of 570, 270 and 210m. A good choice of frequencies for a 6-element version would be 80, 115, 150, 215, 350 and 430MHz with lengths of 1310, 570, 500, 270, 210 and 170mm.

**Really Straightforward**

The bottom end of each element is fastened in the chocolate block connector with each pair of dipole elements being arranged to lie one above the other. (Fig. 1). To minimise interaction, they should be interleaved so that similar length elements do not lie next to each other. As an additional precaution, each element should be bent away from the centre connector at an angle of about 30° so that the completed antenna looks like two cones with their apexes joined together. (Fig. 2). The antenna should be mounted with the support string running vertically through the centre of the cones. Use the best quality coaxial cable that you can afford and lead it away from the centre of the antenna horizontally for a short distance. Strips can be used to support the cable if needed. Try and mount the antenna well away from any mains wiring or water pipes and fasten it as high up as possible.

Although this description may seem rather complicated, construction of the antenna is very straightforward and lends itself to further experimentation, so why not have a go? - my thanks to John for passing on the details.

From your comments, it would seem that some of the helical antennas supplied with hand-held scanners give disappointing results on the u.h.f. bands. This is because the spirally-wound element tends to only have one fundamental frequency of operation as opposed to the harmonic responses of other wire antennas. One way of improving the operation of such an antenna is to include an additional element specifically for operation on v.h.f. This need only take the form of a short quarter wavelength of wire connected in parallel with the existing element.

To check if your helical needs modifying, try pulling the protective end cap off the tip of the antenna. Look down the centre of the wire spring and see if you can spot the end of an insulated wire. Do not confuse this with the plastics support rod that is sometimes fitted by manufacturers to improve the mechanical strength. If you can't see anything, then carefully remove the rest of the insulation away from the end of a short length of stiff wire. Feed it down the inside of the spring, un-insulated end first. Next, pull the end of the cable through the

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side of the spring at the base, as near to the bottom as possible. Solder the wire to the bottom of the spring and cut off the other end flush with the end of the spring. Make sure that the end of the cable is well insulated and cannot short against the spring. Once this has been completed replace the outer layer of insulation and the protective end cap. You should now find a marked improvement in the reception of signals on u.h.f. when using the antenna.

**Antenna-ator**

Whilst we are on the subject of helical antennas, J. Bihflis of Co. Kildare passes on a suggestion for coupling external antennas into a hand-held scanner by wrapping a coupling coil around the helical antenna rather than by connecting it directly into the antenna socket. This may seem a rather strange idea at first, particularly as I am always saying how important it is to have a good antenna system and only to use the best quality coaxial connecting cable. However, some hand-held scanners just cannot cope with the coaxial cable, however attenuators are not particularly cheap and several different values may be required in order to give the optimum signal level.

By using a coupling coil and varying its size and position, different degrees of attenuation can be obtained. In order to make it easier to move the coil it is a good idea to wind it on a former. This can be made by wrapping a small length of thin card around the antenna and then winding the coil on as shown in Fig. 3. Insulation tape is then used to fasten the coil in place and to secure the coaxial connecting cable. You may have to experiment with the size of coil and its spacing in order to obtain the best results but %b it will seem to be a good starting point.

Connect the two ends of the coil winding between the inner and outer conductors of the of the coaxial cable. The assembled coil can then be moved along the antenna in order to achieve optimum coupling. You may have to choose between losing really weak signals or overloading on very strong ones but you should be able to find a compromise somewhere between the two extremes. My thanks to J. Bihflis for his useful suggestion.

**Antenna Kits**

Several readers have commented on the excellent results they have been achieving with the C.M Howes AA4 active antenna kit mentioned in the October 1990 column. This seems to work particularly well on the u.h.f. military airband, where it is reported to out-perform most commercially manufactured discones. One or two people have experienced problems when using the antenna with some of the current generation hand-held scanners that offer continuous frequency coverage. This is because the additional r.f. gain provided by the amplifier stage in the antenna tends to overload the receiver at a much lower signal level than normal. Switching the 10dB attenuator on the interface board into circuit should help to reduce the problem without seriously degrading performance. The current price of the kit is £18.80 and you can obtain further details from their catalogue by sending an s.a.e. to: C.M. Howes Communications, Eydon, Daventry, Northants NN11 8PT or phone: (0327) 6017R. Interestingly, their AA2 hand-held active antenna kit also works very well - and I don't have shares in the company!

**Military Satellites**

Regular readers will have spotted the interesting signals and then drop me a line. Until next month - Good Listening.

---

**Abbreviations**

- a.m.: amplitude modulation
- d.c.: direct current
- f.m.: frequency modulation
- h.f.: high frequency
- i.f.: intermediate frequency
- kHz: kilohertz
- MHz: megahertz
- mm: millimetre
- n.b.f.m.: narrow band f.m.
- r.f.: radio frequency
- s.a.e.: stamped addressed envelope
- TV: television
- u.h.f.: ultra high frequency
- v.h.f.: very high frequency
- w.b.f.m.: wide band f.m.
- Ω: ohms

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US NAVY FAX STATIONS

Being a major naval power, it’s not surprising to find that the US Navy has a formidable world-wide radio FAX network. Jan Nieuwenhuis from The Netherlands has just sent me his latest compilation of these FAX stations. I’ve reproduced the details here for all you FAX enthusiasts. The list is arranged in station order for convenience.

Adak 8.494MHz

Catania/Sicignella, Italy, 9.05, 17.04MHz.

Diego Garcia, 7.582, 12.806, 20.302MHz.

Exmouth, Australia, 8.614, 12.7215, 16.9145MHz.

Norfolk, USA, 3.357, 8.06, 10.865, 16.41, 20.015MHz.

Pearl Harbour, Hawaii, 4.855, 9.399, 21.035MHz.


