REVIEWED THIS MONTH
Icom IC-R72 Communications Receiver
Uniden Bearcat UBC 142XLT Scanner

Projects to Build
Chart Recorder, Bandspread
Dipper & Signal Monitoring Meter
Also
Survivor's Guide to Listening

Plus Regular Features Covering
YUPITERU

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Cover:
Projects are this month's theme and inside you will find constructional details for a bandspread dipper, signal monitoring meter and chart recorder. The inset picture shows the Icom IC-R72 communications receiver, the main review subject.

DISCLAIMER. Some of the products offered for sale in advertisements in this magazine may have been obtained from abroad or from unauthorised sources. Short Wave Magazine advises readers contemplating mail order to enquire whether the products are suitable for use in the UK and have full after-sales back-up available. The Publishers of Short Wave Magazine wish to point out that it is the responsibility of readers to ascertain the legality or otherwise of items offered for sale by advertisers in this magazine.

CROSSWORD
MAY 1993

good listening

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In this issue you will find several projects to provide you with many enjoyable hours building and then using them. One of these projects is for a chart recorder - an indispensable piece of equipment for those interested in weather, propagation or astronomy. Unfortunately, the drawings would take up far too much of the magazine, so I have decided not to reproduce them in the magazine. This decision was helped by the fact that, good as the drawings are, they have been produced on a PC. Experience shows that those do not convert to the Macintosh used to produce the magazine, at least, not to a standard acceptable to me – and the cost of having them redrawn on a Mac would have been prohibitive.

**A No Code Licence**

There is current speculation that a 'no code' amateur licence is being sought from the Radiocommunications Agency. It is certainly true that the RA is asking for written observations by any interested party on a 'no code' licence - so if you have any views, you should write to Mrs Karen Scott, Room 712, Radiocommunications Agency, Waterloo Bridge House, Waterloo Road, London SE1 8AU. My own views, as a Class B licensee, are that a golden opportunity was lost with the introduction of the Novice Licences to move towards a licence structure as used by the Americans. Some form of incentive is needed to gain access to the hf bands and Morse is probably the most obvious. I, personally, couldn’t care less if the extra qualifications entailed juggling three balls and a rubber chicken at 12 moves a minute! The important thing is that there must be some extra effort needed to show commitment before any extra privileges are granted.

**Prize Winners**

The five winners of the December 92 SWM Crossword Competition were Graeme Chesser of Aberdeen, D Ferris of Workington, Harry Guy of Stirling, David Tasker of Leicester and Kenneth Hutley of Maldon. They have all now received their £10 SWM vouchers.

Note: For more information on the stations that he lists as unknown.

**CW Services Update**

Dear Sir

I would like to say how much I enjoy the article by Graham Briggs on long range maritime c.w. services. I have some information on the stations that he lists as unknown.

8453kHz HWN French Naval, Paris
8466kHz UJY Kalingrad Radio, Russia
8475kHz FUX French Naval, Le Port, Reunion & Dependencies
8551kHz CTP NATO, Lisbon, Portugal
8568kHz FUV French Naval, Jibuti, Djibouti
8679kHz CFH Canadian Forces, Nova Scotia, Canada
22537kHz FUF French Naval, Fort de France, Martinique

I hope these are of some use to Graham.

Simon Lucas
West Yorkshire

Long Range Maritime CW Services Update

Dear Sir

Readers might like to hear a comment on the excellent article on maritime matters in the February issue, which shows that even the 'experts' get it wrong sometimes.

You may remember that a while ago a Sea King from Brawdy crashed into the Bristol Channel while on a search and rescue operation. This resulted in a rescue operation to recover the crew, which involved the warships Cumberland and Roebuck, the Angle lifeboat and, of course, the second Sea King (191) from Brawdy.

Obviously this meant there were a lot of signals to and from Plymouth Rescue Centre, a lot being on 2.182MHz. While Sea King 191 was talking on 156.8MHz, the v.h.f. distress frequency, they were asked by Plymouth Rescue Control to change to ‘2182 MF’ (meaning 2.182MHz on medium frequency).

Sea King 191 assumed it was u.h.f. they were being asked to use and replied that they did not have this channel. There then followed a long exchange, with Plymouth repeating the letters 'MF', when it would have been better to say '2 decimal 182' when all would have been clear. Eventually 191 realised that they meant hf. and all was well!

Just to complete matters, 191 did eventually use a u.h.f. channel when contacting one of the warships, using 282.8MHz.

The ditched crew were rescued by a helicopter from one of the ships, and the wreckage was brought to the Naval jetty at Pembroke Dock.

It shows just what can be heard at busy times like this and in addition to emergencies there are rescue exercises that are very realistic and well worth listening out for. They are usually set-up well beforehand.

P.A. Finn, Dyfed

Dick Ganderton G8VFH

SWM SERVICES

**Subscriptions**

Subscriptions are available at £21 per annum to UK addresses, £23 in Europe and £25 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 £36 (UK) £38 (Europe) and £41 (rest of world).

**Components for SWM Projects**

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

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

**Back Numbers and Binders**

Limited stocks of most issues of SWM for the past five years are available at £1.80 each including P&P to addresses at home and overseas (By surface mail).

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

Orders for back numbers, binders and items from our Book Service should be sent to: SWM, FREEPOST, Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 BPW, with details of your credit card or a cheque or postal order payable to SWM Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Broadstone (0202) 659950. An answering machine is welcome by telephone to Broadstone (0202) 659930. A telephone order for a particular back number or overseas. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate. Orders for back numbers, binders and items from our Book Service should be sent to: SWM, FREEPOST, Post Sales Department, Arrowsmith Court, Station Approach, Broadstone Dorset BH18 BPW, with details of your credit card or a cheque or postal order payable to SWM Publishing Ltd. Cheques with overseas orders must be drawn on a London Clearing Bank and in Sterling. Credit card orders (Access, Mastercard, Eurocard or Visa) are also welcome by telephone to Broadstone (0202) 659950. An answering machine is welcome by telephone to Broadstone (0202) 659930. A telephone order for a particular back number or overseas. Please state the year and volume number for which the binder is required. Prices include VAT where appropriate.
**Old v New**

**Dear Sir**

Regarding Mr Marker’s comments in the February issue about old and new receivers. My main communications receivers are good and over 30 years old, I certainly don’t intend parting with them in this life. However, they won’t work in the bathroom, garden or on a quiet hill-top and they don’t receive f.m. Surely, the Sangean portable should not be compared with an old Trio; they were intended for different applications and both represented excellent value for money.

I also have an ATS-803A and am entirely satisfied with performance; big batteries for long life; bass/treble for comfortable listening; fast, accurate and stable frequency selection; and yet I find that both types of receiver are necessary – the ‘tranny’ for general use and frequency hopping – the ‘valve’ for trustworthy long term listening and monitoring.

The 803A has many advanced internal features, one being automatic switching to 50Ω input termination above 1620kHz when the external antenna socket is used, and as Mr Marker noted, compared with older receivers it will not directly match ordinary wire antennas at top and tropical band frequencies.

Fortunately, one very simple additional and easily removable wire link will disable the pod and boost sensitivity by some 20dB around 2MHz. I’ll gladly send details f.o.c. to anyone who forwards an s.a.s.e.

There is one point that niggles me about the Sangean. This medium size portable does not have a handle, so I had to make one.

Graham Maynard

N. Ireland

**Health Warning**

**Dear Sir**

Regarding SWM January page 33.

It is not totally nutty to say that large amounts of Radio Energy are hazardous to health. It was discovered during World War II that personnel had been sterilised by radar after the development of the Magnetron, now found in microwave ovens. The Magnetron developed at Birmingham University revolutionised radar working even in the 1940s at 10cm considered by both sides at the time as the best wavelength to use. This device was considered at the time as Most Secret. There is some intelligence that suggests that the Russians used beamed c.f. against embassies and that at leased one official retired prematurely, during the Cold War.

During World War Two engineers could not understand how German planes managed at night (in the dark) to bomb British cities. After much thought and an experiment in a plane, recommended for write-off by the engineers, a beamed signal was found. Some time later a captured German bomber was examined. The receiver was studied and was found to have a larger amount of i.f. gain than was normally necessary for a blind landing system.

To cut a long story short, diathermy units were requisitioned from hospitals and modified in a small workshop. Although the h.f. beam was only bent instead of being completely indecipherable. This was due to the fact that for operational reasons one of their telephone lines was pinched. As for Kilocycle Ken, he retired and I am reliably informed that young Golly has a very good job with GEC. The recommended safe limit for c.f. is 10mW per square centimetre but this is based on the heating effect - nobody really knows what the safe limit is.

Science is an onion and we keep peeling it.

Peter C Gregory, Ashton-under-Lyme

**Thanks**

**Dear Sir**

I recently wrote to your First Aid column and received a very good response. The pre-selector in question is now working. Thanks must go to Peter Barber, R.H. Avery and David Davies for their invaluable help.

Tim Bucknall, Cheshire

Short Wave Magazine, May 1993

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**Unwanted Gifts?**

**Dear Sir**

I am an old timer DXer who saw service with the eighth army in Italy, 1944-45. I still have a QSL card from HPSJ in Panama that I heard on an 18 Set - and whose FRG-7700 receiver has recently clocked up eleven years service with just two overhauls. I never cease to be amazed to read about receivers, etc., for sale in SWM with the declaration, ‘as new, still boxed’, or ‘few weeks old’. What is the reason for this? Surely they can’t all be unwanted Christmas gifts.

Harold Frank Buggins

Witney

---

**Novel Antennas**

**Dear Sir**

As a ship’s carpenter in the early 1950s, aeriels on a 10000 tonner was a no-no! They kept getting broken. So we made them as short as possible from very large light bulbs, borrowed (?) from cargo clusters. They really did work. I suppose one could silver paint half of one bulb for semi-direction on v.h.f.

The drawings are from memory - a bit old by now.

Hopefully, they may be of use to someone.

Terence Purkis, Hull

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**More DXing**

**Dear Sir**

How nice it is to see the long, medium and short wave DXing column in your magazine, but I thought it would be quite nice if you could possibly extend that by including an f.m. chart on local radio?

David Brooks

Redruth

**Dear Sir**

I was interested in Robert Connolly’s letter in the February issue of SWM and support his idea for a one-off special on Band II v.h.f. f.m. broadcast stations. It might also be useful to do a feature on the audio equipment used in the stations of f.m. stereo broadcast stations and to cover the licensed ethnic/community and minority-interest music stations available on v.h.f. There is more to broadcasting than just transmitters and receivers!

Ivor Nathan

London
rallies

May 3: The Dartmoor Radio Club Rally will be held at a new and larger venue, the Yealmerton War Memorial Village Hall, Meavy Lane, Yealmerton, Devon. Doors open at 10.30am with talk-in on S22. Ron G7LLG. Tel: (0822) 852586.

May 9: The MARS/Graysdon mobile rally will be held at Drayton Manor Park, Tamworth. Staffs. Doors open at 10.30am. All the usual traders, flea market, Bring & Buy, club stands. The family rally. Peter G6DRN. Tel 021-443 1199. Trade stands ring Norman GB8HE. Tel: 021-422 9787 evenings.

May 30: Plymouth Radio Club Rally will be held at Plymouth School, Plymstock. Doors open from 10.30am to 4pm. There will be car parking, traders, Bring & Buy, Talk-in, Raffle and refreshments. Derek Foster G7EJS. Tel: (0752) 781781.

June 6: The Spalding & DARS are holding their Jubilee Mobile Rally at Springfields Gardens, Spalding. T Kettlewell. Tel: (0775) 722940.

June 27: The 38th Longleat Amateur Radio Rally, Longleat House, near Warminster, Wiltshire. Shaun. Tel: (0225) 673098.

July 4: The York Radio Rally will be held in the Tattersall Building, York Racecourse, Knavesmire, York. Doors open at 9am, entrance fee £1. Ample free parking, amateur radio, electronics and computers, arts and crafts, Morse tests, licensed bar and cafe. Talk-in on S22. Andy Suter. Tel: (0904) 708164.

July 11: The Horncastle Amateur Radio, Electronics and Computing Fair will take place at the Queen Elizabeth's Grammar School Sports Hall. Tony Nightingale G6CZV. Tel: (0507) 522482.

*August 8: Flight Refuelling ARS Hamfest will take place at the Flight Refuelling Sports ground, Merley, Wimborne. The event will run from 10am to 5pm and will include the usual mix of traders, Bring & Buy, craft exhibitors, car boot sale and field events. Overnight camping facilities available for the 7th. Talk-in on S22. Richard Hogan G4VCD. Tel: (0022) 901021.

August 29: The Galashields Club are holding their open day at the Focus Centre, Livingston Place, Galashields. All the usual activities will be there - Bring & Buy, traders, club stands, raffle and refreshments. GM0AMB. Tel: (0835) 22606.

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

AVON

RSGB City of Bristol Group: last Mondays, 7pm. The Small Lecture Theatre, Queens Building, University of Bristol, University Walk, Bristol. May 24 - Half Yearly General Meeting, Dave Bailey G4XKT. (0722) 672124.


GREATER LONDON


Edgware & Drs. 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, May 13 - Using the Straight Key by G3JJE, 21st - Straight Key Evening. Rod Bishop. 081-244 1868.

BEDFORDSHIRE

Shefford & DARS, Thursdays, 7.45pm. Church Hall, Amplhill Road, Shefford, Beds May 5 - Modern 10GHz operation by G6PJS, 30m Westwood. The Marconi Historian, 27th - DF Workshop, equipment and technique explained. Brian Shelton G8BHE. Tel: 021-422 9787

BERKSHIRE


CHESHIRE


EAST SUSSEX

Hastings & R&C: 3rd Wednesdays, 7.45pm. West Hill Community Centre, Crock Road, Hastings. Fridays, 28th - 3.30pm. Ashdown Farm Community, Downley Close, Hastings. May 19 - Police Forensics by Gary Fellows G7GHP. Reg Kemp. 7 Forewood Rise, Eastbourne. May 10 - Merency Communications by John Vamperlow.

Southdown ARS: 8.00pm Chalce. Home for Disabled Ex-Servicemen, Southdown ARS: 8.00pm Chasely Downey Close, Hastings. May 19 - Antiques Road Show by Keith Goodchild Walter Craine. (0923) 262180.

HUMBERSIDE

Gool & ES: Most Fridays, 7.30pm. West Park Pavilion, off Airmyn Road, Goole. May 7 - G0OLE on the air, 14th - OF Practice, 16th - G3XAY Memorial Trophy DF, 21st - Contest Planning, 27th - Social evening. Steve Price. (0409) 769130.

KENT


WILTSHIRE

Many short wave stations change their schedules in March of this year. I’ve had quite a few details sent through this month. First Radio Sweden. Their English broadcasts to Europe are:
1500UTC on 1.179 (weekdays only) & 15,190MHz, 1730UTC on 1.179, 6.065 (also via satellite), 9.645 & 15,270MHz 2100UTC on 1.179, 6.065 (also via satellite) & 9.655MHz 2230UTC on 1.179 & 6.065MHz (also on satellite).


San Diego

Radio Award
The City of Belfast Radio Award can be obtained by short wave listeners on a heard basis.
Applicants from the UK and Republic of Ireland need to hear 6 contacts from the city of Belfast. These can be logged on any band and any mode. The cost of the award is £2, with any cheques being made payable to RAIBC (NI) Area. The award is free to blind and disabled s.w.i.s.
To apply, send to Awards Manager, RAIBC (NI Area), PO Box 87, Belfast BT12 5PU.

On Target
On Target is the name of a very 'up-market' leaflet from Radio Netherlands. Media Network by Jonathan Marks is a weekly survey of communications developments compiled with the assistance of over 190 monitors across the globe. Regular contributors include Arthur Cushen, Victor Goonetilleke, Dave Rosenthal, Lou Josephs, Jim Cutler, Mike Bird, Vasily Streinikov and Andy Sennitt. The programme offers coverage of the media developments linked to current events as well as full-length documentaries.
Transmissions times are Thursdays at 0150, 0750, 0950, 1150, 1350, 1550, 1750 & 1950UTC. The best times and frequencies to listen for Europe are 1130UTC on 5.955 & 9.855MHz.

Thinking Day & The Guides
Did anyone get involved with the International Guides Thinking Day on the Air? I’ve heard of one group, the Test Valley Special Event Radio Group, who did get involved - very successfully too!
Prior to the big day, the Guides were given tuition so they learned the phonetic alphabet and had prepared their greetings messages.
What’s really interesting is that some of those involved in the event were only 7 years old!

QRP Novices
I’ve had an interesting letter from Dave Gosling, who is the Novice representative with the G-QRP club. This club provides great back-up for their Novices, with help on such matters as antennas, headphones, Morse keys, learning Morse, transmitting, etc. In SPRAT, the news magazine for club members, there is a Novice News column too.
The G-QRP club novices range from 13 to 77 years old with the only rule that their interest is QRP (that’s low power). If you are interested in joining a group such as this to help with your Novice training, then send an s.a.e. to Rev George Dobbs G3RJV, St Aidan’s Vicarage, 498 Manchester Road, Rochdale, Lancs OL11 3HE. You’ll get a sample copy of SPRAT for your trouble and plenty of help when you join the group.
My thanks to Dave for taking time off from his decorating to drop me a line.

Prize Time
I’ve had a generous donation from a reader of this column. John O’Neill is awaiting delivery of a smart Easyreader DM1000 decoder and so has offered to donate his RMS-3 program for the Spectrum to a junior listener. This program decodes RTTY, Morse and SSTV.
John suggested this gets offered as a prize in a competition, which is a nice idea. Tell me what you already do with your spectrum and what you would like to try and do with this program and the best letter wins. I’ll talk to the Editor and see if he can’t drum up a few extra prizes too. So get writing, who knows what you could win!
**news**

**RAYNET & GPS Trials**

Telecom Design Transponder to West Cheshire RAYNET for field trials. The GPS Transponder not only has a display showing position, date, time and velocity, but also has the facility to be interrogated from a remote station using AX.25 packet radio. Accuracy of the given position is quoted as ±100m. National Grid References (NGR) are also available from the system making correlation to an Ordnance Survey map very simple. The transponder is available in custom specifications to order. Telecom Design Communications. Tel: (0296) 332800.

**JB Radio Group**

The JB Radio group was founded in 1989 to promote friendship through radio, breaking down social, political and racial differences between people of different cultures throughout the world. Members come from all backgrounds, but all have one important thing in common - they are all interested in radio DXing and the exchange of QSL cards. Many members are living in Eastern Europe and CIS, but membership is open to all DXers who operate in professional and courteous manner everywhere throughout the world. This includes s.w.l.s, amateurs and 11m bands DXers.

On joining, members receive:
- A unit number that can be used as a call-sign when DXing on 11m or for exchanging QSL cards as an s.w.l.
- Free membership certificate
- QSL cards to fill in and send away
- A directory or list of members world-wide
- A postcard and information about Ireland will also be enclosed.
- Extra QSL cards are available to members.

The cost of joining and receiving your membership package is £5.00 or $8.00. If you would like more information, please enclose 1IRC.

**Digital Audio Broadcasting**

European agreement has been reached to commence terrestrial digital audio broadcasting (DAB) across much of Europe over the next few years. The EC Eureka project was finalised and agreed mid-December and passed to the European Telecommunications Standards Institute for international ratification and to define DAB standards. The BBC will commence DAB test transmissions across London later in 1993 from a transmitter located at Crystal Palace within the 220MHz band. If transmissions prove successful then use of 220MHz will remain as the DAB UK band. It is anticipated that most of the UK's DAB bandwidth needs will be met with use of Band 3, however a section of Band 1 at 60MHz will remain as a back-up frequency. The BBC will transmit the existing f.m. services over the Crystal Palace transmitter during the test period.

Use of the 60, 220 and 1500MHz bands for DAB will occur across Europe once the service becomes established. France will also be testing later this year across Paris possibly opting for a small band (1.75MHz wide) at 60MHz and the rest at 1.5GHz. - Bands I/III are still in use for TV in France. The CSA in France calculate that 17.5MHz of bandwidth will be sufficient for French DAB transmission use. Germany will also be going DAB and has projected a start of DAB transmissions for real from September 1995 at 220MHz.

For the London tests only a few hundred receivers will be available intended for broadcasters and manufacturers. Eventually UK DAB receivers will be designed to cover the 50-250MHz band accepting a down-converted 1.5GHz signal input into the v.h.f. receiver - should the 1.5GHz ever be used.

**Special Event Station**

**GB8WA.** The Wirral & District Amateur Radio Club will be operating a special event station marking the 50th Anniversary of the Battle of the Atlantic.

During the Battle of the Atlantic in WWII, the Combined Headquarters, Western Approaches were situated in Liverpool from 1941 to 1945. Control of all Allied shipping movements in the Western Approaches of the North Atlantic was performed from beneath a City Centre building. Most of the shipping was convoys of troops and supplies between the UK and the USA.

Throughout the war, Liverpool handled a total of 75 million tons of cargo, of which 56 million tons were imports, including 19 million tons of foodstuffs. More than 73 000 aeroplanes and gliders were loaded at the port and 4 700 000 troops passed through.

To mark the anniversary, one of the largest ever peacetime gatherings of naval ships and submarines of various nations will converge on the port at the end of May. A supporting calendar of events on land, sea and in the air will make up a full week of celebrations.

The station, GB8WA, will be operated from Perch Rock Lighthouse at New Brighton, Wallasey. The lighthouse was built in 1830 at the time of the Napoleonic Wars. It stands over 35m high at the mouth of the River Mersey, the western approach to the Port of Liverpool.

Operational Dates: May 7 to 31

Operational bands: 80, 40, 20, 10 and 2m

Modes: h.f. - c.w. & s.s.b; v.h.f. - s.s.b. & f.m.

A commemorative QSL cards is available for all who confirm contact. Please QSL via the Bureau.

**Ron Cairns G3HFA.** 71 Springfield Avenue, Newton, Wirral, Merseyside L48 9XB. Tel: 051-625 7124.

Nostalgia is Back in Fashion

Roberts Radio have taken a nostalgic return to the days of jive and Elvis and combine genuine 1950s styling with 1990 performance for some of their newest radios.

Between 1959 and 1965 enough radios were sold to stretch between London and Glasgow. They were often customised with anything from real mink to jewels.

The two radios here are the Revival, a 3-band receiver costing £99.99 and the R737, also a 3-band radio costing £119.99.

The Revival is an authentic replica of the R200 which was so very popular back in the early 1960s. It has the same mahogany and leathercloth finish as the original, but this radio has 1990 technology and performance.

It now has f.m. included in the spec.

The R737 is a top-of-the-range model and has ten pre-sets on both m.w. and f.m. and five pre-sets on l.w. The i.c.d. shows frequency, clock and alarm and provides stereo via headphones. Also in this range is the R701 at £89.99.

For your nearest Roberts dealer, contact PR Unlimited, 78 Ebury Street. London SW1W 9QD. Tel: 071-730 7174.

World Telecommunications Day

Celebrated annually on May 17, World Telecommunications Day commemorates the founding of the International Telecommunications Union in 1865. The theme of this year's World Day, the 25th, is Telecommunications and Human Development.

It covers such things as the promotion of human rights, the universal availability of medical care, access to education, employment, environmental protection and economic development.

Morse Book

As the happy owner of a Vibroplex Lightning Bug Morse key, I was very interested in a book stocked by Eastern Communications called The Vibroplex Co Inc. It's the story of the company that developed the 'revolutionary' design of all-mechanical bug key from 1890 to 1990. It charts the history of the key, with plenty of illustrations that will help any collector date their key.

I found the book very interesting, including the pages of patents at the end of the book. One feature that is helpful to the collector is the glossary of the 'plates' mounted on the Vibroplex and how they have changed over the years.

The book costs £19.95 including postage for the ordinary copy, or £23.95 for a signed copy.

Eastern Communications. Cavendish House, Happisburgh, Norfolk. Tel: (0692) 650077.

MVT-7100 New Instructions

Javiation have informed us that they have re-written the MVT-7100 handbook to make it more understandable. These handbooks are included in with any MVT-7100 purchased from them, but can be purchased separately.

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

Open Day

Waters & Stanton are holding their 3rd Open Day from their Hockey premises from 10am to 5pm on May 9. There will be free food and drink. As usual they will have a Bring & Buy Sale, Service Department clear-out items, special offers, etc., and lots of equipment to look at. Talk-in will be on 144MHz using the callsign G0PEP.

Petrol Tokens for Radios

In the past, the RAIBC in Northern Ireland have been able to provide close to £30 000 worth of equipment to members by converting petrol tokens and air miles into cash. This project still continues and they would ask all readers to consider their appeal when you next purchase petrol or home heating oil.

If you have any tokens, vouchers or air miles you can send them, free of charge, to the following address:

RAIBC (NI Area), FREEPOST, BE 1769, Belfast BT12 5BR.

By the way, your used postage stamps can also be useful to provide guide dogs for the blind. They should be sent to: Archie, PO Box 87, Belfast BT12 5PU.

Oops

Recently, we got the telephone number of SSE wrong, it should read: (0703) 769598.

QTI

QTI Tape Magazine have been undergoing a move of house, which didn't go well by all accounts. the latest address for them is now:

QTI Tape Magazine Association, Towers Cottage, Towers Lane, Cockermouth, Cumbria CA13 9ED. There may be another move in the offing and we wish them well.

Construction Course

A Construction Course is due to start at Arnold and Carlton College, Digby Avenue, Mapperley, Nottingham. The course lasts for six weeks, taking place on Tuesday evenings at 7pm, all starting on May 11.

Students will have a choice of any authentic radio-related projects ranging from simple test equipment to a relatively complex receiver or transceiver. No previous constructional experience is necessary, but students are expected to bring their own small tools - soldering iron, pliers, etc.

The components used can either be supplied by the student or purchased at cost from the college. Alan Lake G4DVW. Tel: (0602) 382509.
World Beating Shortwave Receivers

Lowe HF225
Everybody loves a winner! It probably came as no surprise to owners of the HF225 when our receiver won yet another award. After all, they are already appreciating the excellent sensitivity, superb IF filtering and the remarkable ease of operation. Add a keypad for direct frequency entry, an active whip antenna, synchronous detection and FM unit and you have one of the most versatile receivers on the market today – significantly less expensive than some of its far eastern competitors!

HF225 £479.00
HF225 Europa £699.00
(A very special limited edition – telephone for details)

Lowe HF150
Small, but perfectly formed, the HF150 is really establishing itself as a premier receiver for serious listening. It's complete with selectable sideband synchronous detection, three AM bandwidths and SSB filtering optimised for DXing utility stations. But we don’t just stop there. We’ve just made it a lot more useful by launching a quick release mobile mounting bracket, and now we’ve added computer control for complete versatility. Call at any of our branches for full details.

HF150 £359

The Best of the Rest...

Kenwood R5000
Despite its age, still proving a tough, reliable HF receiver. IF Shift and Notch controls allow you to process the incoming signal and narrower CW and SSB filters are available for those who need them. Now the only shortwave set with provision for installing a VHF converter. (And our unique two year warranty!)

From £949

Icom R72E
An ideal choice for those who need lots of memory channels and scanning facilities. FM can be added as an option as can narrower CW filters. DDS technology ensures smooth tuning. Direct frequency entry from the keypad, clocks and timers enhance the operation.

From £759.00

JRC NRD535
Probably the finest receiver available today. Designed to give you total control of the incoming signal, its many features include pass band tuning, notch filters, noise blankers, dedicated data modes including FAX and built in RS232 interface for computer control via our Multiscan software.

From £1395

Colin G3XAS at Bournemouth
27 Gillam Road, Northbourne, Bournemouth BH10 6BW
Tel: 0202 577760

Dave G4KFN at Newcastle
Newcastle Airport, Woolstington, Newcastle Upon Tyne NE20 9DF
Tel: 0661 860418

Tony G4KFN at Newcastle
Newcastle Airport, Woolstington, Newcastle Upon Tyne NE20 9DF
Tel: 0661 860418

Fred G4RJS at London
223/225 Field End Road, Eastcote, Middlesex HA5 1QZ
Tel: 081 429 3256

Tony G4NBS at Cambridge
162 High Street, Chesterton, Cambridge CB4 1NL
Tel: 0223 311230

Sim GM3SAN at Cumbernauld
Cumbernauld Airport, Cumbernauld, Scotland G68 0HH
Tel: 0236 721004

Short Wave Magazine, May 1993
NEW! YAESU FRG100
A new receiver from Yaesu has been a long time coming and the FRG100 sets a new standard from this manufacturer. Broadcast listeners may like the 6 and 4kHz bandwidths and the fifty memory channels will store both frequency and mode.
Seems good value at.................................................................£559

LOWE NEWS!
Plymouth is the site of our latest branch, bringing Lowe sales and service to the south west for the first time. Over the years we have served a large number of satisfied customers in the Devon and Cornwall area by virtue of our excellent mail order system, so we are particularly pleased to offer customers old and new, somewhere they can visit and actually see our products and to try them out before buying.
Derek Foster, G7ESZ, and Peter Thornhill, G6ZKQ are your contacts here. Both contribute widely to amateur radio activities in the area, and keep themselves up to date on the short-wave scene also. In addition, both have many years professional experience to draw on.

The Basement
Royal Fleet Club
Devonport
Plymouth
Devon
PL1 4PQ
Tel 0752 607284
Fax 0752 607285

MULTISCAN
Computer control of receivers is a growing interest with many SWL's and as a result, Lowe Electronics have commissioned the Multiscan program for IBM PCs and compatibles. This is quite a sophisticated and versatile program offering a high level of control of functions depending on the receiver in use. It supports the current range of receivers from Kenwood, Yaesu, AOR, JRC and Icom's R7000 and R7100. Multiscan features 2000 memory channels with dual VFOs and space for a fifty character "comment". Manual tuning can be accomplished with keyboard entry, up/down controls or by mouse control, together with mode change, filter selection, BFO control, passband tuning, noise blankers etc., depending on your receiver.
A spectrum analyser display is also incorporated, together with a comprehensive logbook and precompiled database of over 1000 entries. The database is fully editable, allowing you to create a number of files. A datasheet is available but a demonstration at one of our branches allow you to see the full potential of these excellent software.

MULTISCAN..............................................................£75.00

RF SYSTEMS
This small company from the Netherlands has really turned on the world of shortwave listeners. Their products are highly innovative, extremely well made and offer great value for money - and what's more they work! Comprehensive datasheets are available on all their products and we'll be happy to supply these on request.

Magnetic Longwire Balun............£39.95
MLB Antenna Kit 1 (12.5m long) ..........£66.95
MLB Antenna Kit 2 (20m long) ..........£76.95
MLB Marine (special MLB for maritime use) ..........£54.95
DXONE the ultimate active antenna ............£289.00
DX7 Active antenna ............£179.00
T2FD Low noise antenna ............£169.95
DXListener ............£249.00

NEW! FROM RF SYSTEMS
THE MAGNETIC TRANSFER ANTENNA
Developed primarily for marine applications, the MTA is a passive antenna. Comprising of a 2m long, UV resistant, plastic pipe with stainless steel fittings, the MTA can be mounted in a variety of locations. It has a specially wound helical element designed for omnidirectional reception and is elliptically polarised to make the most out of transmissions vertically or horizontally polarised. Two versions are available: one covering 100kHz - 25MHz and the other 500kHz - 30MHz. We expect the price to be around £159.00. Full details on request.
UNIDEN BEARCAT UBC142XLT
Scanning Receiver

Uniden are well-known for manufacturing receivers for the scanning enthusiast. Lawrence Harris welcomed the opportunity to have a closer look at the new Bearcat 142XLT.

The UBC142XLT is a 16-channel programmable scanner, operating in the v.h.f. and u.h.f. bands. Operating the set is particularly straightforward and the Operating Guide is a folded set of instructions that will not give anyone any problems. A telescopic antenna is supplied with the receiver but, as usual, best results will undoubtedly be obtained by connecting an external antenna. For this review both methods were used as described.

The Operating Guide describes the memory back-up system as being of the 'capacitor type'. This means that frequencies programmed into the receiver will be retained for a considerable time, powered by the capacitor's stored energy. Many scanners use battery back-up, but the capacitor-type can be more convenient, unless long periods of power disconnection are anticipated. The manual suggests that four hours of memory storage will be obtained before these frequencies are lost, but I found that stored frequencies were still held after more than 12 hours disconnection.

The unit includes a two-pronged mains adapter (220V a.c. to 12V d.c.). Although the review sample did not have a shaver adapter - essential to enable it to be plugged into a 13A mains socket - President assured me that one is supplied with all Bearcat UBC142XLT scanners sold in the UK. Alternatively, the scanner can be operated from any 12V supply, and consumes about 500mA. This means that it is highly portable and could run for hours on a small NiCad. I use a 5Ah NiCad for powering my telescope, which uses more power, yet runs almost all night before recharging is necessary.

Appearance

The unit is very light to handle and is finished in black abs plastics with white lettering. The top face has a small two-digit i.e.d. indicator which normally shows the channel currently being scanned. There are two rotary knobs, SQUELCH and POWER/VOLUME, and several rubber digital buttons. There are two groups of these buttons, the smaller being used for numerical entry - setting digital frequencies and channel selection. The six larger buttons, PRIORITY, WEATHER, LOCKOUT, REVIEW, SCAN and MANUAL, select the required operation.

There are no surprises amongst these options, excepting possibly WEATHER - more on this later. The rear of the unit has three connectors; a d.c. power input jack, an external speaker connection and the antenna socket, which is an automotive connector.

Frequency Programming

On receipt, the scanner appeared to have no frequencies already programmed in the main bank, so I started by setting up several of the weather satellites and Russian (or should I say CIS) navigation and military satellite frequencies. Entering a frequency is easy; assume that we are setting channel 1 with NOAA 9's frequency - 137.62MHz. Press 1 (for channel 1) and then MANUAL. Press the digits 137.62 in sequence (the frequency in megahertz) and finally the E (Enter) button, which is the last small button on the key pad. After programming any channel it is worth checking that you have set it up correctly. The REVIEW button does this. When the button is pressed (with the channel number showing), the frequency is displayed on a digit-by-digit basis. This unusual method of showing a frequency is probably due to the receiver being intended mainly for marine use. Frequencies here are channelised and usually referred to in this manner. I was still surprised, considering the almost universal use of wide character displays. Setting up all 16 channels and checking each one afterwards only took a couple of minutes.

Keeping a written record of programmed frequencies is a sensible precaution, so I have a list on my wall for this purpose.

Antennas

Although it is possible to use an indoor antenna, particularly if you are situated fairly high up, I wouldn't expect to be able to test a scanner properly without giving it a fair chance to tune into the ether! I started with my backup WXSAT antenna - an external crossed-dipole (cut for 137MHz) - using less than professional connectors and set the scanner running.

Scanning

When SCAN is pressed, the
unit monitors at the rate of 15 channels per second. It tests every channel, including those not programmed. There is a LOCKOUT button which stops selected channels from being scanned. This feature is useful, particularly when 'birdies' arrive! Birdies are those odd signals (or noise) that every receiver picks up sooner or later. They may be generated internally by the receiver itself, but one can also acquire the occasional un-modulated carrier which can hold a scanner for ages before it is noticed. Use LOCKOUT for any un-programmed channels, but remember to regularly check which channels are locked out - there is an indicator for this. The MANUAL button allows selection of a specific channel - press MANUAL, then the required channel. One of the two rotary controls is labelled SQ, the 'squich' control. It is used in the conventional manner - turn it from the minimum setting until receiver noise stops and after a short delay scanning then starts. This control operates in an anti-clockwise direction - the opposite from any other scanner that I have used, but after my initial surprise, I found it perfectly acceptable. Perhaps it's an American convention? The other rotary control is the combined ON/OFF and VOLUME control, which operates clockwise.

Priority

Channel one has a special feature. If the PRIORITY button is pressed, this channel will be sampled every two seconds during normal scanning, until a signal is detected. It then remains locked in the usual way. If you are keen on closely monitoring a particular channel, such as the marine distress channel, this can be a useful facility. PRIORITY only operates on channel one so remember this when setting up the frequencies.

Results

I operated this scanner next to both my WXSAT and general scanners and used the same external antenna for each. The satellites in the 150MHz band came in on both the Uniden Bearcat and my normal scanner clearly. There are several satellites in this band and the scanner detected them as they came into range. Similarly the WXSATs were easily heard. The sensitivity quoted for the receiver is fairly typical for this type of scanner (see listings below), and this was confirmed by my results. Listening very carefully to the sound I could detect little difference between that from either scanner. A note of caution should be mentioned regarding the use of the scanner near a computer. I did my initial tests with the computer off, and found the receiver sensitivity as expected; all of the satellites were there - loud and clear. Later in the evening I was using the computer for word processing and wondering why little was coming in on the scanner. Investigation showed that the noise from the computer was apparently de-sensitising it. Switching off the computer immediately brought the scanner back to normal sensitivity.

Marine frequencies

The style of this Uniden Bearcat scanner indicates its marine monitoring applications, so after tuning into all of the WXSATs, I programmed it to monitor the numerous local marine frequencies (thanks to a neighbour who is a navigation pilot). The scanner hardly stopped going all afternoon. Looe fishermen were chatting all the time, and several other channels were heavily used! With receivers like these, no ex-mariner could ever feel lonely. My father was ex-Navy and would have loved to listen in to the marine conversations.

Weather Search

The mystery button! The notes say press to search all seven pre-programmed NOAA frequencies - "only used in the USA". In fact it is designed to receive the local USA weather stations which neighbour John tells me operate around the coastline of America. This is channelised in the 162MHz band. I let it run for several minutes without any signals being received.

Frequency Search

Although the receiver is designed to cover three bands (see list below), it does not have a facility to search for active channels. This means that exploring the various sections of the spectrum is not possible in that manner. The use of published frequency listings could get around that problem.

Conclusions

This Uniden Bearcat scanner is very easy to set up and use, though caution may be needed in computer environments. It is almost certainly aimed at the marine monitoring enthusiast, and its light weight and low power consumption seem to make it ideally suited for a life on the waves. Otherwise, more programmable frequencies would enhance its performance. The review sample was supplied by President Electronics Benelux and is available from many SWM advertisers priced at around £117.
In Praise of the AR88

B.A. Berry claims that he doesn't really understand modern receivers. The truth is that he fell head over heels in love with the AR88 over 40 years ago.

History

The AR88 first appeared in the 1940s. It was a high-quality general coverage receiver that was developed for commercial use. It had two r.f. stages, three i.f. stages with a variable selectivity crystal filter, a b.f.o. and a noise limiter. It covered from 535kHz to 32MHz in six bands and was built to the highest mechanical standards. In fact, those standards are very rarely reached in today's equipment. During the war a modified version, the AR88D came into service with much the same specification as the AR88 except that it lacked an S-meter. The AR88D was built by several firms under licence for RCA during those years. Another model, the AR88LF was an i.f. version covering 75-650kHz and 1480kHz-30.5MHz in six bands.

Today an AR88 can be purchased for around £40 - £70 and with few modifications will perform extremely creditably, both as a general coverage receiver and on the amateur bands. True, it will probably need some servicing and alignment, but given this it will give long and faithful service for years to come.

Specifications

The model that is most commonly available today is the AR88D. This is a 14-valve receiver consisting of two r.f. stages, mixer and local oscillator, three i.f. stages, a switched crystal filter, detector, a.v.c. and audio amplifier. There is also a b.f.o. and noise limiter. Its frequency range is from 0.6 to 32MHz, although the exact coverage may vary depending on the model. Sensitivity figures for 0.5W audio output may vary between 0.5 to 1.2µV. The i.f. stages operate at 455kHz and have twelve tuned circuits, which together with a switchable crystal filter give a very high degree of selectivity - when aligned properly! The filter bandwidth is switchable between 3kHz, 1.5kHz and 400Hz. The b.f.o. is continuously variable, and s.s.b. can be resolved fairly easily. However, this is one area where a modification can be very successful, but more of this later. Both r.f. and a.f. gain controls are fitted, as is a tone control, and the noise limiter can be switched in and out of the circuit as required. The a.v.c. can also be switched off if necessary - one area in which some modern receivers are lacking.

The main tuning control that gives mechanical bandspread is extremely smooth in action when properly adjusted and lubricated, although for use under contemporary conditions the scale is not required.
AWARD WINNER

‘BEST COMMUNICATIONS RECEIVER 1992’

FRG-100

As awarded by the World Radio TV Handbook in their 1993 Radio Industry Awards. This is what they have to say about the new FRG-100 . . .

"Yaesu has succeeded in bringing improved technology and features within the price range of a much wider group of shortwave broadcast listeners. It has been a long time since Yaesu revamped their broadcast receiver but for many listeners it will be worth the wait!
A good package at an affordable price."

WHAT MORE NEED WE SAY!
TRY ONE TODAY, YOU’LL NOT BE DISAPPOINTED

As reviewed in April’s edition of Short Wave Magazine

The widest range of receivers in the UK.

Yaesu • AOR • Sony • Icom • Yupiteru • Kenwood • Lowe • JRC
calibration is not really good enough, and this is another region in which a modification can be beneficial.

**Initial Checks**

Having purchased your AR88, the first thing to do is to give it a good checking over and clean it up. Also take a look under the cover of the r.f. stages - this is a large screened box at the left front of the chassis. If you're lucky you'll find that the original trimming tools are still there in clips on the side - if not you'll have to adapt some from their modern equivalents. Do not even think about modifications at this time!

The next stage involves bringing the receiver back to it's original specifications as nearly as you can. By doing this you will be certain that at faults are cleared prior to modification, and it will give you a good basis for evaluating the effects of any circuit changes you may make later. I'm afraid you're going to have to beg or borrow some proper test equipment to do this, as it is almost certain that someone will have 'twitched' the l.f.f. and possibly the r.f. stages in order to 'get more out of it'. If it hasn't been done properly, the result will be a lack of sensitivity, and what is worse, a loss of selectivity. I have purchased several AR88s over the years, and I have never yet met one that has been properly aligned. The easiest and correct way to align the i.f. stages is with a sweep generator and oscilloscope. The i.f. stages are 'stagger tuned' (i.e. each i.f. is tuned to a slightly different frequency) in order to give a flat response of position 1 of the selectivity switch. It is this stagger tuning, in conjunction with the positioning on the i.f. passband of the crystal filter, together with it's phasing, that determines the selectivity in the other four positions of this switch. There is an alternative method of stagger tuning using a signal generator set to the individual frequencies, but this is not nearly so good as employing a sweep generator - and in any case I can't assist with the frequencies!

**Get a Manual**

At this stage if you haven't got a manual you'll have to get one. Reprints are freely available from advertisers in the pages of Practical Wireless. In the manual you will find a set of i.f. curves, which graphically illustrate the shape that you should be aiming for. For those who haven't used a sweep generator don’t let the name put you off. Basically it is an ordinary signal generator in which the output frequency is swept over a range of frequencies, in this case the i.f. - say from 400 to 500kHz. If the vertical input of an oscilloscope is then connected to the final i.f. stage, a curve will be drawn on the tube facing the i.f. response. Your aim is to match the curve to the curves shown in the manual by trimming the i.f. stages. If the sweep generator and the oscilloscope are both set for a 50Hz sweep repetition rate it should not be necessary to synchronise the two instruments. It is not a difficult task, but you should take your time doing it as it must be correct. The same applies to the alignment of the crystal filter. Both it's phasing and loading should be adjusted as described in the manual until every curve for each position of the selectivity switch matches those given in the drawings. The r.f. alignment is much simpler, although it can take a considerable time to do properly, full instructions are given in the manual. As you go through the r.f. alignment you can make a quick check on the sensitivity of each range, which will give you a good idea of the condition of your receiver. Finally adjust the b.f.o. trimmer until zero beat with a signal occurs at the middle of the range of the b.f.o. control.

**Problems**

It is likely at this stage that the sensitivity of the receiver will be somewhat lower than the figures given in the manual. There are several possible causes for this, assuming that your alignment is correct, the most common being loss of emission of one or more valves. Substitution is the best bet here, and it is usually the two r.f. stage valves (6SG7s) or the mixer/local oscillator combination (6SA7/6J5) which will be culprits. Other causes can usually be determined by taking a quick look at the valve electrode voltages and comparing them with the figures given in the manual.

A not so well known reason for loss of sensitivity is due to the fact that in receivers of this age capacitors can dry out and/or go leaky, especially coupling and decoupling capacitors. This will in turn affect valve electrode voltages and cause a change in operating points, with a subsequent loss of sensitivity or increase in distortion. One particular rascal in this respect is the decoupling capacitor on the anode of the 6K6 output pentode. Frequently this goes short circuit - if it does, you can say goodbye to the audio

---

**Advantages and Disadvantages**

There is no doubt that the major disadvantages of the AR88 is its size and weight. I've never actually weighed one, but it definitely takes a couple of people to lift it! As for size, its standard 19in rack mounting front panel is 280mm high, whilst the depth is also 483mm - so you get a lot of receiver for your money! The following table will give you an idea of the points you should consider before buying:

<table>
<thead>
<tr>
<th><strong>Advantages</strong></th>
<th><strong>Disadvantages</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cheap to buy and usually freely available.</td>
<td>1. Weight and size are excessive.</td>
</tr>
<tr>
<td>2. Circuity is easily understood.</td>
<td>2. Some component deterioration over the years.</td>
</tr>
<tr>
<td>3. Valves and other components are easy to obtain.</td>
<td>3. Performance lacking on 28MHz and above.</td>
</tr>
<tr>
<td>4. Plenty of room for modifications that are usually uncomplicated.</td>
<td>4. Analogue frequency dial not good enough by today's standards.</td>
</tr>
<tr>
<td>5. Specifications fall very little below modern equipment and in some instances exceed them.</td>
<td>5. The b.f.o. is not good enough for quick resolution of s.s.b. signals and can effect a.v.c. action.</td>
</tr>
<tr>
<td>6. Solidly built and will last a lifetime.</td>
<td>6. Can be difficult to align without proper equipment.</td>
</tr>
</tbody>
</table>

Even with the disadvantages listed above, the AR88, properly serviced and aligned, performscreditably in competition with its modern counterparts. In the case of some of the cheaper models around today it will outperform them easily. If you can put up with its weight and size, which really are the only major disadvantages, then you have a very good receiver that won't dent your bank account!
output transformer, because a failure here instantly shorts the main h.t. rail to earth via the transformer primary. The transformer is a big one, and not easily obtainable. Your first modification should be to remove this capacitor and place a new one in parallel with the output transformer primary, together with a fuse in series with the h.t. rail. Any future shorts will merely blow the fuse.

Pay particular attention to the contacts on the range switch. They are almost certainly dirty - particularly those inside the r.f. compartment. A good switch cleaner will work wonders for your sensitivity and noise figures. Another problem I have noticed is noisy r.f. and a.f. gain controls. The audio gain control is easy enough to replace, but you may have trouble with the r.f. control. This is marked on the circuit as 66MΩ. To be honest I have never checked, but I imagine that it would be difficult to find a control of this value nowadays. The old service trick of a drop of light machine oil inside seems to work quite well.

**Modifications**

There are quite a few modifications that can be profitably carried out on the AR88, and although I can mention only a few, I would be pleased to hear from those of you who know of others, since I am contemplating a much larger article in the future.

**Digital Frequency Counter**

It is extremely easy on the AR88 to fit a digital frequency counter with the necessary 455kHz offset from the local oscillator output. In my own case I removed the AR88 logo (I have the AR88D) and replaced it with a frequency counter from a very old multi-band portable receiver. It works extremely well, and this type of add on frequency counter with built in offset is freely available. The supply can usually be obtained quite easily by a small bridge rectifier and smoothing capacitor from the filament supply, and if this is not the correct voltage then there is plenty of room inside for a small transformer. This is one modification that could be useful before commencing any alignment - it makes the job that much easier.

**Product Detector**

The addition of a product detector is perhaps one of the more useful modifications that can be done to the AR88, and there are plenty of quite simple circuits around for doing this. The b.f.o leaves a lot to be desired when receiving s.s.b. signals. For reasonably distortion free reception, the b.f.o. injection voltage should be equal to or greater than the signal level, which is certainly not the case in one of these old style a.m. receivers, where the b.f.o. was added almost as an afterthought to permit c.w. reception. At one time the cure for this was to simply increase the b.f.o. signal to the last i.f. by removing the twisted pair of wires employed to mutually couple the stages, and replace them with a 1nF capacitor. Unfortunately, although this was extremely effective in correcting the levels, it resulted in the b.f.o. signal saturating the a.v.c. stage when it was switched on. However, if you don't want to go the effort of fitting a product detector and can manage without a.v.c. then this modification does help considerably when trying to resolve s.s.b. signals. If you do decide to go ahead and fit a product detector, be aware that you may still get problems with the a.v.c. stage but that this can be overcome fairly easily.

**28MHz Reception**

One of the long standing problems with the AR88 has been a lack of sensitivity and poor signal to noise ratio on the 28MHz band. Fortunately it is very easy to substitute more modern low noise valves in place of the 6SG7s that are fitted, and this results in a very considerable improvement in signal to noise ratio. One other modification that I have seen successfully carried out is the fitting of the f.m. detector, although this can involve locating a 455kHz i.f. transformer with a centre tap on the secondary.