San Francisco, USA, 6.453, 9.095MHz.

SUBIC BAY, 10.964, 15.923MHz.
Totsuka, Japan, 4.963, 12.777, 22.3225, 4.967, 22.3265MHz.

LF RECEPTION TIP

Over recent months many readers have written asking how they can improve reception of the F.I. FAX station Offenbach Meteo. The reason for the interest in this station is the range of interesting images transmitted.

Probably the most popular are the re-broadcast Meteosat satellite images. These are full grey scale photographs which, with the right equipment, can produce excellent pictures.

Reception of this station is complicated by three main factors:

a. Narrow shift of 150Hz.
b. Low Frequency of 134.2kHz.
c. Adjacent channel interference.

The narrow shift means that tuning accuracy becomes critical, as does the stability of the receiver. It’s common for listeners to have problems with automatic reception of narrow shift signals. This can usually be traced back to inaccurate tuning.

The reception of I.F. signals often requires a change of antenna, as many conventional h.f. antennas lose efficiency at these low frequencies. If you’re using a G5RV or similar centre fed antenna, there is a way to improve the I.F. performance. All you do is short the inner and outer of the feeder at the shack and connect them to the antenna input of the receiver. However, this doesn’t help with the final problem of adjacent channel interference.

In the case of Offenbach this interference is from a radio-location system and the effect can be severe. There are two basic routes to reducing the effect of this interference.

The first is to use an adjustable audio filter such as those available from Datong and ERA. These need careful adjustment to minimise the effect of the interference.

The final option is to use a directional antenna to null out the interfering signal from the Offenbach station. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal. To help with this J. Briggs of Sheffield has written giving details of the ferrite rod antenna system and the effect can be severe. The system is based around the type of ferrite rod antenna that can be recovered from the Offenbach signal.

For those with some constructional skills, I’ve shown the basic circuit in Fig. 2. This has been adapted from the circuits sent in by Mr Briggs. His full design probably justifies a complete article and covers 60 to 650kHz using two plug-in heads. The unit in Fig. 2 has been adapted for use over the range 115 to 360kHz.

FREQUENCY LIST

To finish off, here is this month’s selection of frequencies. All the transmissions listed have been received by readers of ‘Decode’ over the past couple of months.

The format is the usual; frequency, mode, speed, shift, callsign, time and notes.

4.268MHz, TOR(B), 100, 170, SAB23, 0508UTC, Ships.
5.460MHz, RTTY (Arabic), 50, 425, - , 0442UTC, Arabic Press.
5.466MHz, RTTY, 150, 425, -, 1008UTC, China BBC.
5.466MHz, RTTY, 150, 425, -, 0038UTC, VoA Tanger.
7.85MHz, RTTY, 75, 400, -, 0053UTC, Xinhua Beijing.
7.845MHz, RTTY, 50, 375, SOH284, 0033UTC, PAP Warsaw.
7.91MHz, FAX, 60, 288, RCW79, 2310UTC, DATO/Mata Meteo.
10.1172MHz, FAX, 120, 576, BAF4, 2346UTC, Beijing Meteo.
10.233MHz, RTTY, 75, 70, -, 0014UTC, VoA Bethany.
10.647MHz, ARDS32, 200, 660, -, 0010UTC, French encrypted.
11.467MHz, RTTY, 50, 215, HMFS2, 2255UTC, KCNA Pyongyang.
12.11MHz, RTTY, 50, 400, YOM21, 1310UTC, Romet Press Romania.
12.3155MHz, RTTY, 50, 400, RVWS57, 1148UTC, TASS Moscow.
13.43MHz, RTTY, 100, 400, -, 0715UTC, APN Moscow.
14.367MHz, RTTY, 75, 425, BZP49, 0706UTC, Beijing Xinhua Press.
15.575MHz, RTTY, 50, 400, RE030, 0455UTC, TASS Moscow.
15.605MHz, RTTY, 50, 275, SAU19, 0234UTC, MEF1 Cairo.
16.9060MHz, CW, -, YR, 1530UTC, Basrah Iraq.
18.347MHz, ARQ/SW, 100, 400, SAM, 1008UTC, MFA Stockholm.
22.3275MHz, CW, -, SVG7, 1500UTC, Athens Radio.
22.3725MHz, CW, -, IAR22, 1530UTC, Rome Radio.
22.3975MHz, CW, -, VCS, 1500UTC, CCG Haifa Weather.
22.417MHz, CW, -, LPD91, 1700UTC, Pacheco Radio Argentina.
22.431MHz, CW, -, PXK, 1720UTC, Jakarta Radio Indonisia.

OSL card from OST - OSU coast station at Ostend, Belgium, received by Maurice Lloyd.
I nearly January we had two Russian weather satellites operating, METEORDS 3/3 and 2/19, with occasional short transmissions from OKEAN 2. From the eve of the Gulf War 3/3 went into semi-retirement with irregular transmissions and then it was off from about January 18. For several weeks, only METEOR 2/19 was operating. Late February saw METEOR 2/20 replace 2/19 (on 137.85MHz) which was by then moving close to the terminator, and from March 1, METEOR 3/3 came back on using 137.30MHz. As always the American NOAs have carried on - NOA 9 being switched off due to pass coincidences with NOAA 11 during February and early March.

The NOAs move in orbits that synchronise with the sun so that each passes us (and every other place on Earth) at around the same local time. NOAA 11 is always passing northbound around 1800UTC and southbound around 0600UTC, give or take an hour. The METEORS are in orbits that slowly change their plane with respect to the sun, so they pass by some 20 minutes earlier each day (for the 3/3 series), or later (for the 2/ series). OKEAN 2 continues to transmit sporadically and, finally, the Chinese FENGYUN 1B satellite has not been operating since it apparently started to tumble.