**A Warning**

Finally a word of warning to any younger listeners who may be contemplating work on the AR88. It uses man sized voltages! The h.t rail starts off around 350V - it's dangerous, so do take care when working on it - those big paper capacitors can hold their charge for a long time!

If there is sufficient interest, then I hope to go more deeply into these, and other modifications at a later date. In the meanwhile, if you need a good, cheap communications receiver that will perform extremely well, why not try the AR88?

**Further Reading**

Valved Communications Receivers - the AR88D. *Practical Wireless,* August 1987
Receivers: ‘All Mode’ ~ ‘All the time’

New AR1500EX - Enhanced model extra. Completely new version of this popular handheld receiver featuring new printed circuit boards for even better performance. This is a special model for the U.K. market only. Coverage is from 500 kHz all the way to 1300 MHz without any gaps in the range. Channel steps are programmable in multiples of 5 kHz and 12.5 kHz up to 995 KHz, the BFO will allow tuning between these steps for SSB operation. All popular modes are provided NFM, WFM, AM and SSB (USB, LSB and CW) with the BFO switched on. The receiver is supplied with a comprehensive selection of accessories: DA900 wide band flexible aerial, NiCad pack, Dry battery case (for use with 4x AAA alkaline cells), Charger, DC lead fitted with cigar lighter plug, Earphone, Soft case, SW aerial wire terminated in a BNC connector for shortwave reception and Operating manual. Versatility is excellent. The AR1500EX may be powered from it’s internal NiCad pack, spare dry batteries may be carried for extended operation and used with the dry battery case, the set may also be plugged directly into the cigar lighter socket of a motor vehicle (external input range 11 - 18V DC). Suggested Retail Price £349.00 including VAT. (UK Carriage free)

With the AR3000A (base-mobile receiver) your listening horizons are truly extended providing receive coverage from 100 kHz all the way up to 2036 MHz without any gaps in the range. The AR3000A offers the widest coverage on the market today with a high level of performance and versatility from long wave through shortwave, VHf and onward to the upper limits of UHF and SHF. Not only will the AR3000A cover this extremely wide range it will allow listening on any mode: NFM, WFM, AM, USB, LSB AND CW. The AR3000A also features an RS232C port for computer control. Suggested Retail Price £949.00 including VAT. (UK Carriage free)

“Nearly New” stock offers substantial savings

Occasionally we are able to offer “Nearly New” equipment with full 12 months’ AOR warranty at attractive prices. There can be many reasons for this stock, but most important for ‘you’ is that we can offer substantial savings from Suggested Retail Price. All equipment is thoroughly tested before despatch to ensure full conformity to specification. Typical examples of “Nearly New” equipment include:

1. Brand new arrivals from Japan with slight cosmetic damage, possibly a small scratch or soiled packaging.
2. Dead on arrival (or near-arrival) which has been refurbished - often in the Japanese factory. Be rest assured, any faults in the early days tend to be of a minor nature, of course any such faults are cleared and the equipment fully tested prior to placement into “Nearly New” stock.
3. Equipment returned subject to a re-stocking charge within a few days. This is most unusual and would only be the subject of an unwanted Christmas or Birthday present etc.

Terms: Equipment is sold subject to the company’s current terms and conditions, a copy of which is available upon request. The company reserves the right to change prices, terms and conditions and specifications due to changes in cost and currency fluctuation. All prices are shown in pounds Sterling £ and include VAT. E&OE. “Nearly New” equipment carries a 12 month parts and labour warranty. Due to the nature of this offer, we cannot accept returns for refund, credit or exchange. In the unlikely event of equipment failure, we will be happy to provide full service facilities. Carriage: Parcel Force 48 is the usual method of despatch, the cost is £6.00. Parcel Force 24 and TNT next working day services are also available, the charge is £10.00, while deliveries by this method are usually next day, the service is not guaranteed. This offer is only available directly from AOR (UK) and subject to availability.

“Nearly New” Price Indicator

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>Suggested Retail Price</th>
<th>“Nearly New” Price</th>
<th>Saving</th>
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<tbody>
<tr>
<td>AR3000A</td>
<td>The ultimate. Unique all mode extremely wide band base-mobile receiver. Coverage is from 100 kHz - 2036 MHz with no gaps. Fitted with RS232 computer port.</td>
<td>949.00</td>
<td>799.00</td>
<td>150.00</td>
</tr>
<tr>
<td>AR1500e</td>
<td>Compact all mode handheld receiver. Receive coverage 500 kHz ~ 1300 MHz: AM/NFM/WFM &amp; SSB using BFO. Enhanced model.</td>
<td>299.00</td>
<td>250.00</td>
<td>49.00</td>
</tr>
<tr>
<td>AR1500EX</td>
<td>Compact all mode handheld receiver. Receive coverage 500 kHz ~ 1300 MHz: AM/NFM/WFM &amp; SSB using BFO. Latest model.</td>
<td>349.00</td>
<td>299.00</td>
<td>50.00</td>
</tr>
<tr>
<td>AR2800</td>
<td>Competitively priced full featured base - mobile scanning receiver. All mode operation AM/NFM/WFM &amp; SSB using a BFO. Coverage is 500 kHz ~ 600 MHz &amp; 800 - 1200 MHz. Includes internal NiCad.</td>
<td>449.00</td>
<td>375.00</td>
<td>74.00</td>
</tr>
<tr>
<td>AR2500</td>
<td>Base - mobile receiver 5 - 550 MHz &amp; 800 - 1300 MHz fitted with BFO. Has an RS232 computer port.</td>
<td>419.00</td>
<td>325.00</td>
<td>94.00</td>
</tr>
<tr>
<td>AR2000</td>
<td>Hand-held receiver 500 kHz - 1300 MHz without gaps. AM/NFM/WFM</td>
<td>309.00</td>
<td>250.00</td>
<td>59.00</td>
</tr>
</tbody>
</table>

“Nearly New” equipment is truly supplied as-new and is not the result of worn out used equipment through trade-in deals etc.

If you are unable to obtain supplies of new AOR products from your local dealer, you may order directly - we have a fast mail order service. Please send a large S.A.E. (34p) for full details.
Having been an Icom user for many years, I was keen to unpack the R-72 and see just what it offered. With the packing removed, I was certainly not disappointed with the general appearance. The front panel was very smart and positively bristling with an assortment of knobs and buttons. Dominating the front panel was the very well-lit liquid crystal display that conveyed details of the frequency, mode, memory channel, etc. One of the characteristics of virtually all Icom receivers is the excellent tuning knob. The R-72 is no exception and has a weighty knob which is very smooth in operation. There was even an adjustable mechanical brake so that the operator could set the feel of the tuning to suit personal preferences.

In my usual impetuous way, I was keen to power-up the receiver and see how it performed. As you would expect, the external connections were few and easy to complete. The power requirements were met with a built-in a.c. power supply that could be set to operate at 100, 117 and 220 - 240V. This should meet the needs of all listeners. For those that enjoy portable or mobile operation, the R-72 featured a coaxial external power socket on the rear panel. When a plug was inserted the internal power unit was automatically disconnected. The power requirement was a fairly modest 13.8V d.c. at 1.2A max.

Incidentally, should you have requirement for back-up in the event of a mains failure, Icom produce a battery version with a built-in lead acid battery and changeover circuitry. The only other external connection required was to plug the antenna into the standard SO-239 socket on the rear panel. For the review, I used my G5RV multi-band antenna, though a simple long wire and magnetic balun is the best option.

**Tuning Around**

With the R-72 powered up and ready to go I tuned around the bands to see how it fared. As with all modern receivers, the R-72 tuned in steps rather than continuous coverage. The steps were very well chosen with a default setting of 10Hz. When a.m. is selected the tuning steps change to the programmable kilohertz setting. The default for this mode is 1kHz, but you can set this to any value between 1kHz and 10kHz in 1kHz increments. This had many uses both for broadcast and utility listening. Broadcast listeners can set this to 9kHz to align with standard broadcast channel spacing. On the other hand, a 3kHz step is useful when monitoring the h.f. marine and air bands. The kilohertz setting was also useful for quickly moving around the band. However, for rapid frequency changes, pressing the megahertz button increased the frequency steps to 1MHz. Once you had found that elusive DX you could use the dial lock button to prevent accidental detuning. For really fast frequency selection the keypad is the best option. This enables direct entry of any frequency within the R-72's range. As with most modern units you don't have to enter trailing zeros, so 12.100MHz becomes 12.1. An extra time saving feature came into play when changing frequency within the same megahertz band. In this case you only had to enter the new kilohertz setting - the receiver's software sorted out the rest.

When I first started using the R-72 I found the keypad a little too eager and I often ended-up with repeated digits. However, this improved with practice.

Another useful little extra was the inclusion of switchable pre-amp and attenuators. The pre-amp gave

Icom have a formidable reputation for high-quality radio products. The IC-R72 communications receiver, reviewed here by Mike Richards, has proved to be a very popular receiver.
Computer Control

For the ultimate in flexibility the R-72 featured Icom's CI-V computer control system. The system is very versatile and, in its most basic form, can be set up to control the receiver's basic frequency, mode and memory channel from a personal computer. If you have a range of Icom equipment, you can use this system to connect them all together and control all the functions from one computer. Of course, once you have control by the computer it's comparatively simple to link the receiver direct to your logging system and so build a very sophisticated listening system.

Clock/Timer

The R-72 included in its armoury of features a clock and timer facility that could be used to control remote operations. The timer was a simple, single programme type that could be set to turn the receiver on, off or on and off at pre-set times. The inclusion of such a simple timer was actually a strong point as it was difficult to make mistakes. In practice, it's unusual to need more than one programme anyway. To facilitate the remote recording of programmes, the timer activated the 'remote' socket on the rear panel. This could be used to control the record function of most tape recorders. The clock had a straightforward twenty-four hour readout that could be transferred to the main display with a single keypress.

a measured SINAD improvement of 8dB which was very useful on the higher frequency bands. The r.f. attenuation range of the R-72 was very good indeed covering 0-30dB in 10dB steps. This should be enough to cope with the strongest of signals.

Comprehensive Memories

The provision of a comprehensive memory system is extremely useful and is becoming a feature of all modern receivers. The R-72 boasts ninety-nine memories, each of which can store both frequency and mode. I must admit I was surprised to find that there were no memory grouping facilities provided. I find these particularly handy for keeping the various utilities and broadcast stations separate. On the bright side, the memories were extremely easy to use. The memory mode was selected with a single key press and the active memory number shown in the main display.

One excellent feature was the way in which empty channels were displayed. These appeared with a line immediately above the memory number. This was a very quick and effective way of shown whether or not a channel was free. Once a channel had been selected, you could use the manual tuning controls to move on from the preset frequency.

One handy tip is to store the lower band edge of the h.f. broadcast bands into a set of memories. This makes moving around the bands very quick indeed. So as to make optimum use of the information stored in the memories, the R-72 includes a number of scanning modes. There were four modes provided: Programmed Scan, Memory Scan, Selected Memory Scan and Auto Memory Write Scan. The Programmed Scan is designed to help the operator find stations within a preset band. Before this can be used, the operator has to store the upper and lower frequency limits of the scan in memories one hundred and one hundred and one. With the limits set, the scan repeatedly sweeps between the two limits until a station is detected that exceeds the manually set squelch threshold. In addition to setting the frequency limits there were a couple of other setting that effected all the scanning modes. The first of these was to set the scan speed using the push button on the rear panel. The setting gave speeds of approximately 10 or 4 channels per second.

The only other user setting was to decide the action to be taken once a signal had been detected. Again there were two options the simphest of which was to cancel the scan when a signal is detected. The second and I suspect more popular option is to pause for ten seconds on a continuous signal or a further two seconds if the signal dissappears before the ten seconds is up. An interesting development of the Programmed Scan was the Auto Memory Write Scan. A bit of a mouthful, but very effective! This used the same upper and lower frequency limits but, instead of just stopping on active frequencies, the details were transferred into the top twenty memories - a very fast way of capturing active stations with minimum effort. Once all twenty memories had been programmed the scan automatically stopped so that the operator could review the contents. My only criticism of this mode was that it only operated in a.m. and (optional) f.m. modes. This meant that it couldn't be used for searching air, marine or amateur bands.

The remaining two scanning modes operated on the contents of the main memories. The simple memory scan stepped through each memory in turn stopping on any where the signal exceeded the squelch threshold. The final mode provided the facility to select which of the memories would be scanned. The selection of memories was a manual operation requiring each of the required memory channels to be marked for inclusion in the scan.

Clock/Timer

The R-72 included in its armoury of features a clock and timer facility that could be used to control remote operations. The timer was a simple, single programme type that could be set to turn the receiver on, off or on and off at pre-set times. The inclusion of such a simple timer was actually a strong point as it was difficult to make mistakes. In practice, it's unusual to need more than one programme anyway. To facilitate the remote recording of programmes, the timer activated the 'remote' socket on the rear panel. This could be used to control the record function of most tape recorders. The clock had a straightforward twenty-four hour readout that could be transferred to the main display with a single keypress.
Optional Extras

The R-72 featured a very comprehensive range of optional extras that are worthy of mention. For operators with impaired eyesight there was a very good voice synthesiser module. This was quick and easy to fit and gave an announcement of the operating frequency when the SPCH button was pressed. In addition to being able to select English or Japanese, both the volume and speed could be set to the operators preference. If you live in close proximity to high power transmitters the UR-1 protection unit could be useful. This provides internal protection against such signals. Perhaps the most popular of the options is the UI-8 f.m. receive unit. This provides the final i.f. conversion to 455kHz and F.m. demodulation. With all the other options, full installation details were contained in the excellent manual. For the c.w. enthusiast there were two optional narrow filters available. These featured -6dB bandwidths of 500 or 250Hz. The 500Hz filter can be particularly useful for those interested in RTTY/ data modes providing the centre frequency of your decoder can be adjusted to match the receiver.

Finally, for those needing the ultimate in frequency stability, there was an ovened crystal reference oscillator. Installation of this required rather more expertise than the other options and is probably best left to your dealer. Once installed the already good frequency stability increased to an excellent ±0.5p.p.m. over the working temperature range -10 to +60°C.

Performance

During the review the R-72 was put through a series of tests in the lab to check that performance was within the published specification. Not surprisingly, the R-72 fared very well, exceeding the specification on virtually all counts. The selectivity was particularly good with a filter shape factor of better than 2:1 for the 2.3kHz s.s.b. filter. Distortion of the recovered audio is an area where many receivers fall down. As with all the other options, full installation details were contained in the excellent manual. For the c.w. enthusiast there were two optional narrow filters available. These featured -6dB bandwidths of 500 or 250Hz. The 500Hz filter can be particularly useful for those interested in RTTY/ data modes providing the centre frequency of your decoder can be adjusted to match the receiver.

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Abbreviations

A  amperes
a.c. alternating current
d.m. direct current
dc. direct current
f.m. frequency modulation
f.m. frequency modulation
h.f. high frequency
Hz  hertz
kg kilograms
kHz kilohertz
mA milliamperes
MHz megahertz
mm millimetres
mV millivolts
mW milliwatts
µW microwatts
p.p.m. parts per million
kHz kHz
RTTY Radio TeleTYpe
s.s.b. single sideband
S/N signal to noise
S/N SINAD signal to noise and distortion
Vo  voltage
W watts
°C degrees Celsius
µA microamps
Ω ohms

Specification

Frequency coverage: 30kHz to 30MHz
Modes: s.s.b., a.m., c.w. and f.m. (optional)
Sensitivity: 1.8-30MHz (pre-amp on)
s.s.b. and c.w. < 0.18µV for 10dB S/N
a.m. < 2µV for 10dB S/N
Squelch sensitivity: s.s.b. < 10µV
f.m. < 0.4µV
Selectivity: s.s.b./c.w./a.m. narrow > 2.3kHz -6dB, < 4kHz -60dB
a.m. > 6kHz -6dB, < 20kHz -50dB
f.m. > 15kHz -6dB, < 30kHz -50dB
Spurious image rejection: > 70dB
Intermediate frequencies:
s.s.b. 70.4515 and 9.0115kHz
a.m. 70.4506 and 9.0105kHz
f.m. 70.45, 9.01MHz and 455kHz
Usable temperature range:
Frequency stability:
< ±200Hz (25°C 1min -1 hour after power-on)
< ±20Hz (25°C after 1 hour)
< ±300Hz (0 to 50°C)
Audio power:
Power supply:
Current drain:
Dimensions:
Weight:

Short Wave Magazine, May 1993
YUPITERU
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THE NEW M7100
Set to be the handheld scanner of 1993 this radio has to be heard to be believed! Now with SSB reception here are some of the many features:-
- Covers 300kHz - 1650MHz
- Mode: F/NM/V/M/FM/AM/LSB/USB
- Memories 1,000 channels
- Search steps 0.05/0.1/0.25/0.5/1.0/5.0/6.25/9kHz
- Search speed 30Ch. per second
The set is supplied with a full compliment of accessories including Telescopic Antenna, Car Connector, NicCads Batteries, Carring Strap, Belt Clip, Earphone, Original Manufacturers English Manual, UK Spec. Charger. First Supplies will be limited - reserve your set now!...

FAIRMATE
HP2000
Still one of the most popular handheld scanners on the market. Over the last year the HP2000 has outsold almost all other models.
- Continuous coverage from 500kHz to 1300MHz
- 1000 channels of memory
- Keypad or rotary control
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SCANNERS
BLACK JAGUAR
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- Selectable AM/FM
- 16 memories

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853XL
Due to a special program made purchase we can now offer this 50ch Scanner at an amazingly low price.
- 68-88, 118-174, 406-512, 800-955MHz

NEVADA
MS1000 BASE/MOBILE SCANNER
MOBILE VERSION OF THE HP2000 HANDHELD BUT WITH SEVERAL
- Switchable radio switch
- Tape recorder output socket
- Automatic - signal operated tape recorder switching
- Metal case for improved EMC compatibility

- Receives: 500kHz - 6000MHz
- 805 - 1300MHz: Supplied with mains power supply

AOR SCANNERS
NOW IN STOCK
THE NEW AR1500 EX
ENHANCED MODEL FOR THE UK
With a new circuit board and many improvements this set is better than ever. Covers 500kHz to 1300MHz receiving NicCads, AM, FM and SSB.

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  - Soft case
  - Ear piece
  - Dry cell battery case
  - 5mtr LW antenna...

AR3000A
NEW MULTIMODE SCANNER
- Receives: 100kHz
- 2036kHz modes
- Models: US, USB, CW, FM, AM, WFM

Acepac 3 software now available, for use with IBM PCs and clones...

JAPANESE LOW LOSS COAX
Super low loss coax - essential for optimum performance with wide band UHF scanners and receivers. This cable is good for frequencies up to 3GHz.
- Model 3D (81 mm)...
- Model 8D (11 mm)...
- Model 5D (8.1mm)...

YUPITERU Original soft carrying cases for M7100 or M7000...

THIS MONTH'S BEST BUY
NRD-525 HF GENERAL COVERAGE RECEIVER
Considered to be one of the finest receivers ever made. We've managed to locate a limited quantity at a very special price. Now's your chance to own one of the thoroughbreds amongst receivers.
- Receives 7kHz to 34MHz
- 200 channels of memory
- RTY, CW, SSB, AM, FM, SSB
- Programmable memory scan
- Fully solid state modular design...

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- Search speed 30Ch. per second
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MS1000 BASE/MOBILE SCANNER
MOBILE VERSION OF THE HP2000 HANDHELD BUT WITH SEVERAL
- Switchable radio switch
- Tape recorder output socket
- Automatic - signal operated tape recorder switching
- Metal case for improved EMC compatibility

- Receives: 500kHz - 6000MHz
- 805 - 1300MHz: Supplied with mains power supply

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With a new circuit board and many improvements this set is better than ever. Covers 500kHz to 1300MHz receiving NicCads, AM, FM and SSB.

- Supplies with a large selection of accessories including:
  - Charger
  - Soft case
  - Ear piece
  - Dry cell battery case
  - 5mtr LW antenna ...

AR3000A
NEW MULTIMODE SCANNER
- Receives: 100kHz
- 2036kHz modes
- Models: US, USB, CW, FM, AM, WFM

Acepac 3 software now available, for use with IBM PCs and clones...

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Super low loss coax - essential for optimum performance with wide band UHF scanners and receivers. This cable is good for frequencies up to 3GHz.
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- Model 8D (11 mm)...
- Model 5D (8.1mm)...

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N RD-525 HF GENERAL COVERAGE RECEIVER
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- 200 channels of memory
- RTY, CW, SSB, AM, FM, SSB
- Programmable memory scan
- Fully solid state modular design...

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Short Wave Magazine, May 1993
A Practical Survivor’s Guide

Whilst some may be fortunate enough to count their loss of work in financial terms through a lump sum in redundancy cash, many more - like me - find they can't get anything other than what is due because the outfits we worked for went before we 'got some in'.

Obviously, having a hobby, such as radio, isn't the cheapest way to pass the time now that we have a surplus of it on our hands. After all, even a 'budget price' receiver costs in the region of £100 or so brand new and many more established makes cost the same second-hand, if not more.

Priorities here have to be domestic. Maybe you're wondering about the sense of having a hobby that, on the face of it, could be an investment that in the what was an essential item, so we think that we can survive this employment hiccup until something else comes along. When I say fortunate, I mean that my wife realises that my hobby is important to me. As I don't go out on the razzle, in effect, it's costing us both no more than the electricity - and that is so small as not to count.

But, she also realises that whilst I enjoy my radio enough for it to be everything I've ever wanted in a hobby, she realises that - at times - I may want to get more from it. Obviously, with no money coming in to finance such luxuries, this could prove to be a problem. An example is my a.t.u., which cost almost £90, but which I felt I needed in order to get much more from my radio. The a.t.u. was set-up I've got could realise about £350 cash-in-hand if what was an essential item, so we think that we can survive this employment hiccup until something else comes along. When I say fortunate, I mean that my wife realises that my hobby is important to me. As I don't go out on the razzle, in effect, it's costing us both no more than the electricity - and that is so small as not to count.

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Role Reversal

Panic! I offered to cancel the order, but my wife, bless her, decided that it was an item that would keep me busy in the days to come with no work. Having been in the Merchant Navy and used to being away, time at home would be an extreme shock to my system, therefore I needed something to occupy me for the length of time that I'd now have at home. However, in order to 'earn' the a.t.u. I had to agree to allow her to start up her own business, again part-time, and that I would 'role reverse' and start to do what she used to - clean the house, look after the two children, cook, shop and otherwise assume her place in the great order of domesticity. Fair enough, I said. After all, what else was there for me to do?

In return for my 'labour' I would be, in effect, be paying for the a.t.u. 'in kind'. That seemed reasonable and it also began what we now call our 'points system'. I do the odd jobs around the house that, had I been away at sea, would have had to be done by outside labour. That, as we are all well aware, costs! By deferring these jobs to me - thus cutting costs greatly - I earn 'points' that can be saved towards new gear. Now, while many will argue that I am only doing what is expected of me as a father and husband by undertaking jobs around the house, I must point out that my doing the wife's work allows her to become the breadwinner. So, in effect, I am only being paid the way I used to 'pay' my wife! All that has changed is that she works while I keep house! The budget is such that any extra money made is banked and, if the budget balances, put aside in a savings account. As long as we get no horrific bills in the meantime I can then 'buy' what I want within reason. That reasoning is that it must be second-hand and cost no more than £65 - a figure that is quite reasonable.

Second-hand Bargains

There are numerous bargains on the second-hand market as well as at rallies and the like that can add to an existing set-up without incurring heavy financial outlays. I recently missed a Sangean AT-803A going for £55 and advertised as being 'Brand new, used once, unwanted birthday present'. While that may be stretching the truth some, the idea of another short wave receiver in the shack adds to the whole monitoring aspect of the hobby, as well as increasing coverage. At £55 the Sangean was almost half-price and any inspection would have soon allowed me to make my own mind up as to whether it really was 'used once'.

Whilst I am a dedicated s.w.l. the majority are not. The number of sets, particularly scanners, bought and then sold when the new owner realises that listening is not all 'royal telephone call, is tremendous! Another example - although well out of my price range - was an AOR 2000 going for £125! The person, known to me, was 'fed up with trying to listen to things' and admitted the programming sequences were beyond him. Needless to say it was soon snapped up by another enthusiastic buyer! Had I have been working then I'd have snapped his hand off for that price!