METEOSAT & GOES

The new METEOSAT 5 was successfully launched and will undergo commissioning before it replaces METEOSAT 4. The administration messages are broadcast every three hours from 0218UTC and will keep watchers up-to-date with progress - see Fig. 2. I have been a long time since GOES (the American geostationary satellite) was visible easily from the UK but I can just hear a weak a.p.t. signal over in the west, obscured by a roof. I hope to purchase a Yagi soon to mount higher up than my dish can get!

Letters

Various sets of photographs have arrived and I have received many requests for Kepler elements. P de Jong wrote from Leiden in Holland with a set taken with his equipment which he tells me that the 137MHz band is the double west, obscured by a roof. I hope to purchase a Yagi soon to mount higher up than my dish can get!

Ice in Bothnia

The ice that winter brings to the upper section of the Gulf of Bothnia is clearly shown in Fig. 5, also from Laurence. This year I noticed that the ice didn't really form until the intense cold in early February when the whole area froze within a few days. I marvel at the ability of modern weather satellite equipment to provide views of unprecedented clarity. Laurence mentions that Amigasat provides 16 grey levels, limited by the memory constraints of the computer, which needs a minimum of 1Mb. The version he uses is currently 1.11 and a new one - v 1.2 will be out soon.

Upgrades Coming

I have been told by other manufacturers that they are also releasing upgraded software soon - Timestep Weather Systems’ MEGANOAA and VGASAT 4 and Comar Electronics’s PEGOES. I understand that the Timestep upgrade MEGANOAA will store the entire pass of any satellite at full resolution in a 2Mb file on the hard disk, temperatures can be read directly, and line-by-line synchronisation is available. Details of both systems and hopefully reviews will be published here as soon as available.

METEOSAT animation

A new version of Timestep’s ANIMATE program will be released shortly. The previous version was good, and I received an early copy of the new version to try out which has improved facilities using almost the whole screen. One cannot review programs in a couple of paragraphs, but when I say that I have shown it on both local and SKY television while monitoring the Gulf region to show the movement of the smoke clouds from the oil wells, you can appreciate the clarity. It is also easy to set the program to record a set of METEOSAT pictures, ranging from the Amazon regions to the UK - ideal for worldwide monitoring. Simple editing then allows a set of animated frames to be produced, e.g., recording the D2 and D3 frames on disk sequentially, and then editing the frame names gives two separate sequences each containing as many frames as your computer can store! Super!

Maplin Problems

Another picture arrived, this time from Harry Wagg of Birkenhead who is using the Maplin kit fed by a home-made turnstile antenna and pre-amp. Harry is also experiencing paging interference on his Maplin receiver. Many users of the unit complain of this interference and so I have written to Maplin to see whether they plan to modify the design circuity. I have also asked for the specifications of their Meteosat system, about which I have also received letters! I will publish the response when it is received. Harry also asks about the availability of BBC software for satellite predictions. Any information that other BBC users can send me will be mentioned here.

For those of you who have only recently become involved in weather satellite monitoring, the interference problem started when an allocation was given to paging transmitters to use a nearby frequency band. The weathersat’s transmitter power is a fraction of the paging units so interference was inevitable. Most other satellite receiver manufacturers have done modifications since the problem started three years ago. Meanwhile if anyone has already fixed the problem perhaps they would drop me a line. Dave Robson of York found that he could hear the WXSATs on his AR2515 scanner but uses his Maplin receiver fed by a home-made turnstile antenna and pre-amp. Brian Dudman of Harrow has been comparing his Maplin receiver with his Realistic PRO 2006 scanner and
has found the scanner to be more sensitive. He wants to use the Maplin ASSEMBLY program to decode satellite data on his Amstrad CPC6128 computer. Maplin provide the listing in ASSEMBLY but not everyone has such a program or is familiar with its use. My son Tim has written a program to load ASSEMBLY programs via BASIC, so perhaps this will help.

Another user of a Maplin receiver is R C Harvey of Weston-Super-Mare who decodes his data with a BBC computer and the RX-8 program. He requested recorded data to test his system so I hope that the recordings will have helped. Reader John Williams of Stourbridge is using a home-made receiver, a Maplin decoder and a BBC computer for producing pictures. He anticipates buying a down-converter to allow the reception of METEOSAT pictures and so requested some METEOSAT recordings for this purpose.

Winter pictures

Jim Granville of Blackpool was a keen radio man back in the 1930s and has recently started operating a weather satellite set-up that includes an Icom R9000 receiver, a 268 computer and a collection of antennas including a crossed dipole. Jim has noticed that METEOR pictures (left over) as it moves northwards from Norway to Sweden in winter there is always a problem with low contrast. It is so dark that you can hear NOAA 9 change from visible to water vapour (infra-red) as it moves northwards over Norway. During March there is a rapid improvement and listening to METEOR 2/20 on 137.85MHz I could hear it all the way up to mid Sweden whereas only four weeks ago I heard it switch off just before Scotland! Good software will allow the stretching of contrast levels and I have found this essential to use on winter pictures.

Tape recorders

Many readers will know that the humble cassette recorder can be used to store a.p.t. signals for future replay. I recorded several passes for posterity including early METEOR satellites which, at the time, could not be played back properly without the parallel recording of a time signal. Developments in digital signal processing overtook us and I can now play back those old tapes into my computer (running VAGA1) and obtain perfect reproduction. However, the tape recorder must not apply signal compression techniques. Most recorders will automatically compress a signal unless it is below a threshold level, so if you record straight from your receiver using excess the recording will not include the complete range of grey levels. Therefore, you have to reduce the input level, normally by a potentiometer is used, often a handy fitted in your receiver, and this is set by trial and error until the replayed picture is good. A letter from Tony Branton of Worcester told me of his experiments with different recorders and he confirms the manually adjustable ones are best.