Affordable Prices

Rallies have a great deal of reasonable equipment for sale and are often the best source of good quality gear at affordable prices. What's
more, many of the retailers selling at rallies will be enthusiasts or amateurs, so you are assured of a certain amount of goodwill on your purchase - new or second-hand. What's more, the 'flea market' stalls may well turn up an item that you find you need at a considerable saving. Look, browse and be choosy! Unemployment means you have the luxury of being careful. Avoid, if you possibly can, car boot sales, unless you feel confident in examining the gear and are allowed to. A local sale here had a Heathkit Mohican at £50, advertised as being a 'bargain' - but with an S-meter jammed at S9 and a tuning dial that felt mushy, I certainly wasn't going to be tempted - even if I could have knocked the seller down!

Another very good source of reasonable gear for sale is the 'For Sale' column in the local paper. Recently the gear here has been scanner orientated, although the odd h.f. receiver slips in now and again. There are some good, affordable buys to be had by scouring here carefully but, once again, check the gear to satisfy yourself that it is in good working order and legitimate. Far too much stolen gear is being sold through these columns. Again, beware and be careful!

Armed with my 'points earned' £65, I'm currently on the look-out for a good second-hand short wave RX. Brand names like Tatung or Sangean - yes, the same thing in reality! - are top of the list, though Eddystone, RCA or the like, valved jobs will also be looked at. Being unemployed means I can wait for as long as necessary until the right set at the right sum comes along. Previously, when working, I'd have bought outright! I'm also going through my 'junk box' and finding lengths of wire which can be made into antennas and tuned via the a.t.u. Bothering my uncle - GW0KPV - is also worth while, he always seems to find odd bits he would otherwise have got shot of, such as an old 'Silvery Rod' CB vertical. With the loading coil removed this may prove to be a reasonable h.f. vertical. The time is mine, as is the inclination to get on the bands at a pinch and on the shoe-string that I'm finding myself on now.

Home Brew

Being redundant or unemployed need not mean the end of the hobby that was so attractive during working days. In fact, reduced circumstances may be the 'shove' needed to get us into home-brew. After all, why buy when you can build? Many of us will have the requisite items needed to home-brew anyway - soldering iron, various electrical tools - and the know how can come through experimentation. Personally, while I would not baulk at splicing eight-stranded, multi-plait rope, handling a soldering iron is an art I do not possess! Joking aside, however, I may well find that I can 'if I try'. Why not? After all, I've got whole days in which to learn! The solution to enforced redundancy or unemployment is to remain active. We have a damned good hobby in s.w.l. and with a basis of quite good equipment already owned, those otherwise idle days can be spent trying to recapture the true spirit of the hobby; making do, on the cheap and with economy in mind.

As I said before, my system is working and my wife sees short wave radio as a means of keeping me interested in something. If I didn't have my sets then there's no doubt I'd end up sitting in a chair moping - and that's the start of a host of ills. Those otherwise hopeless days can still be made worthwhile if we fight back. In doing that - in learning to cope - we can only do ourselves a power of good and it is that, in the end, which makes us different from those who have nothing.

Invaluable Lesson

I've been unemployed for nearly a month but, through the interest in radio and in experimenting on a low budget with bits of wire and the like, to keep me going, it's passed quickly. Sure, there are problems - but we had those while I was at work as well! The truth is, this new phase of my life has taught me an invaluable lesson. That a reduction in the essential element in my life need not mean the end. In fact, to be quite truthful, it's opening up a whole new vista of avenues that I would not ordinarily have explored. That, on the face of it, can't ever be a bad thing.

If, like John Griffiths, you've got a family, a mortgage and all the trappings of life that go hand in glove with them and you've just been made redundant then life looks grim and money is going to be something there isn't a lot of. But it doesn't mean that it's the end of the hobby.

Keep an eye on the second-hand ads, you may see a bargain like this Sangean ATS 803A for £55!
**“It’s Fantastic!”**

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**2300**

1MHz - 2.4GHz

Can read a 2W signal frequency at over 100ft!

With 25 Watts...

...WOW!

Simply switch on and connect an aerial to read

frequencies from local transmitters. This is like no other unit you have ever seen. It’s absolute magic!

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- Military & Civil Airband Monitor
- Civil 100 - 108MHz - 160MHz
- 10 Memories 10 Bands
- Scanning and Search Modes
- Priority Channel
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- BNC Helical Antenna & Strap
- Size only 127 x 35 x 58mm

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- Superb Civil Airband Monitor
- 100 - 125MHz
- 10 Memories
- High Quality AM Reception
- Scanning and Search Mode
- Priority Channel
- Memory Lockout
- Steps 25 - 50 - 100kHz
- Superb Weak Signal Reception
- Illuminated Display
- Power from 3 x Ni-cads
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- BNC Helical Antenna & Strap
- Size only 57 x 127 x 35mm

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- Dedicated Marine Monitor
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- Memory Lockout
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- Illuminated Display
- Power from 3 x Ni-cads
- 12V Cigar charger/supply lead
- BNC Helical Antenna & Strap
- Size only 57 x 127 x 35mm

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**MVT-5000**

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- 25 - 550/800 - 1300MHz
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- Fast Band Search
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- Excellent Sensitivity
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Mail Order Price Catalogue
We now have our new mail order price list available. Nearly 1500 items listed from all the top manufacturers. You'll find items in there you never knew existed! From big rigs to little accessories, its the biggest list in the industry. All you have to do is ring or write and it will be in the post.

Mail Order
We have the busiest mail order department in the business. And its expanding. We send out over 10,000 parcels a year. We now have a regular night shift for despatch and of course everything is computerised. We really do try to get everything out the same day and in the last coupe of weeks we have re-organised the mail order department to try and make sure we can continue to achieve this target as our business grows.

Come and see for yourself – Visit us on our OPEN DAY, Sunday 9th May – BARGAINS GALORE!

MFJ - 722
Receiver Audio Filter

This filter will radically improve your short wave reception whether it be receiver or transceiver. Simply plug between audio output and speaker or headphones and hear the weak signal DX without the QRM! Uses 7IC devices and provides full speaker output when fed with 12V DC. Far cheaper than conventional IF stxal filters and far more flexible. Used by DX'ers throughout the world, the MFJ filter will transform your listening pleasure.

SSB high pass filters 2.5 - 2.0 - 1.5kHz
CW band pass filters 80 - 150 - 110 - 80 Hz
CW centre audio frequency 750Hz
Notch filter 300Hz - 3kHz variable
Notch bandwidth adjustable
Straight Through Position

GLOBAL AT-1000
Receiver ATU 500kHz - 30MHz

This receiver ATU has been in production for over ten years and is still the best on the market! Its performance is excellent and is the sure way to improve your aerial matching problems when using random wires, balancing feeders or even coaxial fed systems. No aerial can hope to be a good match over the whole spectrum and you will only get maximum transfer of signal into your receiver when the aerial load presents a 50 Ohm impedance. This is just what the AT-1000 does. It also has provides the added bonus of improving the front end selectivity. An essential item.

£89.95 carr £4.00

Electronic Mail Order Price Catalogue
We now have our new mail order price list available. Nearly 1500 items listed from all the top manufacturers. You'll find items in there you never knew existed! From big rigs to little accessories, its the biggest list in the industry. All you have to do is ring or write and it will be in the post.

Mail Order
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£89.95 carr £4.00

Short Wave Magazine, May 1993
Projects

A Multi-purpose Signal Monitoring Meter

Those who spend their spare time experimenting in communications frequently need pieces of test equipment. The average amateur enthusiast’s budget doesn’t go far when it comes to test equipment, so Richard Q Marris designed a simple, low-cost, multi-purpose, signal monitoring meter for home-construction.

The author’s amateur station G2BZQ, only includes equipment that can be quickly repaired on the spot, or has been home constructed or extensively modified. A continuous programme of receiver, transmitter and especially antenna design is in progress. The antenna activities cover v.l.f. to u.h.f., including antenna designs such as loops, ferrite loops and restricted space designs for transmitting and receiving. The transmitting antennas are, of course, restricted to the amateur h.f. bands.

To carry out various tests it has been necessary, from time to time, to lash up test gear to do a particular job. Inevitably this is eventually demolished and the parts used in other projects. Recently it was decided to build a more permanent audio/visual signal monitoring meter that can be used in many ways, some of which are outlined here.

1. A simple receiver tuning meter.
2. A simple receiver output meter for use when aligning/realigning the l.f. and r.f. stages of a receiver.
3. An audio/visual indicator when designing transmitter antennas.
4. An audio/visual meter for use in the design of resonant receiving antennas, such as frame loops and ferrite loops.
5. A general purpose audio/visual ‘in-circuit’ communications receiver signal monitor.

Fig. 1.

Signal Injection

The A/V meter monitors signals from the audio output of the receiver. A signal injected into the antenna, after processing and amplifying, appears as an audio signal at the loudspeaker and/or headphones. The input signal source is either an external transmitter, or a signal generating oscillator, injecting into the r.f. or i.f. stages.

Some of the functions of the A/V signal monitor are often performed by the receiver’s built-in S-meter, where fitted. This is usually operated by the a.v.c. circuit and when used for anything but its intended function, as a signal strength comparator, can produce confusing results for the unwary. Therefore the most satisfactory, though seldom seen, method is to fit a visual signal monitoring meter at the receiver’s audio output. A refinement is to fit headphones and listen to what the meter is recording. With this method it is most advisable to switch off, or otherwise temporarily deactivate, the receiver’s a.v.c., which can often be done with an AVC ON/OFF switch.

Fig. 2.

Short Wave Magazine, May 1993
You Will Need

Resistors
- 1W 5% Carbon Film 470Ω 1 R3
- 0.25W 5% Carbon Film 10kΩ 1 R2 (see text)

Potentiometers
- 10kΩ 1 R1

Capacitors
- Min Ceramic 330pF 1 C1

Semiconductors
- Diodes 1N34A 1 D1

Miscellaneous
- Transistor output transformer type LT700 (Maplin LB14); Meter, 250µA f.s.d. (Maplin LB80B); Single-sided, copper-clad, SRBP board 203 x 89mm (cut from Maplin HX0OA); Jack socket to suit your headphones.

Construction

The unit is built on to a 203 x 89mm single-sided, copper-clad SRBP board, with the copper surface to the rear, as shown in Fig. 3. This acts as a combined front panel/chassis. The first prototype was built on a much smaller board, but was abandoned in favour of the larger board shown for various reasons. The author's hand hid the meter when adjusting R1 and invariably the headphone lead got tangled with the R1 knob or drifted across the meter face. The unit, being so small, was also light in weight, so that a movement of the headphone lead moved the unit around on the desk. So a larger panel was selected and fitted into a simple wooden case. An alternative would be to build the unit onto the lid of a plastics box.

The layout is not critical, so no actual dimensions are given in Fig. 3. Everything is directly mounted on the front panel, and all earth connections are soldered directly to the copper-clad board. The one exception is transformer T1. This is mounted on a small piece of plain SRBP board, a small brass bracket being bolted to this board. The bracket is soldered directly to the copper-clad board to avoid having to drill the front. Sufficient tags exist on the major mounted components to hardwire the small components C1, R2, R3 and D1. A short length of twin lead is taken, through a rubber grommet, to the audio output of the receiver. The size of the headphone jack socket SK1 depends on the headphones in use. If you are using a non-insulated jack socket the copper must be removed from around the hole so that the socket is not earthed. In the author's case, 11d2 impedance headphones were used, but they could be anywhere between 500 and 41Ω.

Short Wave Magazine, May 1993
Operation

Some ideas of how to use the A/V signal monitor are given here.

1. If a receiver is not fitted with an S-meter, or tuning indicator, the AN meter can be used for seeing and hearing. If the RX has a loudspeaker, and the headphones are not required, then just plug in an open jack plug into SK1, to switch out the load R3.

2. The A/V meter can be used as a receiver output meter when lining up or realigning the r.f. and/or i.f. stages. Temporarily deactivate the receiver’s a.v.c. and inject a signal at the required frequency. Realign the receiver’s circuits for peak output meter reading on the A/V meter. If a signal generator is not available it is possible to use strong carrier signals of known frequency for r.f. alignment. Another idea is to use a 100kHz crystal calibrator with a short length of wire as an antenna. The headphones ensure that interference is not confusing things on the meter.

3. When a new transmitting antenna is being designed or adjusted, use the AN meter with a separate receiver (a.v.c. off), a short wire whip antenna and the r.f. control set near minimum. The receiver should be placed at some distance from the transmitter and the transmitted signal monitored with the A/V meter and headphones. Relative signal strength readings are possible with the A/V meter, which cross-checks when the new transmitter antenna is at resonance, at the same time listening to the quality of the signal. This has been found particularly useful with indoor transmitting loop and other restricted space antennas.

4. When designing resonant receiving antennas, such as frame loops and ferrite loops, the procedure is a combination of 1. and 2. above. Using a suitable carrier or external oscillator, the A/V meter provides relative signal strength readings at resonance and as adjustments are made to the new antenna. The headphones ensure that the signal being used is ‘pure’ and is not partly interference.

FIRST AID

Has anyone got a spare tuning film for an R210 h.f receiver or any information on obtaining one? Also has anyone got any information on fitting the film?

Gavin Jones. 74 Joseph Luckman Road, Bedworth, Warks CV12 8BQ. Tel: (0203) 315080.

I hope some reader can help me. My FRG-8800 has gone on the blink. Ten to fifteen minutes after switching on, the sound goes off and the l.c.d. blinks on and off approximately 60 blinks per minute, also intermittent - the blinking stops and the sound comes back for a few seconds.

I bought this radio about three years ago, second-hand so I don’t know if this fault has occurred before. I don’t have any circuits for this radio. I do have an operating manual.

All expenses will be reimbursed.

Peter B Jones. 22 Windsor Road, Six Bells, Abertillery, Gwent NP3 2OE. Tel: (0495) 212166.

Can any reader kindly supply information on an Advance AC Voltmeter type VM78. I don’t even know which batteries it takes. Instruction book, maintaneance manual, circuit diagram, whatever you have, I’ll gladly pay any expenses.

G Whitlock. 13 Ingestre Road, Stafford, Staffs ST17 4DJ. Tel: (0785) 225106.

Obituary

Amateurs and listeners alike will be shocked to hear of the sudden passing of William Albert Mills GW3LJP of Rhayader on the morning of Sunday February 28. Within four hours, the news was all over the county. Bert, a retired BBC engineer, life-long radio enthusiast and dedicated home constructor, built, along with many other pieces of radio gear, his own SSTV equipment.

At the funeral on March 4, the Baptist chapel in Rhayader was full; every radio club in Powys was represented plus Hereford and South Wales. Bert was very sound technically and at the time of his death was training a group of newcomers for the Novice licence. There are literally dozens of groups and individuals who received a helping hand from GW3LJP, and he will be sorely missed. All of us at PW and SWM extend our deepest sympathy to Bert’s family and his many friends.

Paul Essery & Ron Ham

Short Wave Magazine, May 1993
ICOM IC-R72

Well, if you have read this magazine's review of the ICOM IC-R72, you will no doubt want to experience this tried and tested receiver for yourself, so, for the full story why not pop along to, or telephone a Radio Hamstore today. Here are just a few of the IC-R72's excellent features:

- Frequency range 30kHz-30MHz
- USB, LSB, CW, AM and optional FM
- Direct keypad entry for improved programming versatility
- 99 memory channels and 2 independent scan-edge channels
- Built-in 24-hour clock and timer
- Advanced DDS system
- 100dB dynamic range
- Level-selectable noise-blanker and much more.

IC-R7100

This receiver is the R72's new shackmate featuring:
- Advanced window scan
- 25MHz-1999.999MHz coverage (25-1000MHz & 1240-1300MHz guaranteed)
- 900 memory channels
- 4 memory modes. SSB, USB/LSB, AM, FM & wide-FM.

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ICOM equipment purchased from an unauthorized dealer is not covered by ICOM warranty.

Gordon G3LEQ & John G8VIQ at Birmingham, Chris G8GKC at Herne Bay and Doug G6LUH & Paul G7MNI in London all look forward to your visit.

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Tel: 0227 741555
Fax: 0227 741742

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AM/FM/WFM/USB/LSB

MORE FREQUENCIES:
100kHz to 1650MHz (no gaps!)

MORE MEMORIES:
1000 Channels

Plus:
Delay and skip functions
High speed search
10 search bands
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32 Short Wave Magazine, May 1993
For the beginner to home construction, a kit should offer a reassuring start by providing all of the parts needed together with detailed instructions. Dick Ganderton has been looking at a range of kits imported from the USA.

I have enjoyed constructing my own items of radio and electronic equipment for well over forty years and during that time I have assembled a wide variety of kits, some of which have been superb, while others are best forgotten!

What should one look for in a kit? This depends on what level of competence you have reached and what equipment you have at your disposal. I suppose that most readers would be unable to carry out complex metalwork in order to make a professional looking case. I remember well the kits supplied by the renowned, but sadly now defunct, Heathkit company. Complete in every detail the finished project was indistinguishable from a professional piece of gear. But what always impressed me were the instructions. Each component and every step had its own box to be ticked off when that step had been completed. The instruction booklets supplied with the Ramsey kits that I have been looking at followed the same pattern. I noticed several errors and there were a few problems with component markings not conforming with those stated in the manual. Otherwise full marks for the instructions, which were also informative. I liked the explanatory notes. A loose p.c.b. component overlay drawing is provided, as is a circuit diagram - American style, of course, but one of the better ones. Why the Americans cannot draw decent circuit diagrams has always mystified me.

I followed the constructional order laid down in the instructions to see how easy it was. I found no problems, although I did find it strange to be putting in the sockets and other large components first with links and smaller bits last. Ramsey have a reason for this - at least I think they have. By not following the usual convention of the smallest parts first, the instruction sequence works its way across the printed circuit board in logical circuit blocks.

Components

The components seemed to be good quality, although the resistors, for example, were a bit of a mixed bunch. Some of them had pre-formed leads for vertical mounting, and the leads needed to be straightened out before they could be used. This created no problems, but might confuse the beginner. The whole project is built on one glass fibre, single-sided p.c.b. and the tracks and pads are a reasonable size - essential if the beginner is not to lift them with the application of a hot soldering iron for longish periods.

The kits that I tried out were the AR-1 Aircraft Band Receiver Kit and the FR-1 FM Broadcast Radio Receiver Kit. Both of these kits are supplied without a case and also require a PP3 battery and earpieces. However, cases are available as separate 'kits' and I was supplied with one for the FM Radio. The case kit comprises a plastics box with pre-punched and lettered front and back panels. Knobs are also supplied. The p.c.b. just screws into the bottom half of the case, the front and back panels slot into the case and the top half slots over the panels and is held in place with two self-tapping screws through the bottom half. Four self-adhesive rubber feet are also provided.

Alignment

Full instructions are given for aligning the completed radio. A hex-headed alignment tool is required to adjust the coil slugs and, unfortunately, Ramsey have seen fit not to supply one with the kit. I feel that this is a serious omission, especially for a kit that will appeal to the newcomer, who will certainly not have a suitable tool to hand. The instructions do, however, tell you how to improvise one.

Experience

I found the kits to be simple to assemble and will provide the newcomer to the hobby with a useful piece of equipment at a reasonable price. More to the point, though, it will give pleasure during construction as well as in use and you will have gained experience in the process.

The kits reviewed were kindly supplied by Waters & Stanton, 22 Main Road, Hockley, Essex SS5 4QS. Tel: (0702) 206835. The AR-1 costs £29.95, the FR-1 costs £22.95 while the case and knob set for the FR-1 costs £14.95.
No. 2
Fighting for the No 1 spot, the Kenwood R5000 is still the benchmark to which others are compared. The superb engineering and excellent audio, together with the VHF converter as an option make this an unbeatable package.
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With VHF option, Deposit £309.00 & 9 payments of £99.00

No. 3
The elusive Yaesu FRG100 - it may be winning all the awards, but where the hell are they? By the time you read this, I should have plenty. It's crept up in price, but so has everything else. An ideal starting machine.
Deposit £194.95 & 9 payments of £45.00

No. 4
The LOWE HF1 50 still amazes everyone who comes into contact with it. It's small & dumpy looking, but looks aren't everything. (So my MUM says anyway). It works brilliantly and I've sold hundreds. Do you want to be the next proud owner?
Offered with keypad option, Deposit £40.00 & 9 payments of £45.00

No. 5
It's not No. 1 because I doubt whether I've got any left, but the JRC NRD525 offered last month for silly money had people scrambling from all over the globe. One unit was even dispatched to TURKEY & another to GERMANY. JRC Quality at CHAD VALLEY PRICES!
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No. 6
The IC-71E has zoomed up in price, but I've got a selection of excellent USED examples, just LOOK at the savings!
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The loyal FRG5000 has been a steady and reliable workhorse since it was introduced a few years ago. Excellent display, all mode with keypad & simple to use, make this the "easy to use" choice today.
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No. 8
The IC-72E is the ideal alternative for those who don't want to fork out for its big bro, the IC-71E. KeyPad entry, Large display & speech announcement available, make this receiver a real winner!
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No. 9
If you must have the FM mode on a shortwave receiver & fancied the Lowe HF150, then the HF225 is the one to choose. Slightly larger than its stable mate, I'm offering the unit with FM/ECS unit fitted for you, (its a solder in job), and priced it to include the KeyPad, which is a must.
Deposit £154.00 & 9 payments of £45.00

No. 10
At number 10 is a package deal that will get the keen beginner off to a flying start. With the massive bulk of new stock I get through every month, I always have a good selection of USED RECEIVERS available. One that continues to sell time and time again is the good old FRG7700 from YAESU. They're digital display, all mode & offered with 9 months warranty. I'm offering them in good condition, with the following extras:
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No. 10
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Don't be shy, give it a try. I promise I'm mum.

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Short Wave Magazine, May 1993
No. 1 **THE MARTIN LYNN SCANNER TOP TEN**

This one was at NUMBER ONE before it was even released - the MVT7100 from YUPITERU. Pronounced "YOU-PIT-ER00", it may be a bloody silly name but it's the best ALL MODE hand held scanner on the market. True SSB... etc, you've read it all before, (last months SW etc, was devoted to it!) - and they're in stock!

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No. 2

The AOR 1500 is now up to "EX" spec and makes a close runner to the MVT7100. Still featuring all mode capability, the Handle continues to offer excellent value including NICADS, CHARGER, FLEXI Antenna, CIGAR LEAD, CASE. & much more as standard.

Deposit £49.95 & 3 payments of £100.00

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No. 3

The AOR 3000A is still the ultimate in BASE/Mobile scanners. It's actually more than a scanner, but a true Shortwave receiver as well. All mode and offered complete with Power Supply & Antenna, I've also EXTENDED the payment terms.

Deposit £241 & 12 payments of £9.00

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No. 4

For the keen AIRBAND enthusiast, the VT-225 from Yupiteru is a must. Covering Civil & Military Airband only, this HANDIE scanner has its performance optimised for those two bands leaving the wide band scanners unable to compete.

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No. 5

The Icom ICF7000HF mk111 has found its way into many commercial applications & even more listeners homes! No shortcuts in design & thanks to our HF Modification, the receiver now covers 50KHz - 2000MHz with no gaps. It's not cheap but I'll probably never sell you another receiver!

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---

No. 6

The MVT7000, despite the introduction of the 7100, is still high up the charts & selling well. Basically, if you don't want 1000 memories and have a SW receiver with SSB already, then this is the beastie for you. Brilliant performance & purchased recently by several PUBLIC SERVICE operators.

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No. 7

The ever so tiny IC-RIE has still to be caught up with in terms of its size and performance. A real "POCKET" scanner, sold in their thousands to amateur and commercial users alike.

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No. 8

The amazing VT-125 mk11 from YUPIERU still represents the best civil airband handie scanner available. Nothing comes close to its performance or size. Offered with the very latest "AIR BAND FREQUENCY GUIDE".

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No. 9

Just sliding into the top ten, the incredible value MS1000 base/mobile scanner from NEVADA. Built in a strong metal case, the unit covers all the important frequencies from 600KHz-600MHz & 805-1300MHz. Offered with free Mains Power Supply and mobile or base antenna for instant operation.

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Projects

Do-it-yourself Chart Recorder Part 1

For those enthusiasts engaged in radio astronomy or interested in magnetometry often the most difficult or expensive component to come by is a suitable chart recorder. Richard Noble set to and built his own!

This article describes how to build a simple single or multiple trace instrument, using nothing but hand tools found in most amateur workshops and techniques requiring no special skills beyond those which can be taught here. Most of the parts used are readily available and inexpensive, certainly in the context of chart recorder cost, new or second-hand.

The main simplifying technique employed is what could be called, for want of a better name, clock construction. This is a method pioneered by the old watch and clock makers. "Hold on" I hear you say, "you promised that we required no special skills, and now you talk about watch makers!"

Do Not Be Put Off

Most people probably associate watch-making with the Swiss and immediately think of incredible precision engineering. While not in any way wishing to diminish the skill of those gentlemen, for whom I have a great respect, nothing could be further from the truth. What is actually involved in their case is better described as incredibly small engineering.

If you imagine a small watch, enlarged by some magic or science-fiction process by 25 to 50 times and then imagine that this now large object was something that you had just made in the engineering workshop you worked for, the first thing you would get from the foreman, after he inspected your creation, would be your cards. The bearings in watches work so well, not because they are precision fits, but because they are in fact, nice sloppy fits that would disgrace any macro-engineer. Sloppy fits, of course, wear much more rapidly than precision fits, so now you know the real reason why expensive watches have all those jewels. They make the watch last longer!

Exploit

It is this loose fit approach that we are going to exploit, together with the very ingenious way they fit everything between two flat plates separated by spacers. The great advantage of the system is that the two plates can be clamped together when they are being made, eliminating the possibility of them not being subsequently in perfect alignment, as far as hole drilling is concerned. This ensures that spindles and spacers end up reasonably parallel without special effort. In addition, the two flat plates give good surfaces to attach things to without complication.

The next simple trick to be exploited comes from the way in which brass rod and tube manufacturers make a popular variety of their product. The sizes are imperial and go up in \( \frac{1}{32} \) in increments. The more fascinating thing, though, is that the tube wall thicknesses are just a little less than the increment, which means that they are all a beautiful sliding fit into the next size up, throughout the range of sizes. This makes the manufacture of sliding parts and bearings very easy, without special tools. The other very attractive feature they have is that solder takes to them very well, making all kinds of interesting construction possible. If soldering is not one of your skills, you need not worry as Araldite will do everything you need for this design.

One other necessary special item, which would be impossible for us to make, is a miniature lead-screw and travelling nut, to be used as a drive system for the pen that makes the traces. Two otherwise unrelated components can be found which will make this possible. One is a length of 4BA threaded brass studding and the other is a cylindrical plated spacer with a 4BA hole tapped through it.

After this, all we need is a small, low-voltage d.c. electric motor to drive the lead screw, a linear pot to provide the positional feedback, a small solenoid to lift the pen and another electric motor with an output shaft which goes round once every twelve hours, better known under its alternative name of 'clock'.

The general construction and layout can be seen from the drawings showing the assembly and in particular from the exploded diagrams of the various parts. The finished article can be broken down into a number of more or less independent sub-assemblies, each with their own function to carry out, each described separately in what follows.

Clock Plate System

The first is the basic clock-plate assembly, consisting of two pieces of glass fibre printed circuit board 160 x 110mm and four pieces of 1/min wooden dowel, each 80 mm long, as shown in Fig. 1. The dowels are held in place...
by round-head wood screws fitted into holes which should be pre-drilled in each end of the dowels. The p.c.b. is screwed to two 6 x 12mm wood blocks, bolted to the side plates, thus providing some of the spacing and rigidity for the corner of the plates. The p.c.b. fixing screws should also have pilot holes pre-drilled for them to prevent the wood from splitting. It is best to do this before assembling the components onto the printed circuit board. If the whole assembly is slightly warped, try rotating the dowels a bit. Since the ends are never perfectly square, a suitable combination of rotations can usually be found which will allow the plates to sit square on a flat surface.

The method of drilling the side plate is to mark the top, front, corner hole on one plate and centre-punch it carefully. If you are not used to this and do not have a centre-punch, find a 6BA nail, place the point on the mark and tap the head gently with a hammer. This makes a small dent which guides the drill when it starts cutting. Clamp the two plates together and drill slowly through both with a 3mm drill. Bolt the plates together with a 6BA bolt through these holes, align them carefully and clamp them. Mark, centre-punch and drill the rear bottom corner hole on one plate and bolt with a second 6BA bolt. The plates should now be firmly held together and the rest of the holes can be marked and drilled. All of them should be pilot-drilled with a 1.5mm drill. They can then be opened up to final size using the pilot holes as guides. Be careful however, as some holes are different sizes in the two plates and can only be opened up after the plates are separated.

**Paper Drive**

The next sub-assembly is the paper drive system shown in Fig. 2, consisting of a quartz clock movement and a wooden roller. The clock movement is attached to the side plate by the usual central threaded stud and nut, making use of the rubber washer, if one is supplied. The roller is a piece of 1 in diameter wood dowel. As supplied this is often not exactly 1 in diameter, but it is relatively unimportant and only affects the length of paper used to cover any recording period. The method of fitting the roller is to drill a hole in one end, the same size as the outer diameter of the hub of the hour hand, supplied with the clock movement. Cut the hour hand off the hub and glue the hub into the hole in the roller. This allows the roller to be pushed on to the clock spindle where it is driven by the usual friction grip. The other end of the roller is supported by a brass rod, which is a push fit into a hole drilled in the roller end. This brass rod is a free fit into a hole in the side plate opposite to the clock.

If you are uncertain of your ability to get a hole in the centre of a round rod, try the following. Measure the rod diameter carefully, draw a circle with a pair of compasses on paper and cut it out carefully. Align the paper circle as carefully as possible over the end of the rod and then push the point of the compass through the paper centre hole into the wood. This provides a centre mark for the drill. Use a 1.5mm drill first to give a guide hole for the final drill.

**Pinch Roller**

To complete the paper drive system we add another sub-assembly - the pinch roller mechanism. The frame is made from 3/32 in diameter brass rod and glass fibre p.c.b. end-cheeks. The reason for this is that, after assembly, the rods can be soldered to the copper surface to make the mechanism rigid, but this should not be done immediately. The pinch roller itself is made from a piece of rubber tubing pushed on to a short length of 1/16 in diameter brass tubing. This should be slipped on the brass rod before the ends are soldered. Note that the centre rod is not soldered and that the bottom rod is longer than the others, long enough to protrude through pivot holes in the side plates. This is shown in Fig. 3. If you choose to solder the parts, the brass and copper should be cleaned with fine emery and Baker's Fluid should be used as flux, in order to make the solder flow freely. (Editor's Note: Baker's Fluid and electronic components do not mix - do not even allow Baker's Fluid in the same room as your electronics as even the fumes given off during soldering will destroy the innards of your radio gear.) If you prefer to avoid soldering, use Araldite instead to fix the rods.

Notice that the pinch roller tube is much shorter than the rod it fits on. This is a deliberate part of the design since, with a sliding roller, there can be no side forces on the paper tending to crush the edge against the spacer guides. Instead, the roller will probably creep slowly to one side or the other, but this does not matter as you can easily move it back to the centre at intervals. The chart paper will move over the drive roller and stay straight between the guides. The pinch roller is tensioned on to the drive roller with rubber bands threaded over the centre rod and another rod going between the side plates. Both rods are left free so as to make replacement of the bands easy.

**Part 2**

Part 2 will continue with the pen sub-assemblies to complete the mechanical side of the Chart Recorder. A convenience kit of all the mechanical parts, finished and drilled, including p.c.b.s, motor, solenoid, clock, paper roll, pen, etc., but no electronic components other than the slider potentiometer, is available from R & W Noble, Penbidwal House, Pandy, Abergavenny, Gwent NP7 8EA. An s.a.e. will bring you further details.
A Green Bandspread Dipper

The first requirement for anyone contemplating building any r.f. devices or experimenting with antennas is certainly a reliable Dip Oscillator. In this article Bill Wilson describes how to build one.

The Dip Oscillator described here is, without doubt, the best of many dippers the author has built over the years. The very one first employed a 6J6 valve in a cathode-coupled circuit, which, of course, needed a mains power supply with all the attendant constraints on portability.

The circuit can be arranged in various degrees of simplicity. The basic circuit, shown in Fig. 1, can be built first and, if required, the modulator stage. This enables the unit to be employed as a basic signal generator. The internal NiCad charger can be added later on using the existing board, Fig. 2. Each plug-in coil carries its own calibrated tuning scale, making for unambiguous readings when using the unit. It also avoids tuning scales with umpteen ranges squeezed into a confined space and extra ranges can be easily added as the need arises.

The Circuit

The circuit is shown in Figs 1 & 2. The oscillator itself is the idiot-proof negative resistance f.e.t. pair Tr1 and Tr2, which will oscillate happily, with practically any inductance, from a.f. to v.h.f. as long as it is fed with 5V. Capacitor C1, part of a v.h.f./a.m. foil tuning capacitor, is in circuit at all times, but C2 and C3 can be added to this as required to give a higher capacity, giving a larger swing, for h.f. and i.f.

The value of C3 is not critical and could be anything between 250 - 350pF. Capacitor C1 is used on its own for v.h.f. and for band spreading particular sections of the h.f. range, the amateur bands for example. This switching is done automatically by means of shorting links on the coil units.

The r.f. output from the oscillator is fed through a small capacitor, C4 (two insulated wires twisted together for 10 - 20mm) to the detector, D1, D2, and meter...
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Short Wave Magazine, May 1993
amplifier, Tr3. Potentiometer R8 acts as a sensitivity control and in the basic circuit is combined with the on/off switch. Power is provided by a PP3 battery, D3 or IC1 stabilising the voltage to the oscillator.

**Options**

The circuit around Tr4 is a simple a.f. sine wave oscillator working at about 1kHz modulating the r.f. oscillator via Tr1, this is brought in as required by S1a. Transistor Tr5 and associated components make up a charger for the optional NiCad battery, the i.e.d. (D4) acting as a 'charge' indicator. The battery in this case being either a PP3 NiCad or two 3.6V 100mA p.c.b. batteries in series, soldered directly onto the board. Application of 12-30 V d.c. to SK2 charges the NiCad at the correct current.

For testing 'unknown' coils, one plug-in unit can be made up with two short leads terminated in a miniature crocodile clips. This time the scale is calibrated in picofarads. The coil under test is connected to these clips and the output found by listening on a suitable receiver or by connecting the output to a frequency counter, then the capacity to resonate that particular inductance at the specific frequency read from the picofarad calibration.

**Construction**

Before starting work, get hold of an old, portable, transistioned radio. This will provide the tuning capacitor, the sensitivity control with on/off switch and the a.f. transformer (the one to look for is the red coded one). Now you know why this is a 'green' dipper - almost all of the components can be salvaged!

The full scale p.c.b. print is show in Fig.4, and should be etched on standard 1.6mm glass fibre board, this making the top panel of the dipper. The board will then fit nicely into a cut down (25mm high) suture box of the kind commonly found at rallies and junk sales. The alternative is to treat yourself to a minor operation and collect a few boxes in the process!

The holes for the slide switch, i.e.d. and 2.5mm socket will depend on the particular types used but, of course, need not be cut out all if only the basic option is to be built. Before assembly, the unetched side of the board should be sanded with 'wet and dry' paper, sprayed with a suitable cellulose colour and any lettering applied. If using 'rub-down' lettering, it is wise to afterwards spray on a coat of protective laquer, 'DampStart' is ideal for this as it will not 'lift' the lettering or the paint surface underneath as well as giving a smart eggshell finish. The 40mm meter can be a snug fit in the opening provided or it can be held in place with double-sided tape. All components are soldered directly onto the copper pads and will require their leads cropped to a few mm except for some diodes and resistors which are mounted upright on the board.

Assembly is a trifle difficult as there are no holes in the board to hold the components in place while soldering takes place, so a small bit on the soldering iron and thick skin are pre-assembled in a 'package' (Fig.3) - you now have two terminal negative resistance device, provided that you remember to label the + end with a fragment of sleeving while the type markings are still visible. This package is then wired between the 5V line and the tag on C1 that goes to SK1. There is a land on the p.c.b. - the square with the broader edge - which can be used for C1/SK1 junction, if required. Take good care in this part of the circuit to avoid stray capacitance and inductance if you want the dipper to go up to 200MHz. The component layout for the 'all-options' version is shown in Fig.6.

**Coil Socket**

The coil socket is prepared by soldering short lengths of stiff copper wire, or better still, 2 - 3mm wide copper foil to the contacts, which are supplied separately. Once these are inserted into the housing the complete socket is 'Superglued' to the underside of the board with a scrap of 1mm thick Paxolin sandwiched between them. This extra thickness will lower the level of the calibration dials so that they slide neatly under the tuning capacitor pointer. To attain the highest possible frequency at v.h.f. the tuning capacitor trimmers should be removed or at least set for minimum capacity.

The calibration scales are cut from further suture boxes, you'll get five from one box, and are 'Superglued' to the top of the coil plugs. Calibration points can be drawn on with a fine-tipped, permanent marker and 'Decadry' numerals applied at a later stage when the dipper
is operational. Once the coils are wound and trimmed to frequency, they too, are bonded to the plugs using an epoxy resin for strength. Of course, there is no necessity to use this particular plug and socket system - a bracket could be made for the end of the p.c.b. and any other type of socket arrangement used (even a 3.5mm stereo socket would allow one extra capacitor section to be used.) However, it is then, perhaps, more difficult to contrive individual scales.

The suture box is prepared by cutting it down to a height of 27mm, cutting an opening for the coil socket and stiffening the interior of the box along the long sides with strips from offcuts, using polystyrene cement to weld the strips 2mm down from the top edge. These strips provide a ledge for the p.c.b. to rest on. No other fixing of the board to the case if reasonable accuracy is employed in the construction. For a snug fit, leave the final filing of the p.c.b. until after the box is complete.

**Coil Winding**

The windings for the 265 + 20 + 20pF tuning capacitor used by the author are shown in **Table 1**. Of course, ranges can be omitted, expanded or compressed by using one, two or three tuning capacitor sections depending on one’s interests. There is no lower limit to the dipper although...
Further Reading

For a very full description of dippers and their uses, you are referred to an excellent series of articles by GW3JGA in Practical Wireless October to December 1985. Photocopies of the articles are available from the Broadstone Editorial Offices, price £2.50 for the set, including postage.

The dip is less at lower frequencies. A resistor across the coil plugs makes the oscillator less lively and the dip more apparent. Resistor R7 is built-in for this purpose, but external resistors can be added to individual coil units. You will have to experiment with the value of R7, but try around 10kΩ for starters.

Calibration is best done with a counter loosely coupled to the coils, or the output of the dipper read off from a receiver - but watch out for images!

Table 1.

<table>
<thead>
<tr>
<th>Range MHz (MHz)</th>
<th>Capacitor (pF)</th>
<th>Coil (turns)</th>
<th>Wire (s.w.g.)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 - 5</td>
<td>20 + 250</td>
<td>100</td>
<td>36</td>
<td>close wound</td>
</tr>
<tr>
<td>3 - 11</td>
<td>20 + 250</td>
<td>46</td>
<td>28</td>
<td>close wound</td>
</tr>
<tr>
<td>11 - 18</td>
<td>20 + 20</td>
<td>22</td>
<td>28</td>
<td>close wound</td>
</tr>
<tr>
<td>19 - 32</td>
<td>20 + 20</td>
<td>10</td>
<td>28</td>
<td>close wound</td>
</tr>
<tr>
<td>26 - 39</td>
<td>20</td>
<td>9</td>
<td>28</td>
<td>close wound</td>
</tr>
<tr>
<td>36 - 60</td>
<td>20 + 20</td>
<td>8</td>
<td>16</td>
<td>25mm long</td>
</tr>
<tr>
<td>57 - 91</td>
<td>20 + 20</td>
<td>3</td>
<td>16</td>
<td>10 mm long</td>
</tr>
<tr>
<td>90 - 143</td>
<td>20</td>
<td></td>
<td>16</td>
<td>Hairpin 52 x 12mm</td>
</tr>
<tr>
<td>130 - 200</td>
<td>20</td>
<td></td>
<td>16</td>
<td>Hairpin 22 x 9mm</td>
</tr>
</tbody>
</table>

This table is a guide only, the ranges will depend on the particular tuning capacitor employed and the diameter and spacing of the windings. Prototype coils were wound on empty Berol pen barrels 11m diameter - colour-coded, of course!

You Will Need

Resistors
Carbon Film 0.25W 5%
- 2μΩ: 1
- 1kΩ: 2
- 2kΩ: 1
- 5kΩ: 1
- 10kΩ: 1
- 470kΩ: 1
- 1MΩ: 1

Potentiometers
5kΩ: 1

Capacitors
- 5pF: 1
- Min. Ceramic Disc
  - 20pF: 2
  - 265pF: 1
  - 1nF: 3
- Disc ceramic
  - 100nF: 3
- Tantalum
  - 1μF: 2

Semiconductors
- Diodes
  - OA81: 2
  - 1N914: 1
  - BZ998C5.1V: 1
  - i.e.d.: 1
- Transistors
  - 2N3819: 1
  - 2N3820: 1
  - 2N3710: 1
  - BC214L: 1
- Integrated Circuits
  - 78L05: 1

Miscellaneous

Slide switch 2p2w (S1); Power connectors, 6-pin 0.156in, male (SK1); female (one needed for each for plug-in coil); 2.5mm jack socket (SK2); Output transformer, (see text) (T1); Battery, 9V PP3 or NiCads (See text); Meter 200μA f.s.d.; suture boxes; 1mm felt tipped pen barrels; 16 & 24 s.w.g. copper wire.
Sheepdip and DX

Many readers of Ron Ham's column will be familiar with the name Simon Hamer. He's been a contributor to Ron's columns for over 10 years now. Joan Ham met him when he visited Chalk Pits Museum for a chat.

Simon's family run a farm including a flock of 200-300 sheep, and he joined the team in the natural course of events. It is not the first thing that springs to mind that a busy farming calendar would leave time or energy for an absorbing interest in TVDXing, or for meticulous observations.

Simon claims to have discovered his interest by accident. He remembers co-channel interference bringing foreign voices from the loudspeaker in 1960. When he was 10 years old and staying with an aunt in Denmark, he saw Danish TV and asked for Blue Peter to be put on. His aunt obligingly changed Blue Peter to be put on. His aunt obligingly changed the channel. But instead of his favourite programme, he saw a children's programme in Swedish!

The autumn of 1966 was memorable for a tropospheric opening. When changing channel on the family's turrett-tuned receiver, channel 9 produced Anglia TV with an ITA tuning card bearing the identification 'East of England'. A few days later, this signal was no longer there, and Simon had no idea why this was so. He then found London Rediffusion on Channel 9 and noticed the apology for interference that the station was superimposing on the picture.

The next mystery occurred when Simon went to stay with another aunt in Wales, and turning on the TV expecting to hear the signature tune for Midlands Today, was once more confronted with an unfamiliar signature tune and caption Wales Today. This was Simon's introduction to regional broadcasting. They first received BBC2 when the Sutton Coldfield transmitter was commissioned because they were happily located where a gap in the hills allowed reception. It was the only part of Wales able to receive the transmissions in the mid-'60s.

Like many youngsters, Simon liked listening to pop music, especially from Radio Luxembourg. All the sets in the house had the lovely old dials with many station names on them, and Simon wanted to know where they all were. The domestic sets began his s.w.l. interest, and his father, who used to pick up Australia on a short wave set in the early days, got out an old Mullard wireless and connected a long wire antenna to it. Simon found that a lot of fun.

Then came his 11th birthday and a present of a Russian s.w. set. That was his pride and joy and brought Radio Australia booming in at 7am. The first time he became aware of amateur radio was when a Scout troop from Hereford were camping in his uncle's field. They possessed a Heathkit Mohican communications receiver—a real eye-opener, which introduced Simon to the magic of bandspread.

Local radio in the v.h.f. bands came in the 1970s, and while tropospheric openings were in progress he could hear Radio Birmingham, Bristol, Manchester, Oxford, Stoke-on-Trent and BBC Radio London; the first foreign DX was a French station. At 17, Simon was given a Grundig Melody Boy 500E that had a very good v.h.f. band and intensified his interest in Band II DX with such stations as BBC Radio Leeds, Sheffield, Solent and for the first time a station from the Republic of Ireland. Other memorable moments of reception were of tuning in for Radio Derby using just the set's own antenna and hearing the announcer from BFBS in Germany saying, "10 o'clock in Germany and 9 o'clock in Britain". Another tropospheric opening was in progress; West German and Dutch stations were coming in, and on TV, good colour pictures. At the time, Simon wondered why they had little sound, not knowing that sound was transmitted on another channel.

So to the 1970s, when Ron started writing about v.h.f. matters in Practical Wireless, this naturally captured Simon's attention. He wrote to Ron for some advice about a converter to receive u.h.f. on his v.h.f. set. By 1980 Simon had become a regular contributor to Ron's column.

Simon's first real communications receiver was a Grundig Satellit with digital readout. With this came reception of Radio New Zealand, a station using a mere 7.5kW on 15.485MHz.

In 1983, on a visit to the amateur radio rally in Droitwich, Simon added a Daiwa 144MHz receiver to the collection, enable him to hear the amateur repeaters. The following year a 4.5in screen multi-standard Hitachi K2300 for mobile TVDXing appeared, closely followed by a Lafayette HE30 communications receiver.

Simon Hamer has gained an enviable expertise at trapping and identifying DX. This led him to writing an invaluable little book illustrated with photos of European test cards and captions received in the UK. Published by HS Publications, 7 Epping Close, Derby DE3 4HR and available from SWM Book Service.
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| **Yupiteru** | back by popular demand | "Even more, back by popular demand!"
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| **OPT-2300** | No scanner should be without one! 0.1-3.6GHz. includes nicads and charger |

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<td><strong>DR-112E</strong></td>
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<td><strong>FT-250R</strong></td>
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<td><strong>YAESU FT-50</strong></td>
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<td><strong>ICOM IC-W2</strong></td>
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Short Wave Magazine, May 1993
SWM Prize Crossword Puzzle

Clues Across

7 Artificial heavenly bodies, like oscar (10)
9 Highest point in trap extension on antenna (4)
10 Alter, usually equipment, hopefully for the better (6)
11 Schooled, not ignorant. Dated cue (8)
12 Environment friendly colour - resistor number 5 (5)
13 All the same; these military clothes - phonetic letter (7)
17 Extension to electric socket supply - found on cowboy's boot (4)
19 An element, but nothing to do with antennas (5)
21 Q, SINPO, RST for example (4)
22 What an XYL is to her children (6)
24 Sent in a different direction (8)
26 Become less strong, as an attenuated signal might (8)
29 Where the World Service is based (6)
31 Small quantity, comes before farad (4)
32 Avoid, get around, shirk or dodge (5)
33 Natural support for long wire antenna? (4)

Clues Down

1 Electronics company who make well known Morse tutor (6)
2 Partly, as in detached or conductor (4)
3 Drama seen in radio equipment display (4)
4 Made less by absorption or scattering. AAEEDTTTU (10)
5 P, phonetically speaking (4)
6 Paid off, recovered, saved. EEEEDDRM (8)
8 Usually found just before Arabia (5)
13 Planet and antenna connection (5)
16 OrbiSat carrying Amateur Radio (5)
18 Radio amateur's alphabet (8)
20 What an antenna does on a rotator (8)
25 Wears away, like outdoor antenna components in bad weather (6)
27 Top of house - where you might have to climb to put up antenna (4)
28 This Dutch cheese is made about (4)
30 Fishing devices or groups of broadcasting amateurs (4)

Complete the crossword and send it (photocopies accepted including the coupon at the bottom of this issue's contents page) to the Editorial Office, marked SWM May Crossword competition.

A worthwhile prize will be forwarded as a surprise present to the first five correct entries drawn from the sack!

Don't forget to include your name and address with your entry!

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Please allow 28 days for delivery. Only the p.c.b.s listed here are available.

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<tr>
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<th>Title of Article</th>
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<td>SR008</td>
<td>Experimental VHF Receiver</td>
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<td>5.81</td>
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<tr>
<td>SR002</td>
<td>Weather Satellite Reception</td>
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<td>3.88</td>
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</tbody>
</table>
It's a wonder, with the bad winter weather, that friends in the British Astronomical Association, who supply me with auroral and solar data, are able to achieve the results they do. This was made abundantly clear by Ron Livesey in his January report to the BAA, where he wrote, "Dave Wheeler on Fair Isle made the understatement of the year when he said that it was not a good month for observing aurora. Although he reported auroral glows on four nights, tying in well with other observations, magnetic and visual, he also reported, 22 days of gales of which 9 were severe gales, 8 storms, 2 violent storms, 1 hurricane and 24 days on which gusts of storm force were recorded". All I can add is my thanks to Dave and to all the visual astronomers. Your efforts are much appreciated.

The atmospheric pressure for the period January 26 to February 25, recorded at my home in Sussex, plus more weather reports from readers, can be seen in my television column elsewhere in this issue.