PC Decoding

More readers are moving towards the use of IBM-type PCs (personal computers) for their satellite monitoring. Robert Fulford of Exeter has a Commodore PC-1 computer and was wondering whether it might be suitable for pictures. Unfortunately, his model has the CGA (Colour Graphics Adapter) which was the first generation IBM screen display and is of rather limited resolution. However, Robert might be able to buy a suitable card which supplies more memory to convert the display to an enhanced version, preferably the VGA (Video Graphics Array - sometimes called the Versatile Graphics Adapter). These cards are not too expensive - try SWM advertisers. In addition, a hardware decoder is required and there are two or three types available as described in the special weather satellite supplement. Finally, before buying any hardware you must check that all of the units will be compatible with the computer - a reputable manufacturer will be able to advise Robert whether a particular system will run on his machine. You can buy the computer hardware and the satellite card from the same source.

Photography

I have recently discovered the secret of stripe-free pictures of the monitor! During a visit by a local television crew to see METEOSAT gulf imagery I mentioned the fact that most of my pictures of the monitor show the well-known stripe. One of the crew told me to try an exposure of about one-tenth of a second. The result was a delight! My latest batch of 24 pictures were perfect for the first time ever. I pass this on to those who similarly may not know.

Atari-ST

A letter from Victor Suller of Knutsford tells me that he has found an excellent public domain satellite tracking program for this computer which he obtained from the Page 6 Software Library. Victor says that the program gives identical results to his other programs but has additional features. It is on the disc Ham Radio (ST-243).

Macintosh

Victor mentions that there is a satellite tracking program, also from the public domain, called MacSat which gives identical results to the previous programs. Thanks to Victor for much helpful information!

WXSAT Frequencies

The American NOAA satellites transmit on:

- NOAA 9 and 11 - 137.62MHz; NOAA 10 - 137.50MHz
- NOAA 10 - OKEAN 2 - 137.40MHz occasional transmissions
- NOAA 9 - OKEAN 2 - 137.85MHz when switched on.

I hope that this list proves useful to those who are just entering this fascinating field!
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Lawrence Harris's uses Timestep equipment for his column in Short Wave Magazine. Les Currington who received the first Chinese Feng Yun image and presented it to Chinese Diplomats, also uses Timestep equipment.

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When logging details of a S.W. broadcast, it is worth remembering that almost all stations operate on frequencies that are multiples of 5kHz, e.g. 15.325MHz, 15.330MHz etc. If your receiver has a digital frequency display and it indicates a frequency ending in another figure, then adjust the main tuning control slightly so the signal is correctly tuned.

**Long Wave Reports**

Note: L.W. & M.W. frequencies in kHz; S.W. in MHz; Time in UTC (=GMT). Unless otherwise stated, all logs were compiled during the four week period ending 7/3/91.

One night, weak L.W. signals from Europe and N.Africa were heard by Darran Roberts in Brenchley. On February 11, he logged Saarloy, Germany on 183kHz as 2123 at 0630UTC. Two signals from the 294kHz beacon on the 16th, Roumoules on 2162 at 0635 and Allouis on 162, which peaked 23330 at 0635. The best conditions were on February 28, when two signals from Algeria were heard by Dave Tudor, who says, "There was no trace of Donebach on 153kHz, so the Bechar signal was clear." He logged it as 22233 at 0655. Due to an aircraft on 140kHz he used u.s.o. to resolve Topaza on 252, which he rated as 2122 at 0610.

The comments on the signal strength from Atlantic 252 (Jan & Mar '91) prompted Bob Ellis (Matlock) to 'phone the station. An engineer confirmed that 500kHz is radiated until 1800UTC, when it is reduced to 100kW. This change equates to 6.98dB, so a reduction in S-meter reading should be evident.

**MW Transatlantic DX**

While searching the band in Bridgewater at 2300, Darren Beasley heard a transatlantic signal for the first time: it was CQ5 in St John's, NF on 309kHz. At 2300, he logged VOCM on 599. He says, "Reception was not too good and the signals sometimes faded away totally. At best I rated them as 23322." He also heard up a very weak signal from Canada on 140kHz but could not identify it. Encouraged by this, Darren now intends to search the band from 0000 until 0400UTC.

In Co.Wexford, Bart O’Brien logged CQ5 as SI0222 at 2239. His reception last month of the Caribbean Beacon, Anguilla on 1610kHz has now been confirmed by QSL. CQ5 was also heard by Darran Taplin in Brenchley on March 14. They rated their signal as 23422 at 2330 and a remarkable 44422 at 0108. At 0900 he logged CBM on Torquay, on 940 kHz as 23222. He was very surprised to hear these because he was using a Yaesu FRA-7700 active antenna ahead of his FRG-7700 receiver. Signals from six stations in the USA were logged by Tim Shirley in Bristol. The earliest was from WVMCA in New York on 570, which he rated SI0333 at 2345.

While listening at all hours of the night in Grimsby, Jim Willlet logged 18 broadcasts from the USA, Canada, the Caribbean and S.America. He found conditions to be quite good and rated CQ5 as SI0333 at 2310, but others were SI0222. No doubt his giant 4m square loop helps!

**Other MW DX**

Sky wave signals from stations in N.Africa have reached the UK after.the first time. Those from Algeria were Les Trembles 549 (600kW) logged by Cliff Stapleton in Torquay, Air Beida 531 (600kW/200kW) SI0333 at 1830 by Tim Shirley; Alger 891 (600-390kW) W3223 at 2310 by Sheila Hughes in Morden; Alger 581 (600-390kHz) heard in the evening by Phil Townsend in E. London.

**MW Local Radio DX**

The m.w. programming of ILR Southern Sound and ILR Ocean Sound has been combined to form 'South Coast Radio', radiated from Farlington Marshes on 1170, Southwick on 1323 and Vesals Park on 1557kHz. 'Classic hits' are broadcast on their v.h.f. outlets, now renamed 'Ocean Sound FM' (96.7-97.5MHz) and 'Southern Sound FM' (102.4/103.5MHz).