One of my regular beacon contributors, Gordon Foote (Didcot), says that if he had to choose only two hours of the day to be the best time for listening, then he would select the period between 1700 and 1900. "The Scandinavians are often still there and the Americans are heard at their best", he added.

Solar

While in Edinburgh or Glasgow, Ron Livesey, using a small refractor telescope and projection screen, identified two active areas on the sun's disc on January 4, 6, 9, 15, 18, 22, 24, 25 & 31 and three on the 7th, 8th & 12th. Activity associated with the number of sunspots, observed by Patrick Moore (Selsey) and drawn from his projection screen, Fig. 1, at 1030 on February 28, may well have been responsible for the frequent signals, received in the UK, from the North American beacons, see Fig. 2, toward the end of the month.

Auroral

Ron Livesey, the auroral co-ordinator for the BAA, received reports of visual auroras, in various forms, for the overnight periods on January 1, 25, 30 & 31 from observers in Fair Isle, on the 17th from County Tipperary, on the 26th from Glasgow and the 18th, 23rd, 25th, 30th & 31st from North Dakota.

Magnetic

The magnetometers used by Tony Hopwood (Upton-on-Severn), Karl Lewis (Saltash), Ron Livesey, David Pettitt (Carlisle) and Tom Rackham (Goostrey), between them recorded active conditions on January 3, 4, 8-10, 13, 14, 16, 18, 26, 29 & 30 and magnetic storms on the 2nd, 7th, 11th, 19th, 25th & 31st.

Propagation Beacons

First, my thanks are due to Gordon Foote, Simon Griggs (Chelmsford), Henry Hatfield, Ted Owen (Maldon) and Ford White (Portland) for their 29MHz beacon logs, which have enabled me to prepare this month's chart, Fig. 2, of the beacons heard by them, between January 26 and February 25, inclusive. Gordon Foote logged EA2ZRA on February 17, Ted Owen and Ford White added signals from LU1FHH (Argentina) to the chart this time and Henry Hatfield remarked that EA3.JA (Spain) was 'quite loud' on February 5. Possibly some early Sporadic-E?

Tropospheric

At 1055 on January 1, P.R. Guruprasad (Vellore, India) listened to the commentary of a match between Saudi Arabia and Qatar on 102MHz. He uses a Sony ICF-7600DA and tells me that this programme was a simulcast of the satellite channel Star TV. Others available are BBC Asia, Music TV and ZEE TV. "Concurrent frequencies were 107.1, 90.8 and 90.6MHz with the best signals on 90.6".

Radio Astronomy

Periodically, readers ask me for more information about radio waves coming from celestial sources and in particular those coming from the active sun. I suggest that you keep an eye open for any of the books shown in Fig. 3. From the top, these are Radio Astronomy by Roger Jennison (published by Newnes), The Radio Universe by J.S. Hey (Pergamon), Sun, Earth and Radio by J.A. Ratcliffe (World University Library), Radio Astronomy by J.D. Kraus (McGraw-Hill), Radio Astronomy by J.L. Steinberg and J. Lequeux (McGraw-Hill) and Solar Radio Astronomy by Mukul R. Kundu (Interscience Publishers). Most of these have been on my book-shelf for over 20 years and although they may now be out of print copies do appear in second-hand book shops. Don't forget to check all engineering and science sections in the shop - I once found a book about 'valves' [wireless type] on the motor-car shelf!
A number of unidentified satellite signals seen over previous months have now been resolved, thanks to ever-vigilant readers who have written with the answer! 'CTS-PBD' has been seen on a number of occasions within Ku and Telecom bands, the identification - 'Centra de Transmission Satellite Pleumeur-Bodou' and is the French equivalent of our Goonhilly and is sited in West France near Lorient in Bretagne. Thanks to Didier Pencet in Lësny for this info.

On another day colour bars with the inlaid 'HPTV PRETEST' over Eutelsat I/F (12.710GHz) at 16°E caused doubt - this was identified as a corporate video conference for Hewlett Packard. Mid February saw at 10.97GHz vertical - also 16°E - a test pattern with 'Belgacom Satellite Services' - using PAL coding - not an SN2 operator this time! Over the February 18/19 RTM - Radio Television Morocco - opened up in SECAM with 'entertainment' programming making up a 3rd Arabic programme downlink on this satellite (joining both Egypt and Tunisia). The quality of the programmes shown by RTM are rather heavy going with a high content of religious material, Koran, etc.

Sometimes a VTR clock is not available and a local telemetry source is used. These crude count down captions, such as this news feed from Algiers to Paris. The VTR machine is standing by to roll from a freeze frame hence the horizontal bar. From Andrew Sykes, Halifax.

Sixteen East is certainly the hot Ku band bird in the heavens, the weekend of the February 20/21 TV Polonia fired up with programming using PAL on 11.08GHz horizontal and with the announced intention of the full service opening and March. The on-screen logo lower right hand must be the largest logo currently in use, it was enormous and rather distracting to the programme viewing!

The usual Brightstar 11.53 and 11.65GHz trds are always carrying news items or the Brightstar Logo in 525-line NTSC or 625-line PAL. The Transponder' bulletin solved the mystery of the missing 'EBU Sarajevo' news circuits that have traditionally

Roger Bunney, 33 Cherville Street, Romsey, Hants S051 8FB

It is possible to roughly lock up MAC signals using a sync inserter as this photo shows of Marco Polo 1 at 31°W.

The London uplinked 'Turkiye Gazetesi Radyo Televizyonu' test transmissions over Eutelsat I/F at 16°E from Andrew Sykes, Halifax.

Operating from designated Tongan 'space slot reservations'. Two existing Russian satellites will be used initially at 130/134°E with another five new birds to be launched by the Russians in the next few years, the first new bird will be flown this autumn. The new Ramiat service may well present a commercial threat to the Hong Kong based Asiasat service.

There have been antenna problems (misalignment) with hispasat 1 at 30°W which has caused a delay to the full intended Spanish service. RTVE the national broadcaster will be offered 2 licences for transmitter facilities on the new satellite. Hispasat 2 is tabled to launch October 1993.

It seems that plans for BSkyB to scramble their remaining programmes on Astra may be delayed until 1994. The TV and satellite trade are unhappy about all English language offerings being scrambled since it acts as a disincentive to buy satellite receivers it immediately a further payment is necessary to secure programmes. Many of the German channels are in the clear on a full-time basis. RTL-2 is now transmitting on both Astra 1A (trdr 1 - previously Screensport) and Eutelsat II F1 trdr 21 - 11.095GHz horizontal. Screensport and Eurosport have joined forces and are establishing a new base in Paris. The controversial 'Red Hot Television' is now dual scrambling with SAVE on Mon, Weds and Fri., with the new Videocrypt Enigma 1 system and smart card (addressable over air) on Tues, Thurs and Saturday. The dual encryption transmissions will continue for some weeks and then opt entirely to Enigma on a 6 days a week basis.

Turkiye' Gazetesi Radyo Televizyonu test-card.

Short Wave Magazine, May 1993 49
L

iving at sea level and more than 80km away from the Alexandra Palace transmitter, as I did, over 40 years ago, a large antenna was required to receive some sort of signal from the BBC on 45MHz. At that time a pole in the garden was preferable to an array 80km away from the Alexandra Palace transmitter, as I did, over 40 years ago, a large antenna was required to receive some sort of signal from the BBC on 45MHz. At that time a pole in the garden was preferable to an array mounted on a low-profile chimney stack.

The view in Fig. 1 was taken from our bedroom window and shows the large Belling & Lee 'H', that we used, on top of a wooden pole standing about 11km above the ground. The feeder, seen leaving the window, was a test-card in colour, Fig. 2 and a programme caption, Fig. 3, from Italy's 'RAI' (Radiotelevisione Italiana). For Lt. Col. Rana Roy (Meerut, India) openings on Ch. E2 (40.25MHz) in Band I produced strong pictures from an unidentified source in SE Asia, Fig. 4, at 1915 during December 2, 1980 and Bangkok, Fig. 5, on Ch. E3 (55.25MHz) at 2053 on February 23, 1991. He also saw an Arabic station (probably Abu Dhabi), Fig. 6, on Ch. E3, at 1940 on May 8, 1992.

All of the pictures by Bob and Rana are good examples and typical of the quality to be expected while such a disturbance is in progress.

Weather

"Even though this time of the year, here in Vellore, is not supposed to be too hot, it is on the contrary (except in the Nilgiris where the night temperature reaches below zero), the temperature in my room is 23°C now at 1190IST (0620UTC) despite the fact that our house is surrounded by a dozen palm trees," wrote P.R. Guruprasad (Vellore, India) on February 6. He uses an Indian Weston receiver for DXing but he told me about a recurring problem, "monkeys sometimes distort the orientation of our TV antenna."

Among my Christmas cards was one from Peter de Jong (Leiden, Holland), Fig. 7, showing, at that time, most of the UK free from the clouds swirling around the Northern hemisphere. Peter received this picture via Meteosat.

The variations in atmospheric pressure for the period January 26 to February 25, Fig. 8, were taken at noon and midnight from the recording chart of the barograph installed at my home in Sussex. I cannot remember when we last had a trace indicating the pressure remaining above 30.0in (1015mb) throughout the period. In addition it peaked between 30.6 and 30.7in (1036-1039mb) on 5 of the days and remained consistent around 30.5in (1032mb) for 11 days in a row.

The month ended with cold north winds, snow flurries and a frost with overnight temperatures on the 27th/ 28th down to 22°F as measured in our garden.

"February has been a month of high pressure, sadly little DX to show for it", wrote David Glenday (Arbroath) on March 1. David's barometer was above 30.0in for 26 out of the 28 days in the month. The exceptions were the 19th and 25th. "There was a remarkably mild spell of weather around the 18th and 17th", said David, with recorded temperatures up to 15°C. I recorded a mere 0.28in of rain in February compared with 1.94in throughout the same period in 1992. The month was predominantly overcast with either grey skies or persistent fog.

Fig. 7: Meteosat picture.

Fig. 1: It took two photographs to make-up the whole picture of this antenna.

Fig. 2: Colour test-card from RAI.

Fig. 3: RAI Italy.

Fig. 4: Unidentified SE Asian TV.

Fig. 5: Bangkok.

Fig. 6: Probably Abu Dhabi.
"The weather here in the East Midlands was very cold and dull with fog on higher ground," wrote Carl Bowen on February 28. He added that this was a contrast to the weekend of days 13/14 when an anticyclone was producing spring like weather.

**Tropospheric**

"There was a fair opening on Band III around the middle of the month," wrote John Woodcock (Basingstoke) on February 22. He saw the athletics, news and weather, followed by a film from France (Canal+) late on the 13th and a mixture of French signals during the morning of the 14th, at 1420 on the 15th and 1600 on the 16th.

Fluttering pictures from Belgium (BRT & RTBF) and France (Canal+), in Band III, on February 13, told Carl Bowen that a tropospheric opening had begun. Carl found this event interesting because the anticyclone which had established itself over central Europe was in decline. During the two day event Carl added Luxembourg (RTL+), Belgium (Tele 21), France (FRANCE 3), Germany (ZDF) and Holland (NED3) to his score in the u.h.f. bands.

During February David Glenday received pictures from Denmark (DR) and Germany (ARD1) in Band III and Denmark (TV2), Germany (NDR3, RTL+, SAT1 & ZDF) and Holland (NED1, 2 & 3) in the u.h.f. bands on the 1st, Crystal Palace on Ch. E30 late on the 4th, Ireland’s RTE, in Band III at 1610 on the 8th, Denmark in both v.h.f. and u.h.f. bands at midday on the 10th, Belgium and Holland in Bands IV and V on the 11th and Belgium (BRT1 & 2) and Holland from 2100 to 2400 on the 13th.

In New Radnor on the 4th, Simon Hamer received pictures from Belgium, France, Holland, Germany and Ireland in Bands 111, IV and V including the Belgian Canal+ on Ch. E50 and the new German station, VOX, from Dusseldorf on Ch. E39. Simon has also seen VOX on the Astra satellite’s transponder No. 5. During the opening on the 14th, he logged Denmark’s ‘DR’ and ‘TV2’ in the v.h.f. and u.h.f. bands respectively and Belgium, France, Germany (ARD1, West 3 & ZDF), Holland and Ireland (RTE) in the u.h.f. band.

**SSTV**

Among the slow scan television signals copied by John Scott (Glasgow) are ‘CO’ captions by the German stations DJ4IG, Fig. 9 and DL5GY, Fig. 10.

Although Fig. 9 gives a good demonstration of the effect of interference lines on slow-scan pictures, it is unfortunate that this lot has distorted the station’s callsign. (Typical, do I hear some of you mutter!). Despite such strong interference being present, John was able to copy an ident from DL4SAW, Fig. 11 and a Mickey Mouse cartoon, Fig. 12 from an unknown source.

However, clearer pictures of a weather report, were received from another German station, Fig. 13 and the head and shoulders of an operator in Switzerland, Fig. 14.

John makes hard-copy of the pictures he receives, mainly around 3.730 and 14.230MHz, with a Star LC-10 printer on sheets of A4 paper. I have always admired the dedicated efforts and sense of humour that prevails among the slow-scan fraternity and look forward to having more of their reports and print-outs.
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Progress is being made towards the arrival of another new country on the short wave broadcasting bands. Dr Gene Scott, who can already be heard on his University Network 24 hours a day on short wave, says the first short wave antenna has been erected at the medium wave station Caribbean Beacon, which he owns, on the island of Anguilla. Construction of the transmitter has been finished and it is likely that it will be on location by the time you read this. No target date for the start of broadcasts has been announced yet, nor have any times or frequencies. As they say - stay tuned!

Hawaii Calls

Another religious organisation, LeSea Broadcasting, which owns and operates WHR short wave from Indiana, is also moving towards getting its new station on the air from Hawaii. This would be the first real short wave broadcaster (as opposed to time station WWHV) from Hawaii since the Voice of America closed its relay station there decades ago. Most radio country lists consider the 50th state as a separate country. The organisation says the new station, which will use the call letters KWHV, should be on the air by the first quarter of the year, i.e., by April. LeSea put WHR on the air on the target date it had set, so if they've done that again KWHV should now be active. The transmitter is located on the southern-most tip of the Island of Hawaii and will be used to provide better coverage of Asia, including India, Japan, Korea and China. Frequencies had not been announced as this was written.

One for the Road

As most everyone is aware, time is running out for Trans World Radio, Bonaire, which is due to end its short wave broadcasts on July 1 at 0400UTC. The station has always been a friendly and professional outlet - right down to their QSL styles and policies. And that is offering a special reprint of their first QSL card. A correct reception report to Trans World Radio, Bonaire, will be used to provide better coverage of Asia, including India, Japan, Korea and China. Frequencies had not been announced as this was written.

USA Notes

The Voice of America's new relay at Udorn, Thailand should be in operation by now. Check these frequencies at various times: 6.045, 6.090, 9.560, 9.615, 9.680, 9.760, 11.705, 11.785, 11.865 & 11.905MHz. The power is 500kW and beams are to South-east Asia, South Asia and China.

From South America

Argentina Radio Malargue has been reported in North America on 6.610MHz variable in Spanish around 0400.

Bolivia There have been a number of new or reactivated stations coming on the air from this country: Radio 9 de Abril at Pulucaoy on 3.200MHz; Radio Florida, 3.371MHz at Samapata; Radio Metropolitana, La Paz, on 6.195MHz; Radio Norte, Montero, 4.339MHz and Radio El Mundo, 6.015MHz from Santa Cruz have all been noted in recent months. All frequencies are slightly variable.

Colombia Radio Nueva Vida has resumed operations on variable 5.570MHz and heard around 1000. The government station Radiofusora Nacional has dropped from the 9.685MHz frequency used last fall, down to 9.655MHz. The 31m band channel has apparently replaced 11.8225MHz. Another reactivated station is Radio Macarena on 5.975MHz. One of the rarest stations from this country, Radio Buenaventura on 4.833MHz, is also being heard again, though it is often tough to pick out, squeezed as it is between Radio Reloj on 4.832MHz and Radio Tegucigalpa on 4.835MHz. Still another reactivation is Armonias del Caqueta on 4.915MHz, a frequency also occupied by Radio Cora in Peru and that causes some QRM. La Voz de la Selva is another that has returned recently, using 6.170MHz.

Radio SRS QSL card.

11.825MHz. Another reactivated station is Radio Macarena on 5.975MHz. One of the rarest stations from this country, Radio Buenaventura on 4.833MHz, is also being heard again, though it is often tough to pick out, squeezed as it is between Radio Reloj on 4.832MHz and Radio Tegucigalpa on 4.835MHz. Still another reactivation is Armonias del Caqueta on 4.915MHz, a frequency also occupied by Radio Cora in Peru and that causes some QRM. La Voz de la Selva is another that has returned recently, using 6.170MHz.

Ecuador Radio Bahia has resumed operations, this time on variable 4.950MHz, and is heard around 1000. It may also be audible in the 0000 to 0400 time period. Another reactivation is Radio Catolica on variable 3.395MHz.

French Guiana The other French Guiana station, the government's RFO Cayenne (as opposed to the RFI relay) has returned to the air on 5.055MHz variable, which is supposed to be used in the 0000 to 0400 time period. Another reactivation is Radio Catolica on variable 3.395MHz.

Surinam Rumour had is that SRS in Surinam is planning a return to short wave on its (very) old frequency of 4.850MHz.

Uruguay Another reactivated Latin American is Radiofusion Nacional SODRE in Montevideo. It's quite a difficult catch though, since it is listed for only 300W and is in the middle of the QRM-filled 49m band, on 6.125MHz. Test broadcasts are also supposed to be carried out on 9.515, 11.885, 15.275 & 15.350MHz. The schedule is 0900 to 0400 daily, Radio Monte Carlo, also in Montevideo, has been noted recently on 11.735MHz around 2300. This station is active only on an occasional basis.

Notes from Central America

Dominican Republic Radio Estrella is a new station using 6.205MHz and sometimes running to as late as 0400, though often closing much earlier (on some days it’s not noted at all). It’s located in Santo Domingo. Radio Santiago, on 9.8775MHz, continues to be heard quite regularly and La N-103, silent for about a year, is also back on 6.000MHz variable (at least occasionally), relaying its 100Hz f.m. outlet.

El Salvador Former clandestine station Radio Venceremos is currently off of short wave due to transmitting problems, but keep an ear on the 6.3MHz area for a possible return. The address is Apdo 209, San Salvador. The other former clandestine station, Radio Farahbudo Marti, plans to return to short wave sometime in the future. That station’s address is Apdo 3080, San Salvador. The other former clandestine station, Radio Farahbudo Marti, plans to return to short wave sometime in the future. That station’s address is Apdo 3080, San Salvador. Both stations are active with f.m. outlets.

México Most of the short wave stations in México are inactive most of the time, making only occasional and brief appearances at, it would seem, the whim of the owners. One that surfaced recently is Radio Yucatan, XEDM on 6.105MHz, from Mérida, which is scheduled until 0500. The station is listed as Tus Panteras (The Panther) but has switched between many different names over the years. Meanwhile the government’s Radio Mexico Internacional continues to be active on a reasonably regular basis on at least one of its several short wave frequencies. So does Radio UNAM, the station of the Autonomous University of Mexico, which operates on 9.600MHz. Most consistently active of all is Radio Education on 6.185MHz.
Sorry about last month's confusion over who was compiling the column. It was me but somehow Graham Tanner's name and address appeared on the make-up page that went to the printers. Graham has kindly sent your letters on. Another correction concerns the US/A TriPod. My brain must have been disengaged (nothing unusual about that) when I called it an aircraft carrier. It is of course an amphibious assault ship.

You Write

The recent references to Rainbow Radio in Canada have sparked off a number letters about message handlers, company frequencies and the like. David Murphy has built up quite a list of such stations and I have decided to include some here. I have skipped the usual Portishhead, Stockholm, Berne, Speedbird and Anic frequencies as these have all appeared before and are included in the companion book to this column.

First Air (Ottawa): 13.285MHz
Tandem (Buchanan): 10.021MHz
Prague Radio: 5.532, 10.027 & 13.351MHz
Falcon - Gulf Air (Bahrain): 5.538, 11.303, 17.931 & 21.943MHz
National (Montreal): 13.399MHz
Air India (Bombay): 5.637, 8.330, 10.072, 13.933, 17.931 & 21.943MHz
USAF aircraft traffic still seems to be the favourite listening and Ron Galliers reports that a lot of aircraft are still heading down towards the Gulf and Africa with air-to-air refuelling over the Atlantic at around 2200. The sailors use callsign prefixes 'Mobil' or 'Exxon' and are controlled by Lagos with most radio traffic on 6.738 and 11.176MHz. Some co-ordination with Santa Maria takes place on 5.596, 6.628 & 3.016MHz (NAT E-tacks). Ron adds that the five figure digits that follow the 'Reach' prefix appear to be issued sequentially and are often used on both the outward and return journey. Ron noted that the Egyptian GHS directed aircraft to change to 14.615MHz after poor contact on the usual 11.176MHz. Interesting because 14.615 is not listed as a GHS frequency and is normally occupied by Cape Radio in Florida.

Paul Hilton's log included contact between an unidentified ground station and a Moroccan registered aircraft CN-AJF on 5.681MHz, which is a EUR-A region frequency. The Aerad Comms supplement shows only Berlin and Malta on this net and you are one upon me Paul because I have never logged anything on the little used EUR-A circuit. Paul also logged Halifax (Canada) Military with Rescue 314 on 6.693MHz which is a Canforce search and rescue channel. Phillip Murphy's log covered a large amount of USAF traffic and an interesting entry of traffic between 'Head Dancer' and Lagos. The latter requested a move from 15.019MHz to 15.044MHz which shows there are still some changes going on as far the GHS network is concerned. 15.044 fits in with the typical 3kHz channelising used by the USAF but I have never before seen it listed as used by Lagos.

Swissair

Alan Page has been frustrated in his attempts to find a company frequency for Swissair and says he has never been able to hear them on Berne Radio allocations. I may be wrong but I seem to recall hearing them work through Speedbird London (British Airways) with the following: 5.535, 8.921, 10072, 13.333, 17.922 & 21.946MHz. Failing that check-out the usual Stockholm Radio frequencies.

Back to Ron Galliers and he says the Aerad chart NAT 1/2 also shows reporting points over the Atlantic. I am not familiar with that particular chart but warn readers not to confuse it with EUR 1/2, which only covers low level reporting points over Ireland, England, Wales and Northern France. Aerad charts are produced by British Airways and you can order them by telephone using a credit card. The number is 081-582-0795. You might also want to order what is known as the Europe and Middle East Supplement (still referred to by many pilots as 'Aerad Comms'). This book is updated four times a year and gives details of airfields and their frequencies within the area mentioned in the title together with a host of other flight information. Ron has been trying to figure out the two letter call signs used by the navy. He recently heard Gravesend Radio with HAMS Marbleborough using SAGJ and another ship using KD with the operator having a strong German accent.

I have access to a comprehensive list of the ITU callsigns allocated to the Royal Navy (please do not ask for copies. I cannot get them) and cannot find KD listed anywhere even as part of a callsign. The KD series is allocated by the ITU to the U.S.A. and so I can only think that it may have been solely a tactical callsign perhaps being used by a German ship on NATO manoeuvres. Finally, from Ron he mentions that the Russian Broadcast station in Ashkabad on 4.704MHz is occasionally interrupting its programmes late in the evening to broadcast number sequences. Still with numbers and John Macnoughton also believes the numbers transmissions on 6.628MHz are Mossad. John adds that a good UK source for numbers chasers is the book Monitoring the Iraq/Kuwait Conflict by Langley Pierce. It is available from Interproducts, 8 Abbot Street, Perth PH2 6EB. Telephone: (0738) 441199.

Books

Copies of Peter's book Short Wave Communications are still available from the SWM Book Service, along with Scanners 3rd edition and Scanners 2. Short Wave Communications covers a wide area and provides an introduction to the hobby of radio communications. International frequency listings for aviation, marine, military, space launches, search and rescue, etc. the books costs £8.95. Scanners 2 is a guide for users of scanning receivers, covering hardware, antennas, accessories, frequency allocations and procedures. The books costs £8.95. Scanners 2 is an expansion to Scanners and provides even more information on the use of the v.h.f. and u.h.f. communications band and gives constructional details for accessories.

A C-141A Starfighter of USAF, landing at RAF Mildenhall during February 1980. All C-141As are now converted to C-141Bs, with the inclusion of fuselage plugs and an air-refuelling receptacle above the cockpit. Also, almost all C-141Bs were re-painted in a dreadful low visibility slate-grey/dark green colour scheme, but they don't make very good photographs!
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Short Wave Magazine, May 1993 55
Recently I was asked about a.m. and the s.w.i. Well, the received signal = Power out of transmitter plus twice the antenna gain, minus the losses to hear one's own return signal, all in dB. The antenna gain is times two because it acts in both directions.