**Short Wave Reports**

Solar activity is continuing at a very high level. Some days, solar flares have disturbed the ionosphere and logged up reception in the h.f. bands. This is likely to continue.

Several broadcasters are taking advantage of the good propagation conditions in the 25MHz (11m) band. They include R.Deutschland via RNI 25.730 (Da to S.Am 1130-1155) SI0444 at 1150 by John Coulter in Winchester; RNI Oslo, Norway 25.720 (Nor to Asia 1200-1230, Eng SatSun) 35544 at 1200 by Roy Patrick in Derby; BBC via Daventry 25.670 (Fr to W Africa 1200-1245) 45555 at 1245 in Quebec; DW via Julich 25.740 (Ger to US 1200-1300) SI0544 at 1300 by John H’Alloran in Harrogate; R.Australia via Carnarvon 25.750 (Eng to M. East 0800-1050) 24442 at 0810 by David Edwarson in Wallisend; RFI via Issoudun 25.620 (Fr to E Africa 1000-1555) 43333 at 1530 by Jim Cash in Swanwick; R.Moscow, USSR 25.780 (Eng to E Africa, M. East 0800-1444) at 1444 by Dennis Beather in Doolgalla, HCBJ Quito, Ecuador 25.795 (u.s.b.) p.c. SI0343 at 1345 by Bill Clark in Rotherham.

Some days, good long distance reception was noted in the 21MHz (13m) band. R.Australia's signals to C. SE Asia via Darwin 21.525 (Eng 0900-1000) was 34333 at 0701 by Kenneth

---

**Local Radio DX**

Recees in Preston, to Asia via Cararvon 21.775 (Eng 0500-0958) as 45333 at 0930 by Ron Damp in Worthing.


Some broadcasts to other areas were logged. BBC via Tsung Tsui, Hong Kong 21.715 (Eng to Asia 0000-0600) SI0333 at 2232 at 1734 by Philip Rambaut in Macclesfield; BBC via Ascension Island 21.660 (Eng to...
S.Africa 0900-1745 44434 at 1725 by Rhoderick Illman in Thumrait, Oman.

Good long distance reception was noted in the 17MHz (16m) band on some days. The signals to Pacific areas from Radio New Zealand Intl. via their 100kW transmitter at Rangitangi, N.Island on 17.70 (Eng 2111-0300; Mon 0000-0030 Sun) were 44333 at 0425 in Prenton. Some signals from Radio Australia have also reached here. Their signals to SE.Asia via Shepparton 17.75 (Eng 0900-1030) were 2232 at 0929 in N.London, to S.Africa via Carnarvon 17.630 (Eng 1500-1800) S1044 at 1940 by Fred Pallant in Storrington; to C.Pacific, W.USA via Shepparton 17.75 (Eng, Fr 2000-0800) S1034 at 2100 in New Radnor.

Among the 16 broadcasts noted in the morning were Vatican R, Rome 17.10 (Eng to Africa 0500-0530) rated 44444 at 0905 in Oman; R.Spain, Bulgarian 17.565 (Eng to Europe 0730-0800) 43333 at 0800 in Norwich; R.Finland via 17.00 (Fin, Eng to Australia, SE.Asia 0800-0925) S10555 at 0800 in Harrogate; R.Japan via Yamata 17.195 (Eng, Jap to Oceania 0700-0800) S10444 at 0900 in Shefield; R.Beijing, China 17.710 (Eng to Pacific 0600-1045) 22323 at 0830 in Macclesfield; SRI via Schwarzenburg 17.570 (Eng to Pacific 0800-1205) 32232 at 1000 in Torquay; Robin Clark in Plymouth; Voice of Greece, Athens 17.525 (Gr, Eng to USA 1200-1250) S10444 at 1250 by Ken Willius in Scarborough.

Later, DW via Wachtel 17.75 (Eng to S.Africa 1500-1550) was noted as 53323 at 1506 in Swansea; R.Sweden via Horby 17.880 (Sw, Fr, Eng to Norway, USSR, S.U.S.R. 1700-1800) S10444 at 1800 in Harrogate; R.USA via 17.880 (Eng to Africa 1900-1930) heard 1900 by Paul Hilton in Newbury, HCBJ Quito 17.790 (Eng to Europe 1900-2000) S10445 at 2000 by Alf Gray in Greenwich; R.Sweden via Issoudun 17.620 (Eng to Africa 1600-1700) S10444 at 1630 by Neil Waterman in St Albans; to Lyampha by McKeever in Birmingham; RCI via 17.540 (Fr, Eng to New Radnor) 1900-1930, noted as 'fairly good' at 1900 by R.Booth in Ormskirk.

The 15MHz (19m) broadcasts to Pacific areas from R.New Zealand Int. have reached the UK some evenings. In the evening, Radio Mike Smith's ratings on signals on 15.130 (Eng 1800-2111 Sun-Fri) as 32323 at 1830. Some of Radio Australia's broadcasst to Shepparton have been clearly received here. Their signal to C.A.Sia on 15.170 (Chin 1000-1400) was rated 54444 at 1100 in Bridgewater; to S.Pacific areas on 15.240 (Eng 2200-2330) 44444 at 0525 in Cheltenham; to C.Pacific areas on 15.320 (Eng 2030-2220) S10443 at 2100 in New Radnor; to SE.Asia on 15.465 (Eng 0900-1030) S10444 at 2145 in Warkworth, UK. Some broadcast to other areas originated from R.Spain, R.Korea and R.Japan.