Another simple sum says the path losses on 145MHz are about 196dB. Assume the transmitter runs a kilowatt output at the antenna terminals and you have 22dBd antenna gain. The return signal can be expected to look like 0.25V/m across 50Ω. That is an ideal; in fact the moon is far from a perfect reflector, and the received frequency is affected by doppler shift. The reason a.m. stations go higher in frequency is that antenna gain becomes easier to get, faster than path losses increase. So for a listener who has the knowledge and skills to build and operate an antenna of more than 22dBd genuine gain after taking in the feeder losses in, a.m. is theoretically possible. All you need now is to know when and where stations will appear. As ever, we're back to the grapevine!

Reports

Will Williams lives in Neath, and has 2m of wire up, coupled to a Realistic DX-350, on which he listens to 3.8MHz either last thing at night or early in the morning. In the mornings ZL4BO and others attract callers from Europe. Late into the night and into the small hours, Will listens to the various Europeans working the WA4rayO stations. Don't forget that the American band goes working the WNENO stations. Don't listen to the various Europeans others attract callers from Europe. Late either last thing at night or early in the morning, will appear. As ever, we're now, is to know when and where stations will appear. As ever, we're back to the grapevine!

To Grid

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

Round-up

56 Short Wave Magazine, May 1993

wire beams (non-rotatable) for 3.5MHz aimed at 80° and 28°; a switched reflector is in the pipeline to enable 'steering' to some extent. For Top Band there is a half-wave with one end at 13.8m, and the other end up to 24m. As for results, I notice all continents save Africa on 3.5MHz, including Western USA, with N.A. and Europe on Top Band where it's nice to observe 2X0CAF of Aberdeen among those present.

Next, Gerald Bramwell in Swinton. Gerald has Top Band giving various sidebands to Ws and VE, UB4AWL, WR9CQ, UA6JUL, UA9SPJU, plus the smaller fry including GW1JYV up the road. 3.5MHz gave a string of Ws, VEs, G3BFT, UC3JF, J28BG, C9RTC while a shift down to 24MHz sideband for WA4DAN/KP5, AH1A on Howland.

J28BG, C9RTC while a shift down to 24MHz sideband for WA4DAN/KP5, AH1A on Howland. Fridays are a couple that Don notes 1600UTC Monday Wednesday and the DL2BCH/CU2YA effort at 1500UTC Mon-Fri, 0600UTC Sat/Sun, 13.8m, and the other end up to 24m. As for results, I notice all continents save Africa on 3.5MHz, including Western USA, with N.A. and Europe on Top Band where it's nice to observe 2X0CAF of Aberdeen among those present.

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Professional communications operator Donald Robson (Hawick) served as a telegraphist in the RAF, mainly in the Far East, during 1967-8. For 6 years in the following decade, Donald worked with the Ministry of Aviation at Croydon Airport. Not quite as historic, but still in the realms of bygone technology, is Donald's 30-year-old Trio 9R-59DS receiver. About the time Donald purchased this, I was still at school. Those members of the school radio society who owned this type of receiver were regarded with much jealousy by the less fortunate ones - such as myself. What is there that is lacking in today's conditions, that makes nostalgia so attractive? That is not often the case, and I believe that, in the USA, one of my short articles on page 39 of the March issue was prompted by his request. Please note that although cloud is measured in octas (eighths), the word is often omitted from reports for brevity. I believe that, in the USA, where altimeter settings are in inches of mercury (29.92 being the standard pressure setting), cloud cover is measured in tenths.

In order to monitor arrivals of aircraft at his local airport, Manchester, as well as at Gatwick and Heathrow, lan Doyle consults page 747 of Skytext. Unfortunately lan, you don't say how to go about viewing this service. Is it a dial-up bulletin board requiring a telephone modem and computer? Who do you contact to subscribe to it?

Ian has tried out a KC13 pre-amplifier. For about £25, this unit amplifies the signal picked up by the antenna, and passes the thus strengthened signal on to the receiver. It appears to amplify Band II broadcasts as well as u.h.f. television - and everything in between! An inevitable problem will be susceptibility to interference from stations that are outside the band of interest. This is a consequence of the broadband nature of the amplifier. It is designed not to discriminate between different signals.

Frequency and Operational News

From the CAA, GASIL 2/93 introduces the hoped-for a.t.i.s. at Bristol (Lusitania) on 121.75MHz. The d.m.e. at Great Yarmouth has now been withdrawn. At Prestwick the Control Zone has been removed. The Carnane n.d.b. and advisory route has also been removed. Also from the CAA comes AIC 24/93 which changes the Danger Area Activity Information Service frequency for 007 Fowey, Previously Wembury Range Control 122.1MHz, it is now St. Mawgan Approach 126.9MHz. Outside the boundaries of St. Mawgan’s watch, call London Information 124.75MHz.

To mark the 75th anniversary of the founding of the RAF, a flypast is planned at RAF Marham, Norfolk. By the time you read this, the practice days (March 26 & 30) and the display itself (April 1) will have been completed. What advanced warning is there that something this big is about to take place? The CAA organise a free of charge recorded telephone message on (0500) 354602. The information gives pilots warning to avoid hazards such as royal flights (purple airspace), the practice and maneuvering areas for fly-pasts, and Red Arrows’ display areas. The information usually gives notice of events expected tomorrow.

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>Airbus</td>
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<tr>
<td>AIC</td>
<td>Aeronautical Information Circular</td>
</tr>
<tr>
<td>a.t.i.s.</td>
<td>automatic terminal information service</td>
</tr>
<tr>
<td>B</td>
<td>Boeing</td>
</tr>
<tr>
<td>CAA</td>
<td>Civil Aviation Authority</td>
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<tr>
<td>d.m.e.</td>
<td>distance measuring equipment</td>
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<tr>
<td>ft</td>
<td>feet</td>
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<tr>
<td>GASIL</td>
<td>General Aviation Safety Information Leaflet</td>
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<tr>
<td>kHz</td>
<td>kilohertz</td>
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<tr>
<td>MHz</td>
<td>megahertz</td>
</tr>
<tr>
<td>n.d.b.</td>
<td>non-directional beacon</td>
</tr>
<tr>
<td>u.h.f.</td>
<td>ultra high frequency</td>
</tr>
<tr>
<td>v.h.f.</td>
<td>very high frequency</td>
</tr>
<tr>
<td>v.o.r.</td>
<td>very high frequency omni-directional radio range</td>
</tr>
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</table>
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Follwing the release of the AOR AR-1500EX, Richard Hillier of AOR (UK) Ltd has been good enough to send me some additional information on the changes made to this latest version of the popular hand-held. The major differences include new printed circuit boards, changes to the intermediate frequencies and switching, better selectivity, greater sensitivity above 900MHz and improved a.m. a.g.c. characteric.

As well as these changes, the microprocessor reset keystrokes are also different. Some AR-1500EX units that were shipped out before 17.2.93 do not have the correct information in the handbook. If you reset using the AR-1500EX you will find that the sensitivity on u.h.f. is very poor.

The correct keystrokes are:

| BANK 1 | PROG 0.5 | LIMIT 95.995 |
| BANK 2 | PROG 96 | LIMIT 299.995 |
| BANK 3 | PROG 300 | LIMIT 512.995 |
| BANK 4 | PROG 513 | LIMIT 737.995 |
| BANK 5 | PROG 798 | LIMIT 1105.995 |
| BANK 6 | PROG 1106 | LIMIT 1300 |

SEARCH 556.325 ENTER
SEARCH 556.325 ENTER
SEARCH 248.125 ENTER
SEARCH 58.075 ENTER
SEARCH 243.125 ENTER
SEARCH 556.325 ENTER

One other interesting quirk is with the auto memory function. If you program the set to only selecting bank 9 i.e. SEARCH BANK PROG 9 LIMIT 3 ENTER strange things happen. The first search cycle works normally but on the next cycle the bank number changes to 0 (1 on the next cycle and so on) and the set searches the 'layers' of the same search range. It no longer auto stores, but stops on busy channels as if it was in the normal search mode, except that you can lock out different spot frequencies in each of the ten 'layers'. This is likely to be due to a 'bug' in the programming but perhaps someone out there can think of a practical use for it - if you can let me know.

Satellites

Some time ago I read a short article in an American scanning club newsletter about monitoring Inmarsat, the maritime communications satellite operating in the 1.6GHz band. Inmarsat is a global non-military satellite communications organisation providing voice, data, facsimile and telex services as well as distress and safety communications for ships, aircraft and land mobile operations.

As an example, many of the recent conflicts throughout the world have been reported almost instantaneously by news crews equipped with portable satellite telephone equipment, much of this traffic has been carried via Inmarsat. There are currently ten satellites in the system, although only five of them are actually in use. The orbital positions have been chosen to provide a compromise between global coverage and channel capacity in particularly busy areas such as the Atlantic region.

The satellites receive signals transmitted from the earth at frequencies around 1.6GHz and retransmit them at 4GHz back to a network of Land Earth Stations (LES) situated at strategic Locations around the world. The LES are used to connect the satellite system into terrestrial telecommunication networks. The return leg of the signal is transmitted back from the LES to the satellite in the 6GHz band, which is then converted to 1.5GHz for transmission back to the earth.

Commercial satellite terminals for Inmarsat are split into different categories. The standard Inmarsat 'C' ship earth station is primarily intended for use as a low traffic volume terminal unit permitting transmission and reception of telex and data traffic at a rate of around 600b/s. The advantage of this type of equipment is that the digital transmissions can be sent at low data rates which means that much more compact antennas can be used, often as small as 80mm by 50mm.

An Inmarsat 'A' terminal permits voice communication and it is this type of terminal that tends to be used by reporters to send their stories back from remote corners of the world. Because of the need for a much wider bandwidth to carry the speech signal the antenna size has to be much larger, usually requiring at 0.85 to 1.2m dish. The speech signals are transmitted using a special type of n.b.f.m. that uses syllabic companding and has peak deviation of about 12kHz. This type of modulation can be received on a scanning receiver, the most noticeable difference from normal n.b.f.m. transmissions being the disappearance of carrier during pauses in speech. This is in order to maximise the use of the limited amount of power available on-board the satellite.

As well as the type 'A' and 'C' terminals, a new generation of digital 'B' and 'M' terminals are planned. The 'B' terminal is intended to be a digital version of the existing analogue 'A' terminal but the 'M' terminal is intended to provide digital voice grade communications from a unit the size of a briefcase. This could easily be the forerunner for a future global mobile phone system.

Receiving INMARSAT

As an experiment, I wondered if I could detect any signals from the Inmarsat stationed at 15.5°W. This is intended to give coverage of the Eastern Atlantic region and is the easiest to receive in the UK, although there are others stationed at 55.5°W and 64.5°E that may just be within range of the southern half of Britain.

In order to save time I decided to modify an existing antenna. I have a small Amstrad offset dish mounted on a tripod that is calibered so that I can find what azimuth and elevation I need to set for a given satellite orbital position. I wondered if the dish would work effectively at the much lower frequencies used by Inmarsat. I quickly made up a small dipole from some tinned copper wire, which I soldered to a short length of thin 50Ω coaxial cable. I rotated the dish to approximately the correct position, set my AR3000 to search from 1530 to 1545MHz and connected it to the dipole. I then held the dipole just in front of the existing LNB feed and waited. To make sure the search stopped on a weak data signal at 1530.95MHz. Once I had located this signal I was able to position the dipole more accurately at the focus of the dish. I also found that adding a small reflector helped to improve the antenna gain.

Having peaked the antenna on the data signal I was able to find several other weak transmissions in the 1530 to 1545MHz band. Some of these appeared to carry speech but they were just a little bit too weak to be able to determine what was actually being said. No doubt adding a pre-amplifier or second dipole phased to give right-hand circular polarisation would have brought these signals up to a usable level.

LEO Sats

Several companies are now proposing a new generation of low power communications satellites known collectively as Low Earth Orbiting spacecraft or LEO. It is intended that they will operate on frequencies around 1.6GHz. The difficulty with orbiting satellites is that they only provide communications when they are within range of the user. This often means that only a few minutes of communication is possible during each orbit, depending upon the height and orbital position of the satellite relative to the user. The way the LEO will overcome this problem is by having several satellites orbiting the earth at carefully selected positions, so that at any one time there will always be at least one within range. As well as providing communications the system will also be able to give positional information in a similar manner to existing navigation satellites. In fact, two of the proposed systems may provide positional information as a spoken location such as '144 motorway Junction 12'.

One of the main contenders in the race to provide LEO communications is Motorola with its Iridium system. This will use a constellation of 77 satellites in seven evenly spaced circular polar planes, each plane containing eleven satellites spaced 37.5° apart. This arrangement gives global coverage with more capacity towards the earths poles where the coverage areas overlap. In order to maximise the use of the limited radio spectrum available and minimise the amount of transmitter power required, each satellite will use digital modulation and use up to 37 separate spot beams to form cells on the surface of the earth. Each one of these spot beams is likely to be able to provide 174 full duplex voice channels.

Maritime Mobile Satellite Services

<table>
<thead>
<tr>
<th>1530 - 1544MHz (Sat TX)</th>
<th>1625.5 - 1645.5MHz (Mobile TX)</th>
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<tr>
<td>1544 - 1545MHz (Sat TX)</td>
<td>1645.5 - 1647.5MHz (Mobile TX)</td>
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| Aeronautical Mobile Satellite Service | 1544 - 1545MHz (Sat TX) | 1645.5 - 1647.5MHz (Mobile TX) |

Table 1. Inmarsat II frequency bands.
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Short Wave Magazine, May 1993
Meteors 3-4 has remained operating on 137.30MHz since mid-January. It has only transmitted visible images (at least when I've been looking). During its night-time orbits it transmits only the bars and a blank line. Meteors 3-3 was switched off around February 18 (previously using 137.85MHz). Meteors 3-3 had been operating very close to the morning terminator - a location that provides very poor solar illumination for the solar panels. It came back on in early March. As the weeks pass by we can expect more changes in operations. Perhaps Meteors 3-5 will come on during its next favourable solar illumination period.

Fengyun 1-2

Paul Wilson of Macclesfield regularly sends me data collected from various BBS, and one has given some recent information about the Chinese WXSAT Fengyun 1-2. We stopped receiving a.p.t. from it a long time ago, but it was known that the Chinese were trying to stabilise it. Apparently a rocket thruster jammed in the open position causing all the propellant to escape. Thrusters are sometimes used for minor attitude (pointing position) adjustments. The magnetic torquing system was used for a period, to bring the WXSAT to a stable position while over the PRC (Peoples' Republic of China), and some h.r.p.t. was also received in America. Unfortunately it seems that this cannot now be done.

Meteors 3

During January and February this geostationary WXSAT was slowly drifted westwards to its new location at 75°. It managed to receive signals from it until February 18, by which time it was very weak due to horizon obstructions.

Pictures from M3 will continue to be re-transmitted from Meteosat 4 at the usual times, and I believe that there is a likelihood of extra transmission slots being allocated. There is a significant change in the view from M3. We can clearly see right across to the western coast of the USA. Californian weather can now be monitored! My Primary Data images from Meteors are quite spectacular.

Letters

Brian Dudman of Harrow has spent some months setting up what must be an exceptionally well featured WXSAT receiving station. He has sent me several pictures during the last year or so (thanks for those) including Fig. 1, which shows his various computers fed from assorted antennas and receivers. The left monitor shows hurricane Andrew, the central one shows a Meteosat Primary Data whole disc image of the earth, and the monitor on the right displays a FAX image but the nearby light has caused a reflection.

Brian operates three computers in the room. I can't but wonder whether he suffers much interference from them? To receive the polar WXSATS Brian has installed three different antennas in his loft. The original crossed dipole points vertically, this would be the usual way to install a single antenna. In such a position the main lobe (direction of greatest sensitivity) is upwards, but signals are received down to virtually horizon level. The other two are pointing at 30° elevation north and south. Each antenna is cooled with coaxial lead down to his operations room where they are connected directly to a motorised switch. The south antenna has allowed him to obtain good signals 'way down the Red Sea', and the north-pointing antenna has let him see to the top of Greenland. His main problem, he tells me, is deciding on each pass, just when to switch over between the different antenna. Brian's photographs have shown an unusually clear image of Greenland - see Fig. 2, which was taken before his antenna installation was modified.

Peter de Jong of Leiden in Holland sent me Fig. 3, which shows an image from Meteors 3-5 collected last April during a morning pass. The picture illustrates the cloud detail that Meteors seem to register so well. Peter comments that when the Meteors do transmit infra-red images during a north-bound pass, they switch from visible to i.r. usually after first transmitting four minutes of blank frame, followed by one minute of white, so we don't see much during these northbound passes. I wonder how many monitors have noticed that when the white section does start, it normally includes one line of (infra-red?) data first?

Doug Harris GW3NDR of W Glamorgan, has recently completed building a Maplin 137MHz receiver as part of his plan to start receiving WXSATs. Doug already has an IBM clone of the 286 variety and is proposing to use the Technical Software WXSAT module to decode the images.

He has been receiving FAX for some time, using PC-HF-FAX 6 and wondered whether the FAX program could decode WXSAT images. In fact I think that it is just possible to decode an image of sorts, but there would be no synchronisation because the two systems (FAX and WXSAT) use different modulation techniques and different start and end tones (and there are many other differences as well).

Tom Woolner of Harpenden has designed a simple analogue demodulator-remodulator 'interface' to fit into a Cirkit satellite receiver and a PC. Perhaps Tom will let us have more details about the operation and application of his device, which can apparently be used with HF-FAX type software. A Malloy is one of the column's younger readers who has been setting up some WXSAT equipment at home. He has been able to use school satellite software and a NOAA predictor to calculate when the different NOAA satellites will be visible from home. He has made his own quarter-wave

Fig. 1: Brian Dudman's receiving station.

Fig. 2: Meteors 3-3 image of Greenland from Brian Dudman.
crossed dipole cut for 137MHz and can use a scanning receiver to hear the WXSA T S. The problem has been locating a suitable interface for a BBC computer. Although he was able to use the school's unit for test purposes he was wondering where he could obtain one, including the necessary software.

The BBC computer was one of the first to be used for decoding WXSA T images, and I believe that there are still one or two companies which can supply interfaces and software. I know Maplin did at one time. Nowadays the extremely limited capabilities of the earlier machines have long been surpassed by many machines.

**More Letters**

Lester Corino of Holsworthy and Steve Nas of Oswestry have both written to mention the shareware tracking program PC Track, version 2.14 which has an American author and which can be bought from radio rallies and other outlets, and costs about $25 to register. They comment that the graphics are good and that up to eight satellites can be tracked simultaneously.

Geoff Chance of Redruth has bought a 286 PC to use with the Radiofax system, which he says provides FAX and SSTV as well as WXSA T decoding. Geoff's computer runs at 12MHz and has a mono-VGA monitor. Although he feels that this may be slow, in fact I suspect that he will find everything works very well. Satellite pictures are black-and-white anyway!

He also advises me that he understands Maplin having a waiting time for METEOR satellite downconverters of four months from receipt of order. Does accord with letters that I have received from other readers who have commented to me on long delivery times. Bill G3MMF is an engineer servicing X-ray and ultra-sound scanners, and suggests that an article on 50kHz i.f. for 10.7MHz would be welcomed. This is the normal i.f. for many receivers, of which the WXSA T S require a bandwidth of about 50kHz for extracting the full range of frequencies from the signals. This would be of interest to those people who are building their own, so perhaps a short piece would be helpful.

Mike Robinson of Accrington has designed and built his own f.h. WEFA X, RTTY and c.w. decoders. That only leaves the WXSA T S! Mike recently bought an IDS METEOSAT MET 1 system and got 'hooked'. After building a crossed dipole antenna and connecting it to a Realistic PRO-2006 scanner Mike had some success, but was still unaware of satellite rise and set times. His latest purchase is the Timestep Trackit program which Mike is finding extremely helpful. Mike runs it on a 386 computer fitted with a coprocessor. He supplied Fig. 4, a NOAA picture from early February showing Spain and a cloudy France.

Jim and Hilda Richardson of Fife recently updated the computer to a 386 PC with SVGA monitor, bought a Timestep PROsat WXSA T receiver, loft-mounted turnstile antenna, and runs the PC-GOES/WEFA X 3.3 program, which also provides HF FAX decoding. Jim contacted Comar about the screen scroll-freeze, which I noted in a review of the software some months ago. Apparently he has been advised that setting the ICD to 0f 4 enables a full METEOR scroll without any disadvantages. This may help other users. Jim says that Comar are issuing updates to the software to correct problems with running PC-GOES on faster machines than the 286.

Peter Finn of Dyfed asked me a few questions about the use of colour on Timestep's PROsatl software. I did a review of this suite of programs which covers METEOSAT, NOAA (and the other polar satellites) and an animation facility - and can be enhanced with the tracking software Trackit mentioned previously. Unfortunately, as Peter points out, I didn't mention the use of colour. In fact all but the animated images can use colour, and several sample palettes are provided. There are no special computer requirements for adding colour - other than needing a colour monitor. The facility is quite advanced and special palettes can be set up and stored for selected formats. One very effective method is to set up a palette for METEOSAT D2 images - infra-red for Europe, using shades of red. The same palette can be loaded throughout the year, and the warmer summer months result in deepening reds. This method can be used with other software, not just PROsatl. It provides an interesting insight into the changing streams of warm water that flow around the Mediterranean sea.

Lester Jones G7NR of West Kirby has also upgraded from a BBC Master to a 386DX PC. He asked me what hardware and software I would recommend for this computer, which is identical to mine. This is quite difficult, not because of any wish to avoid advertising in the column - but simply because the choice is large and depends on personal means and preferences. All I can do is try to bring new products to the attention of readers whenever suppliers advise me of new hardware and software.

**GOES Constellation**

The current position of all WXSA T S in the GOES group is as follows: Prime - GOES 7 112°, GOES 6 94°; GOES 3 179°; GOES 2 (west) 135°, MET 3 75°.

**Kepler Elements**

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

**Frequencies**

NOAAs 9, 11 a.p.t. on 137.62MHz; NOAAs 10, 12 on 137.50MHz; NOAAs beacons on 138.77 and 137.77MHz; METEOR 3-4 or 3-5 on 137.30MHz; METEOR 3-3 on 137.85MHz; FENGYUN 1-3 monitor 137.06 and 137.80MHz.

**Tape Recordings**

Some time ago, I offered to provide a.p.t. recordings to anyone having trouble starting off. For several weeks I was kept unexpectedly busy making such recordings. I will offer the service again for a short period. Please send a pre-paid envelope with a cassette tape and a couple of extra stamps, and I will provide NOA and METEOR a.p.t. signals. METEOSAT is a bit of a problem because I don't have a suitable output for recording signals from that system.

---

**Fig. 4: NOAA 11 7 Feb from Mike Robinson**

**Fig. 3: METEOR 3-5 image from Peter de Jong.**
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When you build a HOWES kit, you know that you are dealing with well designed equipment that has full technical support, and a wide range of matching accessory kits to enable you to build up your station in easy stages!

DXR10 Electronics kit for SSB/CW receiver with 1W AF output £27.50
DCS2 "S Meter" accessory kit - driver module and custom meter £10.90
HA10R Hardware (case, tuning cap., dial, knobs, nuts and bolts etc.) £19.90
Total cost of receiver (as pictured above) in kit form: £58.30 plus £4.24 P&P.

Other Receiver Kits: DcRx single band SSB/CW for 20, 40, 80M or 5.45MHz air: £16.90
AB118 Kit: £18.80
AB118 Assembled PCB Module: £24.90

AA4 25 to 1300MHz ACTIVE ANTENA
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AB118 Assembled PCB Module: £25.90
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ASL5 Kit: £15.90
Assembled PCB Module: £24.90
As a success story to start this month, Alan Lowe of Cheltenham, like many, had been suffering computer interference problems. Having read my comments in the March 'Decode', he lined his monitor with foil and has now completely cured the interference. The nice touch is that he took the trouble to write and let me know. For those that are thinking of trying the same, I'll repeat the safety warning. Don't even consider delving inside the case of a computer monitor unless you know what you're doing. All monitors contain lethal voltages which can be present even with the mains supply disconnected. It's also important to make sure that you don't restrict or block the ventilation slots or you could considerably shorten the life of the unit.

For those interested in receiving press photos, Geoff Crowley reports good results on 5.242MHz. This frequency is used by Dyn in Buenos Aires and appears to send a regular stream of pictures. Geoff prints out the images on a 24-pin NEC printer which seems to produce very good results. To give you an idea of the quality, I've shown an example in the column. The only problem with receiving pics from South America is the news personalities are often unknown.