<table>
<thead>
<tr>
<th>Country</th>
<th>Power (kW)</th>
<th>DXer</th>
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<tbody>
<tr>
<td>Algeria</td>
<td>600</td>
<td>J</td>
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<tr>
<td>Spain</td>
<td>100</td>
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<td>Belgium</td>
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<td>Portugal</td>
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<td>England</td>
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</table>

**Medium Wave DX**

**DXers:**
- Denis Beecher, Dolgelly.
- Bill Clark, Wetherby, Yorkshire.
- John H. Martin, Pretoria.
- Tim Shirley, Bristol.
- Chris Stenlake, Middlesbrough.
- Cliff Stanmore, Torquay.
- Peter Townend, London.

**Note:** Entries marked * were logged during darkness. All other entries were logged during daylight or at dusk.
short wave magazine, may 1991

long medium & short

[Radio propagation details and log entries for various countries and frequencies, including European and Far Eastern stations, with notes on equipment used by listeners.]

Patrick McKeever's listening post in Birmingham.

Through Monday 5th June, the 9MHz (31m) broadcasts from R.N.Z.I. were quite clearly in the UK. In Largs, their transmission on 9.700 (to EU area frequencies 0630-1110) were received at 0850. Among the many following entries were WCSC, Corner, Corner 9.840 (to EU area frequencies 0600-1000), R. Korea 9.325 (to EU area frequencies 0900-1200) and 1545 in Derby; R.Australia via Carnarvon 9.770 (to EU area frequencies 1200-1500) to Sheffield; R.C.I. via Aligarh 9.412 (to EU area frequencies 1500-2000) to 2015 in Shepparton; Voice of Iran, Tehran 9.022 (to EU area frequencies 1200-1500) to 1900 in S. Africa; Voice of Israel, Jerusalem 7.465 (to EU area frequencies 2300-0000) to 2330 in Edinburgh; Voice of Turkey, Ankara 9.445 (to EU area frequencies 2200-0000) to 2330 in Lytham St. Annes; Beijing via Mali 9.770 (to EU area frequencies 0000-1000), noted as 'good' at 0300 in Gibraltar.

The broadcast using the 7MHz (41m) bands, "reach politicians in Europe" which include WWC, Tokyo 5.720 (to EU area frequencies 0900-1100) to 2045 in Norwich; WWR via Fulham 4.720 (to EU area frequencies 0900-1100) to 2045 in Norwich; R.C.I. via Daventry 7.235 (to EU area frequencies 0900-1100) to 2045 in Norwich; Voice of Israel, Jerusalem 7.465 (to EU area frequencies 2200-0000) to 2330 in Edinburgh; R.C.I. via Shepparton 7.345 (to EU area frequencies 2200-0000) to 2245 in Plymouth; R.Bay via USSR 7.15 (to EU area frequencies 2200-2300) to 2245 in Plymouth; R.Bay via USSR 7.15 (to EU area frequencies 2200-2300) to 2245 in Plymouth; R.Bay via USSR 7.15 (to EU area frequencies 2200-2300) to 2245 in Plymouth;
Andy Emmerson

Welcome to this new, quarterly column in which I will be covering the ATV scene for readers of this magazine. My brief is to look at ATV technology, but not operating, with a broad appeal right down to entry level.

Most radio enthusiasts, whether listeners or hams, seem to specialise after a while. One particular ‘mode’ of transmission tends to take your fancy more than others: it may be packet radio, weather satellites, RTTY, utility transmissions or even amateur television (ATV). If you’re a keen devotee of the ATV scene you won’t need further explanation, but perhaps you haven’t come across it yet. Perhaps you didn’t even know that hams could transmit ‘real’ television.

They can, however, and you can even watch some of these transmissions without too much difficulty. If you are really keen you can invest a lot of effort and money in ATV, but this is not entirely necessary. Read on and find out how.

Back to Basics

First of all some basics. There are two kinds of amateur television, slow-scan and fast-scan. Fast-scan is just another name for normal, real television with moving pictures in colour or black and white. Slow-scan on the other hand is a specialised form of TV where you send only still pictures: they may be in colour but they don’t move. In fact they are just freeze-frames (‘grabbed’ from video recordings) or perhaps computer graphic images or pictures from photographs. The advantage of slow-scan is that the transmissions occupy no more bandwidth than normal speech, so they can be sent on any voice communication channel or even down a telephone line (which is what the police do with ‘mug-shots’). For people like me, slow-scan does not have the appeal of TV with moving pictures and I have not got involved with it. For that reason this article will confine itself to fast-scan TV.

Fast-scan ATV uses the same television standards as normal broadcast TV: this is so that normal TV receivers can be used. If you have a home video camera or an industrial closed-circuit one, you can use this as well, together with normal video recorders and other accessories. Some ATV is in colour, though not on 70cm, where the need to share the band with other amateur radio users means that operation is restricted to black and white. Sound to accompany the pictures is often transmitted on 144MHz v.h.f. separately from the pictures. On the microwave bands (24cm and above) this may not apply.

What’s On Tonight?

What will you see on ATV? Well, it’s certainly different from broadcast TV. You might say it’s ‘amateur’ because few of its devotees are professional TV people. Most ATV transmissions are one-to-one affairs, because amateurs are not supposed to broadcast at random. So people end up sending their pictures to friends, generally in the local neighbourhood. TV repeaters (see below) extend the range of the signals, as do ‘freak’ weather conditions (tropospheric openings) now and again, when the weak transmission may be received in another country several hundred miles away! Amateurs are limited to relatively low power (to avoid interference); they have to stay clear of offensive material and music is also banned. Furthermore, using the station for business, advertisement or propaganda purposes is taboo. But that leaves a wide range of permissible subjects, so what do TV hams put out?

No Holiday Films, Please!

Most people start off by sending shots of home, their family and views of the garden, either ‘live’ from the camera or off video tape recorded previously. Holiday films are also shown (but generally discouraged by the viewers): some people take the opportunity to make ‘programmes’ of their hobbies and subjects as varied as local history, old trains and amateur dramas. Productions get the ATV treatment.

Some ATVers, as they are called, are more adventurous and take their video and transmitting gear to country fairs, sports events and the like, where they help by providing video facilities to assist the public service officials. A couple of amateurs have mounted small cameras in radio-controlled helicopters and buggies - the views transmitted back from these unusual vantage points are most amazing! Cameras and transmitters have also been used aloft in light aircraft and hot air balloons, as well as aboard trains, on canal barges and in cars.

Joining In

Upto now most amateur transmissions have on the 430MHz (70cm) amateur band, just below the normal u.h.f. broadcast TV channels, and this is the band where most beginners start. There are also other frequencies on which amateurs are active, starting at 1296MHz (24cm), but these are in the microwave region and need special apparatus (and skills, which you can develop gradually) to receive them. It’s worth making the effort, though, because this is where the television repeaters are. Repeaters are well-sited stations with a wide coverage. People then beam relatively weak signals up at the repeaters, which then re-broadcast the signals simultaneously over a much wider area.

The licensing side of ATV is quite straightforward: anyone who holds a normal TV reception licence is entitled to watch amateur transmissions (read the small print!), while to transmit pictures you need a radio amateur licence. You will doubtless know that you can’t just go out and buy this licence at the post office like you would a citizens band one. There is a technical examination (no Morse code though!) and most people pass after six to nine months’ studying. If you are good with electronics you’ll have no difficulty, but all sorts of people, of all ages and backgrounds, pass every year.

Next time I shall describe the equipment you need to receive or transmit ATV. If you can’t wait until then why not send off for the booklet mentioned below.

Fast Facts

Joining the BATC costs just £9 a year: for this you receive four 100-page magazines a year, cheap sales and wants ads, plus many other membership benefits. For more details send an s.a.e. to Dave Lawton, Grenehurst, Pinewood Road, High Wycombe, Bucks. HP12 4DD.

A low-cost guide, TV for Amateurs, will tell you how to build your own TV station and get on the air. Send £1.75 to BATC Publications, 14 Lilac Avenue, Leicester LE5 1FN.

Andy Emmerson’s new column will appear on a quarterly basis. In the intervening two issues this page will be taken up by Brian Oddy’s ‘Long Wave Maritime Beacons’ column followed by another new column devoted to reporting on Pirate Stations. This is in response to the numerous requests from readers who are interested in finding out what is going on - which stations are legitimate and which are pirates.

You can get quite adventurous with amateur television. Here Marc Chamley F3YX, nicknamed ‘the pope of ATV’, has fitted a camera and mobile TV transmit and receive gear to his car. He is transmitting the view of the road ahead while simultaneously receiving another station, whose picture has been inlaid electronically in the top left-hand corner of his own picture!
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FOR SALE Kenwood R5000 communications receiver, c/w VC20 v.h.f. converter, v.g.c., perfect working condition with manual, £740. Tel: (0392) 73404 (Ester).

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FOR SALE Band I 3-element beam covers E2-E4, for forthcoming sporadic-E season or 6m, £15. Antiferrence 7-element f.m. 'mushkiler' 8dB gain, £25. Tel: (0273) 509958 (Brighton).

FOR SALE Basic Realistic DX-440, b.f.o., clock, 9 entry, scan, a.m./f.m. direct entry, £65 or £70 with adaptor. M Keating, 511 Kings Road, Kingsstanton, Binghamham BA4 9HL.

More on the following page...
Continued from page 71

WANTED Edystone EA12. Tel: (0226) 288718.

FOR SALE AOR 1000 portable hand scanner 9 months old with charger and NiCad batteries, £150 o.n.o. Philips D2935 receiver, 1 year old, excellent condition, £75 o.n.o. K. Williams, Whitefoord House, 53 Canongate, Edinburgh EH8 8BS.

FOR SALE Sony ICF PRO80, 150kHz-223MHz, 8 ways to tune, mains adaptor, £175. Also Sony ICFSW15 kit including antenna controller, antenna module, mains adaptor, earphones, all in hard case £80. Tel: (0734) 815354 near Basingstoke (evenings).

WANTED R210 70mm 52in film tuning scale, part number ZA-49511. David. Tel: (0926) 425220 Royal Leamington Spa.

FOR SALE Tektronix dual-trace oscilloscope, type 546 good working order, reason for sale, it's no longer in use. Buyer collects, £90 o.n.o. Tel: (0604) 534441. Northampton.

FOR SALE Fairmate HP100E scanner, excellent condition, complete in box with all accessories and charger, £175 o.n.o. A. Carter. Tel: (0892) 835075 Paddock Wood (evenings and weekends).

EXCHANGE TR1000 for TR200 or similar, cash adjustment. W. Bell, 33 Back Canning Street, Liverpool L8 7PB. Tel: 051-709 6927.

WANTED Realistic PRO2005 scanner. Tel: (0204) 398844 Bolton (evenings).

FOR SALE Versatower P60, complete with winches, head unit and ground post (easily removed), telescopic and tilting-over, approx height fully extended with mast, 22m, excellent condition, £500. Tel: (0923) 220774 Watford.

FOR SALE HRO-60, l.s., 2 coils, BC221-M and a.f. TX Navy type GS-5, Panoramic adaptor BC1032B, Elmac TX model A-54, Triplott meter model 666H and Test Set Demolition Mx1, offers. Tel: (0634) 70715 Minehead, Somerset.

FOR SALE Icom IC R72 communications receiver, new, mint, boxed, manual, £475 carriage paid. Tel: (0482) 838097 after 5pm.

FOR SALE Yaesu FRG-9600 scanner 0.2kHz-950MHz, manuals, power supply, discone antenna, magmount antenna, all as new, £425. EXCHANGE for h.f. receiver and scanner. Tel: (0472) 362359 Grimsby.