Now for some detective work. Keith Mayhew of Mansfield has sent me a print of a RTTY station running on 16.793MHz. Unfortunately, he omits to give any details of the mode. Looking through the printout, the transmission starts with a conventional CG call and includes a request for confirmation of reception followed by the character string AT. As this is the standard string to change direction on an ARQ or SITOR link, I assume that's what this station is using. The odd point about the station is that it's using the callsign RAF and is using FM audio filter technology. The two main models for audio filter systems are the FL2 and FL3 including Datong units. The two main models are the FL2 and FL3. The difference between the two models is in the provision of an automatic notch filter in the FL3 unit. The automatic notch filter is primarily for speech reception and works extremely well. The unit searches over the range 200Hz to 4kHz looking for a steady tone to lock onto. Once a suitable tone has been found, the notch filter takes over and reduces the level of the tone by at least 40dB. In my tests, this rendered the interfering tone completely inaudible.

At the heart of the FL-2 is a pair of computer optimised five-pole elliptic filters. These are configured as high and low pass filters which, when combined, create a band pass effect. As these two filters are separately adjustable, you can tailor the filters performance to match the requirements of each received signal. This gives tremendous power, well above that from even the best crystal filters. In addition to the high and low pass filters, the FL2 includes a two-pole notch filter that can be switched to operate as a peak filter.

I know how sensitive your filters were to lock onto. Once a suitable tone has been found, the notch filter takes over and reduces the level of the tone by at least 40dB. In my tests, this rendered the interfering tone completely inaudible.

For the utility listener there was a particularly effective RTTY mode. This gave an ideal response with two peaks for the f.s.k. signal and a deep notch in the centre. In fact the mode appeared so good that I took a few measurements to prove it. The results were extremely good with 40dB skirts and a deep 40dB notch in the centre. Setting the controls for this mode was also very simple. You just pressed the two buttons marked RTTY, adjusted the left and right knobs to suit, and you were ready to go. The results were extremely good with 40dB skirts and a deep 40dB notch in the centre. Setting the controls for this mode was also very simple. You just pressed the two buttons marked RTTY, adjusted the left and right knobs to suit, and you were ready to go.

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Sample print from the ERA Synoptic decoder.

**London Decode Clinic**

Those of you who caught last month’s magazine would no doubt have seen that I was running a Decode clinic at the London Pickets Lock show. This proved to be a resounding success and I was kept very busy throughout Saturday and most of Sunday. To help attract attention to the stand I set up a display station using loaned kit. The receiver was a Lowe HF-150 that was attracting plenty of interest. Those of you who caught last month’s magazine would no doubt have seen that I was running a Decode clinic at the London Pickets Lock show. This proved to be a resounding success and I was kept very busy throughout Saturday and most of Sunday. To help attract attention to the stand I set up a display station using loaned kit. The receiver was a Lowe HF-150 that was attracting plenty of interest.
The World Administrative Radio Conference (WARC) held in Spain in 1992 allocated a new band for h.f. broadcasting and extended some existing ones. The new allocations are all reserved for single sideband (s.s.b. + p.c.) broadcasting and are not officially available until the year 2007. The new 18MHz (15m) band, which extends from 18.900-19.020MHz, is already being used by Catholic broadcaster WEWN in Birmingham, Alabama to reach listeners in Europe. They have set a precedent by using a 500kW amplitude modulated (a.m.) transmitter instead of s.s.b. + p.c. as agreed.

### Medium Wave Chart

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### Short Wave Magazine, May 1993

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

Note: Entries marked with asterisk (*) were logged during daylight or at dawn.
YMT-7000
Hand-held. Probably the UK's most popular hand-held scanner!

MVT-8000
Mobile or base wide band scanner

FAIRMATE HP-2000
One of the most popular scanners on the market.

NEW YUPITERU MVT-7100
Hand-held. Covers 500kHz to 1300MHz, receiving AM/FM/ WFM with 100 memories.

ALINCO DJX1E
Wide band receiver. Covers 100kHz to 1300MHz receiving AM/FM with 100 memories.

YAESU FRG-1000
The most promising general coverage receiver yet.

AR-1500
Hand-held. Covers 500kHz to 1300MHz receiving NFM, WFM, AM and SSB.

AR-3000A
Multimode scanner - covers 100kHz-2036MHz. Modes: USB, LSB, CW, AM, FM, WFM.

AR-2000
Hand-held wide band scanning receiver 1000 memories.

GAREX ELECTRONICS

WIDEBAND SCANNERS
All major brands available, with the all-important service back-up. AOR, BLACK JAGUAR, JIL, REVO;
ICOM, YUPITERU. Also good stock of secondhand sets. Ask for A111.11XX0/2000.

WIDEBAND ANTENNAS

REVO-2000
Premium quality British VHF/UHF / dåse tone (guaranteed free from exaggerated advertising claims) 3202.29 connections.
N-type connector for improved UHF performance.
Optional vertical whip feature for experimenters.

"RADAC" nest of dipoles: imitated but not equalled. Guaranteed Tx capability over customer specified 6 bands in the range 27-470MHz, with excellent wideband Rx performance.

NEW GAREX GA-4 SERIES: 20MHz - 1GHz instrument grade amplifiers precision stripline construction.

MOBILE ANTENNAS

REVO-GA-4M, as above, but PUSCO connectors, (reduced performance)

Top quality cable and connectors also available.

WIDEBAND PRE AMPLIFIERS

NEW GAREX GA-4 SERIES: 20MHz - 1GHz instrument grade amplifiers precision stripline construction.

MOBILE CARRY CASES

REVO-GA-4M, as above, but PUSCO connectors, (reduced performance)

COMPUTER SOFTWARE

We now stock a wide range of IBM PC software, mainly aviation related but other 'games' as well. Any radio purchase over £200 entitles you to purchase any PC software within our range for £20. Choose anything from F15 Eagle III to Sub Logic's ATP or if you require something specific just ask!
their ground wave signal is weak here, Sheila Hughes (Morden) logged it as SINPO 22212 at 1445. Reception may improve after dark when their skywave signal reaches here. A 33333 rating was heard at 2226 by Vera Brindley in Woodhall Spa.

An unexpected change in propagation was noted one evening by Michael Williams in Rudhill. At 2130 he heard Atlantic 252 in Clarkstown S.Ireland clearly with no trace of co-channel Tipaza, Algeria, but half an hour later Tipaza was loud and clear and Atlantic 252 was almost inaudible!

### Medium Wave Reports

On January 31, Roy Merrall (Dunstable) heard several transatlantic signals. CJWY in St John’s on 1530 kHz was readable by 0202 UTC, on 1610 he heard the Caribbean Beacon, Anguilla at 0002. The signal was weak, but clear. Portuguese from R.Globo in Rio, Brazil was heard at 0210; VOAR as 13431 at 0328; VOCM on 1210 as 24332 at 0103; Caribbean in N.London, the signal was 24332 at 0035 and WNEW in New York 1130 as 756kHz was heard at 0015 by Jim Willett at Oxford. Just before midnight on February 6, John Wells (E.Grinstead) has noticed that BBC R.Bedfordshire (630 kHz) was heard on 1400 at 0107. On 0100 he heard Atlantic 252 in Clarkestown S.Ireland clearly with no trace of co-channel Tipaza, Algeria, but half an hour later Tipaza was loud and clear and Atlantic 252 was almost inaudible!

### Solar activity resulted in some ionospheric disturbances, fortunately they were short. Reception from many areas has been reported.

### Local Radio Chart

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

**Listeners:**
A: Leo Barr, Sandhurst
B: Vera Brindley, Woodhall Spa.
C: Geoff Crawford, Haslemere, Farnham.
D: John Eaton, Woking.
E: Barry Haynes, Bush Heath.
F: Simon Halsall, Emsworth.
G: Sheila Hughes, Morden.
H: Rachel Keen, Gosport.
I: Ross Lockley, Shirley.
J: Edie McKeown, Newry.
K: George Power, Wotton, IDW.
L: Sid Morris, Rolye Regis.
M: Graham Powell, Fompston.
N: Harry Richards, Bunt-on-Humber.
O: Tom Smyth, Co.Fermanagh.
P: Ted Watlen-Weight, St.Tymouth.
Q: John Wells, Eust Grinstead.
The 18MHz (15m) broadcast to Europe from WEUV in Birmingham, USA, on 18.930 (Eng, Du, Fr 1300-1800) 2049.

21.485 (Eng to Af 2000-2200) 55534 at 2250 by David Edwardson in Okeechobee 21.615 (Eng to Eu, Af 1600-1700) 4.870.

The hub of activity for many listeners.

35.43 at 1635 by David Edwardsen in Walsend, WcSN, ChE 21.640 (Eng to N/E.Af 1600-1900) 23333 at 1925 in Kilkeel; R.Sofia, Bulgaria 17.780 (Eng to USA on 18.930 (Eng, Du, Fr 1300-1800) 2049.

The 18MHz (15m) broadcast to Europe from WEUV in Birmingham, USA, on 18.930 (Eng, Du, Fr 1300-1800) 2049.

21.485 (Eng to Af 2000-2200) 55534 at 2250 by David Edwardson in Okeechobee 21.615 (Eng to Eu, Af 1600-1700) 4.870.

The hub of activity for many listeners.
## Long Wave Chart

### Frequencies and Stations

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### Notes
- Entries marked * were logged during darkness. All other entries were logged during daylight or at dawn/dusk.
- Also noted were R.Nederlands via Irskot, CIS 9.860 (Eng to S/Asia, 0300-1125) 24243 at 1002 in Guildford; WSHB, Cypress Creek 9.495 (Eng to E/Eu, 0900-2300) 44444 at 2200 in Edinburgh; Voice of Turkey, Ankara 9.445 (Eng to S/Asia, 2000-2300), heard at 2300 by Michael Griffin in Ross-on-Wye; UAE, Abu Dhabi 9.450 (Eng to UAE, 0700-1900) 1/2222 at 2200 by Francis Hearne in N.Bristol, R.NewZealand has been reaching US 2230-0015) 510444 at 2345 in N.Bristol.
- Amongst those noted to other areas in the day were FBC via Bocaue 11.690 (Sp to M.East, 0900-2200) 44444 at 2200 by Michael Griffin in Ross-on-Wye, also R.NewZealand has been reaching US 2230-0015) 510444 at 2345 in N.Bristol.
- FBC via Bocaue 11.690 (Sp to M.East, 0900-2200) 44444 at 2200 by Michael Griffin in Ross-on-Wye.
Probably because of the shorter ranges (under normal conditions) we ATVers tend to have little contact with our colleagues on the continent of Europe. This is a shame as we can no doubt learn from each other. For this reason, a letter and photos from Hardy HB9RRH in Niederswili came as a welcome surprise, especially as it is clear he is a keen home-brewer.

He writes, "I am active on ATV with 70 cm a.m. and 23 cm f.m. I made an entry in last September's IARU Region 1 ATV contest with a small 70 cm transmitter working with 1.2 W only. The portable transmitter weighs just 300 g, without batteries, and was developed and built by my friend HB9CSU, Dr. Hans Karl Sturm. Hans Karl has just completed a fine repeater, the HB9FW, situated 790 m above sea level. It is about 3 km from my QTH, which is at JN47NK.

"Repeater input is 23 cm f.m. on 1274 MHz, or 23 cm a.m. on 70 cm a.m. with 60 W sync power on 432.350MHz picture, 437.850 MHz sound. The antennas for 23 cm and 70 cm are slotted tubes, arranged as a four-antenna system on each band, all home-made. The pre-amp is 20 dB. The relay covers the region of eastern Switzerland as far as Ulm in Germany. It is intended to make a link-up with the repeater DB5KV situated near Friedrichshafen on Lake Constance. We are awaiting permission from the post offices of Germany and Switzerland.

"Apart from the repeater, I am quite often QRV from the top of some mountains. German amateurs have relayed my transmissions on several occasions as far as Munich as have been active from a mountain some 1500 m above sea level, sending pictures of hang-giders starting from snow-covered slopes. It was a real thrill to us all. Two years ago I went together with my son to the Zugspitze, which at nearly 3000 m is the highest mountain in Germany (near Garmisch-Partenkirchen). Hans Karl was able to receive my 70 cm transmission in a loud and clear he is a keen home-brewer.

More Repeater News - In Birmingham

G8EMX is putting out a lively bulletin giving details of progress with the new Birmingham repeater. "I am pleased to announce a MAJOR DEVELOPMENT," he writes. So it must be good if it warrants 36-point capitals. No, I must not jest, because it seems things are bubbling in Birmingham. The Midland Amateur Radio Society (MARS) have given their willing agreement for the TV repeater group to mount an Aftord Slot repeater on top of their club HQ for TV coverage trials. Thursday evenings and Saturdays are the most likely times for access. The site is about half a mile north-west of Colmore Circus and it is likely to replace a previous location planned. At this stage it is not clear what propagation is likely to be from the new site, so trials are to go ahead in fact they should have started by now. G8EMX ends his newsletter with a very shrewd note: "We need ATV activity on both bands (70cm and 24cm). That's right - don't write off 70cm yet!"

...And In Bristol

The latest edition of P5 the Severnside Group's newsletter, has arrived and gives details of their 10GHz TV repeater trials. Shaun O'Sullivan G8VPG writes, 'Work on our proposed 10GHz amateur television repeater continues to progress. A major milestone was passed on November 29 last, when the first site trials were carried out. Ted G3JMY, Ivor G1XJF and Viv G1XKE assembled on the proposed site and set up a transmitter operating on 10.15GHz, which the expected output frequency. The antenna used was the slotted waveguide that the repeater will utilise. It was a typical cold November afternoon, but thankfully the rain that we had been having rather a lot of at that time had stopped. "A number of people with 10GHz receiving equipment were eagerly awaiting the switch-on to see if the signals were watchable. For receive everyone was using converted satellite TV LNBS in conjunction with dish antennas of varying sizes. The reports received were very encouraging and suggest we should obtain good coverage of the Bristol area. Roy G3FYX at home in Winterbourne sent in a P5, commenting that more deviation was required. This was a comment everybody made and a suitable adjustment will be made to the transmitter in due course.

"Phil G1HIA at home in Horfield reported a P4, John G3RFL, at home in Portishead saw between a P0 to P3 with fading, which I think surprised even him. Ken G4BVK at home in Hanham utilised his main steerable 1.2m satellite dish but still could not see anything (later investigations showed one of the stages in his LNB was not working). Finally, Steve G8KUV dashed round /portable to various sites in the Filton area but also drew a blank.

"The results form the day's work will enable us to produce the necessary area coverage map and complete the licence application forms. However, we must first get formal permission to use the site. It is a super site which is the reason why we are keeping it a secret until we have our licence. All will be revealed in due course!"

Last Word

It appears there may be another ATV repeater in London, this time in central London. There's a whisper that Imperial College is considering a 24cm repeater at its South Kensington location (perhaps on the roof of the Imperial Institute tower?). I'll let you know when there's any more news.
Many Radio Amateurs and SWLs are puzzled. Just what are all those strange signals you can hear but not identify on the Short Wave Bands? A few of them such as CW, RTTY, Packet and Amtor you'll know — but what about the many other signals?

HOKA ELECTRONICS HAVE THE ANSWER! There are some well-known CW/RTTY decoders with limited facilities and high prices, complete with expensive PROMs for upgrading etc., but then there is CODE3 from Hoka Electronics! It's up to you to make the choice but it will be easy once you know more about Code3. Code3 works on any IBM-compatible computer with MS-DOS 2.0 or later and having at least 640K of RAM. The Code3 hardware includes a digital FSK Converter unit with built-in 230V AC power supply and RS232 cable, ready to use. You'll also get the best software ever made to decode all kinds of data transmissions. Code3 is the most sophisticated decoder available and the best news of all is that it only costs £3291.

- RTTY: Baudot/Nurnberg/CYTA/CCITT2 plus all bit inversions.
- SITOR - CCIR 625/476-4. ARO. SBRS/CBRS FEC, NAVTEX etc.
- AEC3 packet with selective call monitoring, 320 Baud
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- Autospec - Max 3 and 24 with all known interfaces.
- DUP-ARO 1/2/4 R30000 Duplex
- Duplex - 100 Baud F76C Simplex ARQ
- ASCII - CCITZ & variable character length/parity.
- ARQ-M0/90 - 760 Baud Simplex ARQ
- SI-ARQ/A005 - AR1005 simplex
- SWED-ARD/ARD-SWE - CCR 518 variant
- ARQ-40000/1200 Duplex
- ARQ H - AR50000 Duplex variant, ARQ-12000
- ARQ H - CCR 518 variant
- POL-ARQ - 150 baud Duplex ARQ
- TDM24/ARD-MQ24/2-256 CCR 242 with 1/2 on 4/4
- TDM24/ARD-MQ24 CCR 32/2 with 1/24 channels
- FEC-A - FEC100A/FEC101
- FEC-S - FEC100/FEC101
- Sports Info. 300 Baud ASCII FB/RC
- Hellscreiber - Synch./Asynch.
- SITOR RAW - (Normal Sitar but without synchronisation)
- ARQ-73
- Amtor FT89K
- Packet - coming soon!
- SYNOP RTTY Decoder - coming soon!

All the above modes are pre-set with the most commonly seen baudrate setting and number of channels which can be easily changed at will whilst decoding. Multi-channel systems display ALL channels on screen at the same time. Split screen with one window continuously displaying channel control signal status e.g. idle. Automatic USP - English, French, Spanish, etc. All with a great character set and resolution. Please add £5 to the above prices for carriage to fully insured First Class Postal delivery (default method).

Call or write for our comprehensive information leaflet — there is just not enough room here to tell you everything about Code3! Professional users — please ask about our new CODE30 DSP unit available now! (Piccolo down to -12dB S/N!!) Prices start from £1375.
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Amana air conditioner, room size, window or wall mounting, used 3 hours last summer, still under warranty, £450. Swap 386 25MHz PC, SVGA monitor, HD. Tel: 081-842 1564.

AOR AR-1500 wide band receiver, less than one year old, excellent condition, original packing, etc., frequency guide included, £200. John. Tel: (0252) 621573 evening and weekends, Hants.

AOR AR-1500E, factory modified, 1000 memories, a.m., f.m., s.s.b., 8 months old, hardly used, new condition, £195 bargain, complete with factory supplied circuit diagrams. Tel: (0523) 525523 quota page No. 615183.

AOR AR-2001 base scanner, 25-550MHz, a.m.f.m.w.m., immaculate condition, still in original box, hardly used, includes accessories, excellent on airbands. Reluctant sale due to redundancy. Can arrange delivery, £15 o.n.o. Jim Wright. 192 Church Lane, Winslow, Buckinghamshire.

AOR AR-3000A communications receiver only 6 months old (passing fad), under warranty, boxed, mint condition, the best scanner about £600. Walker & Leach receiver 35A plus r.f. tuners, £50. 081-942 1564.

Bearcat DX-1000 h.f. receiver 10kHz-30MHz microprocessor controlled a.m., s.s.b.f.m., good condition, boxed, £250 o.n.o. ERA RS222 display, £100 o.n.o. Olivetti PR15 printer, £25 o.n.o. Tel: (0253) 860727 Blackpool.

Complete h.f. station, new never used, Trio TS-820S, Trio speaker 820, Kenwood station monitor SM220, Decca Superswitch K1017, 1010, 'Highgain' 1BA Turbostar cost new £1440, sell £690 o.n.o. Tel: (0202) 707013.

D707 base antenna, 500kHz-150MHz with 20dB pre-amp, 1m long glass fibre cased, requires 12v d.c. supply, only one month old (£99 new). Bargain at £5. Rob Adams. Tel: (0252) 878787.

Dartcom weather satellite receiver complete - dish, v.h.f. antenna, microprocessor controlled receiver, latest software and handbooks, needs 286 PC or better. Can be seen working. Bargain, £1600 e.g.p. (0273). Tel: (0276) 856868 anytime, Woking, Surrey.

Drahe R80 receiver, mint, as new, still under guarantee, boxed with manual, £795. Dewsbury DM1000 Easyread, RTTY decoder version 3 with SITOR B & FEC, boxed as new, under guarantee, £190. Carriage extra. Tel: 081-570 5603.

Edystone 1837/2 digital general coverage receiver, 5 filters, s.s.b./s.u.b./i.s.b. 10kHZ-31MHz, excellent performance, £300. Panasonic DR-28 digital, m.w./l.w.-f.m. 3-30MHz table model, wide/narrow filter, very sensitive, u.s.b./l.s.b. looks works like new, £95. 081-813 9193 London.

Edystone Model 40A noise measuring set, mains, battery, 130kHz-30MHz, 8 separate ranges, fully transistorised, ideal for the experimenter including two technical manuals, £10 or v.n.o. Len. Tel: (0752) 343074.

Edystone S870A, £30, working Sony ICF-2001D, as new, 2 weeks old, boxed with AN1 active antenna, £200 o.n.o. Yupiteru MTV-700 as new, boxed, case, £180. Pete G1RVP. Tel: (0329) 382570 Darlingston.

Era Microreader Mk2, latest revision 4.1 firmware receives SITOR and FEC as well as RTTY and Morse, £120. Colin. Tel: (0392) 488636 Radiang.

Grundig 650 Satellite boxed as new with instructions, £265. Tel: 071-613 0103.


Icom IC-R7000 with h.f. converter, £700 or exchange for Icom IC-71E or Kenwood 5000. 081 (0286) 818664 after 5pm Westhoughton.


ICS FAX-1 weather map decoder, print maps direct to printer, as new, only 14 months old, with cables, manual and power supply, can be seen working, £225. G6XNG. Tel: (0272) 615713 Bristol.

Interpretation of weather maps and charts, as reviewed in Short Wave Magazine, £6.50 post paid UK. Philip C. Mitchell, 2 The Marlowes, Newbury, Berks RG14 1AY.

JRC NRD-525, RTTY board, RS232 interface, a.t.u. plus original boxes, complete with PC 20M mono plus software to control plus scan, £895 complete. Can be seen in action. Dave GIDY. Tel: 0597 (549) 9553 95m-9pm weekdays.

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Kenwood R2000 receiver, immaculate condition, still boxed, buyer collects, £250. Jeff. Tel: (0773) 747786 Central Derbyshire.

Kenwood/Trio 2000 with v.h.f., good order, £250. Tel: (0266) 762398 Essex.


Lowe HF-150 complete with power supply, telescopic antenna, manual plus MLB plus Kenwood HS-5 phones, £250 or will split. Buyer collects. Tel: 0896 80979 after 6pm, Beverley, North Humberside.

Lowe RF Systems RX antenna T2FDF unpacked only, £75 location too small. Or exchange for SEM QRM Eliminator. P H Boone, 19 Queens Road, Budleigh Salterton, Devon EX9 6GS. Tel: (0928) 443073.

Marconi CR100 general coverage receiver, good condition, £70. Marconi VIVM, £12. Knight VIVM, £10. Various valvevalories, £10-15, allin working order. Tel: 081-9627577 anytime, Manchester.

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Seagate ATS-803A little used, boxed, £65 inc P&P. Also Realistic DX-360 broadcast bands only, boxed in good condition, £279 inc P&P. Bob Chester. Tel: 02044 310271 evenings.

Sony ICF-2001, Datong FL filter, Search S9B 2m RX, XM 435/400 converter, Pye F1 pocket-phones plus Nightcall charger, home-built h.f. a.t.u., no sensible offers refused. Barry G4AAT. Tel: (0254) 682487 evenings, Lancashire.

Sony ICF-2001D boxed, very good condition, £190. AOR AR150 scanner boxed, new condition, £240. Post extra or buyer collects. Tel: (0274) 872505 evenings.


Sony ICF-2SW55 general coverage radio, 6 weeks old, as new, £2010 o.n.o. Tel: (0508) 844168 after 6pm.

Sony ICF-SW7600 l.w., m.w., s.w., f.m., stereo in mint condition, with all accessories, £90. Tel: 081-855 3622 Welling.

Timestep Meteosat framestore, £150 o.n.o. Black and white 12in monitor, £100. WIN 10B airband receiver, £75. Skyview FAX, £25. Ian. Tel: (0959) 632289.

Philip D2835 World Receiver, am. 150kHz-20MHz, f.m. 88-108MHz, boxed with instructions, much loved! One year old, hence £90 o.n.o. Julian. Tel: (0903) 506866 after 1700hrs, Worthing.

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The author has had a radio school for the last 12 years and has helped thousands qualify for their v.h.f. and s.s.b. certificates.
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This offer is open until 4 June 1993.

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