FOR SALE AOR 2002 v.h.f./u.h.f. receiver and scanner, covers 25-550MHz and 800-1300MHz, seldom used, 18 months old, manual and boxed, excellent condition, £325 o.n.o. Tel: (0942) 728531 Wigan.

FOR SALE Selena Vega 215, 8-band (5 short wave), battery/ mains, £15. Steepletone MBR7 multi-band receiver including air and marine bands, battery/mains, £20. Tel: (0254) 775141 Lancashire.

FOR SALE Valved radios Pye 19A, l.w., m.w., three s.w., band spread, pilot, X754H, l.w., m.w., two s.w., 15 to 550m, Ekco A104 l.w., m.w., s.w. KB/10 Bakelite l.w., m.w., v.h.f., each £60 o.n.o. All complete working, v.g.c., buyer collects. Sharples, 13 Beryl Avenue, Blackpool, Lancs FY5 3PA.

FOR SALE Icom IC-R1 hand-held communications receiver, may possibly swap AR1000 scanner or will buy outright. Please write with details. Mr Clark, 13 Settle Street, Barrow-in-Furness, Cumbria LA14 5HR.

FOR SALE Kenwood R5000 receiver and scanner, covers 25-550MHz and 800-1300MHz, seldom used, 18 months old, manual and boxed, excellent condition, £325 o.n.o. WANTED Kenwood R5000 receiver, must be in mint condition. Tel: (0625) 429030 Macclesfield.

FOR SALE Icom IC-R1 hand-held scanner with accessories, leatherette case, additional battery case, cigarette lighter cable with noise filter, brand new, unwanted gift, £275 o.n.o. Tel: (0926) 886713.

FOR SALE/EXCHANGE ICS MET-2 weather satellite receiver system for Meteosat4, also Icom-7000 receiver with TV adaptor, Citizen 120d printer. Chris GODW. Tel: Shrewsbury 241194.

FOR SALE Microreader MkII, £60. Tel: (0742) 846742.

WANTED Beginner requires basic low-cost h.f. receiver, may possibly swap AR1000 scanner or will buy outright. Please write with details. Mr Clark, 13 Settle Street, Barrow-in-Furness, Cumbria LA14 5HR.

FOR SALE Yaesu FRG-7 communications receiver with f.m. board fitted. Covers all modes 0-30MHz, excellent condition £100. Also AOR AR1000 hand-held scanner with NiCads, charger, carrycase and strap. Covers 8-1300MHz, fully boxed, £200. Richard. Tel: (0909) 564536 after 6pm.

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For the enthusiast who prefers a more permanent installation the IC-R100 is ideal giving full frequency coverage of 500KHz – 1800MHz and AM/FM, FM wide modes of operation. The IC-R100 boasts 100 memory channels to store your favourite stations and features similar to the little pocket receiver.

Refusing to compromise on quality can have its price but at ICOM our products reflect our style. We only make the best.
THE HF-225 GENERAL COVERAGE RECEIVER

What ever you want to hear, wherever you want to hear it, the HF-225 will give you that gateway to the world.

Technically, the HF-225 distinguishes itself by having a low phase noise synthesiser which gives performance not far off that of "professional" receivers costing up to ten times the price. And that's not just advertising talk; it is really true. The receiver actually tunes in steps of 8Hz, which betters most other receivers and gives a smooth "VFO" feel when tuning. As one user has already commented: "If you tuned the HF-225 with your eyes closed, you would believe you had a £5,000 receiver on the table."

The HF-225 has a range of popular low-cost options; like a keypad for direct frequency entry which plugs into a rear panel socket, an active whip aerial, a rechargeable battery pack for portable use and an attractive carrying case which protects the receiver whilst in full operational use. The D-225 detector option is really something special because it gives true synchronous AM detection for dragging sensible programme quality out of a signal affected by selective fading distortion. The same option also gives narrow band (communications) FM.

Every listener these days appreciates a receiver which offers facilities for memorising favourite or regularly used frequencies and the HF-225 offers 30 memory channels for this purpose. Using the memories has been made particularly versatile because the operator can review the contents of the memories while still listening to the frequency he is using. Alternatively, in the "Channel" mode, he can tune through the memory channels using the main tuning knob, listening to each frequency as it appears on the display. Just like having a bank of single channel receivers under your control.

Great for checking BBC World Service frequencies in a hurry.

Unlike most HF receivers on the market, the HF-225 comes complete with filters fitted for every mode - 2.2kHz, 4kHz, 7kHz and 10kHz. There is also a 200Hz audio filter for CW and if the D-225 detector is fitted, a 12kHz filter for FM. The correct filter for each mode is automatically selected by the receiver mode switch but further selection can be made by the user from the front panel and the receiver remembers which filter was used. True versatility and all built in - at no extra cost.

At the end of the day, what can the HF-225 offer you as a user? Let me quote Chris Williams who wrote from Massachusetts:

"I received my Lowe HF-225 about a week ago. Since then I have enjoyed many pleasant hours listening to it. As a past owner of receivers such as the Sony ICF-2010 and Grundig Satellit 650 and 500, I must say that none compares to your Lowe HF-225. Without question, for hour after hour listening, nothing compares. I especially like the Genie keypad. Why more receivers do not incorporate such intelligent ergonomics is beyond me."

That just about says it all, but on top of all the praise from users, the HF-225, following its launch, was voted "Receiver of the Year" by World Radio and TV Handbook.

Why don't you find out why the HF-225 opens that gateway to the world.

HF-225 30kHz-30MHz .................. £429.00
K-225 Keypad Controller ............... £40.36
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The HF-235 professional monitor receiver. Already in use by monitoring stations and widely accepted as a new mid-price entry into this most demanding market.

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