**JRC NRD 345G**

A cracking new receiver aimed at the Broadcast and Shortwave listener. JRC build some of the World’s finest receivers and this is no exception. Designed to give clarity and interference free reception.

- AM synchronous detector
- Low noise PLL chip
- Wide dynamic range
- Sensitive receiver
- Noise blanker
- RS323 computer I/F
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- Clock/Timer functions
- Supplied c/w AC mains adaptor

Priced at £699.00

**ICOM 8500**

ICOM’s TOP OF THE RANGE receiver! ICOM are ICOM ‘MAIN’ DEALERS

- 100kHz - 2GHz
- 1000 memories
- RS 232 computer interface
- SSB, CW, FM, WFM, AM
- Audio filter
- IF Shift

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ICOM’S NEW COMPUTER RADIO SYSTEM

- 100kHz - 1200MHz
- All mode reception
- Plus LOTS MORE!
- NEW
- PCR OPTION
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- UT 106

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**DRAKE SW2**

A new low cost receiver with exceptional sensitivity, selectivity and dynamic range.

- 100kHz - 30MHz
- AMSSB
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- Dual antenna inputs
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**YAESU FRG-100**

This receiver provides solid coverage from 50kHz to 30MHz with all mode reception of AM, SSB and CW. 50 fully tunable memory channels store frequency, mode and filter selections. The FRG-100 has twin 12 hour and 24 hour programmable clocks with on timer and sleep timer. The set requires 12V DC.

FM option available - add £39

**YUPITERU MVT 3300EU**

An exciting new handheld packed with features - but at a price you can afford! The receiver has “breathtaking performance” ensuring this set is destined to be a number one seller

- FREQUENCY: 66 - 88MHz, 300 - 470MHz
- MODES: AM/N
- STEPS: 5.6, 25kHz
- MEMORIES: 200
- BAND MEMORIES: 10
- SCAN SEARCH SPEED: 30 per sec
- POWER: Requires 4 x AA batteries
- SUPPLIED WITH: Antenna. Earpiece. Carrying Strap and built-in Desk Stand

Priced at £179.95

**YUPITERU MVT 7100 EU**

Probably the most popular high end Scanner. It’s easy to use and can receive just about anything going!

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- 1000 Memories
- Ow NiCads & charger

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- SELECTABLE CONTROL BEEP TONE
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- MAINS DROP IN CHARGER
- For easy and convenient use
- NICAD BATTERY PACK
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OPTIONAL EXTRAS
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that's easy to use with
TURBO SCAN and wide
coverage.
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- 100 memories
- Supplied c/w
NiCad & charger

UBC 220XLIT
A Wideband Scanner
covering Aircraft, Land
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Easy to use with the
famous Bearcat reliability
and performance.
- 66-956MHz (with gaps)
- 2000 Memories
- Supplied c/w
NiCad & charger

AOR AR8000
STILL the No1 seller!
- All mode - FM, WFM, SSB, CW, AM RX
- Newly designed 'BUSY
CATCH SCAN'
- (0.5MHz - 1300MHz)
- 1000 memory channels
- C/w NiCad & charger

ICOM IC-R10
- All mode - FM, WFM, SSB, CW, AM RX
- Newly designed 'BUSY
CATCH SCAN'
- (0.5MHz - 1300MHz)
- 1000 memory channels
- (Voice Scan Control)
- Full computer access
capability
- Auto mode & tuning step
- 4 AA NiCads or
4.5-16V ex power supply

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- 600 memories
- 1000 frequency lockout
- Built-in PC interface
- Capture 5 watt UHF signal from 800 feet

R11 Test Receiver:
- 30kHz - 2GHz wide band receiver
- Built-in speaker for inbuilt audio demodulation
- 50Hz frequency range and position display
- Reaction Time with Readout
- Capture 5 watt UHF signal from 800 feet
- 1000 frequency lockout

OS456/535

PC Control

OS486 / OS335:
Computer control of scanning interface board for the popular RadioShack Pro 2005/6 and Pro 3050/42

Optolinx Universal Interface:
Perfect interface to connect the frequency from Scout to a PC, or computer control the ICQM R7000, R7100, R6900, R9000, R110 and also the AOR AN6000. Use built-in data recorder output for use with Transmitter software. (Transmitter software not included with Optolinx)

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- 1MHz - 2GHz
- Storries 400 frequencies in memory
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R11

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M1

W

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Short Wave Magazine, July 1998
Air Tattoo Competition Winners

The following readers have won tickets to the International Air Tattoo, which is being held over the weekend of 25-26th July 1998.

Mr I. Fairman, Swansea
J. Pluquet, Hampshire
Mr M. Andrews, W. Midlands
C.K. Usher, Essex
R. Mason, Bournemouth
Roy Medcalf, Warwick
Mr T.A. Ledger, W. Yorkshire
Reginald Featherstone, Nr. Sheffield
T.F. Minns, Dorset
Peter Charante, Roxburghshire
Mr M. Morley, Wolverhampton
I.N. Scott-Dunn, Cheshire
Frank Lowe, Wigan
Alan Moulsdale, South Glos
Mr L.T. Burgess, Scotland

Well done and we hope you enjoy the show!

RAE Course

Interested in Amateur Radio? Do you want to become a Radio Amateur and transmit your signals to other Radio Amateurs all over the world? Then now's the time to enrol for the Radio Amateurs Examination Course held at Huntington School in York on 1st July 1998. The course will be held on Tuesday evenings, commencing on 15th September leading to the Radio Amateurs Examination Course held at Huntington School in York on 1st July 1998. The course will be held on Tuesday evenings, commencing on 15th September leading to the City & Guilds RAE in May 1999. The course tutor will be Tony Skaife G4XIV and he can be contacted for further details on (01904) 330502.

RADIO & TVDX NEWS

Less than wonderful news - though not unexpected - for TVDXers. The Spanish telecoms authorities in Madrid confirm that their terrestrial digital TV bill should be government approved by September '98 and that all analogue TV transmissions will cease by 2010. The present timetable suggests that by January '99 terrestrial digital TV will be reaching to 50% population, 70% in 2000 and 95% by 2008. The commercial channels Tele 5 and Antena 3 will have to simulcast analogue/digital by April 2002 and Canal+ by April 2003.

The cellular press reports a recent court case where a motorist attended the Knightsbridge, London court for using a radar detector, the police claiming that such devices are illegal. The motorist challenged the police understanding of the law and learned evidence eventually ruled on the side of the motorist in that the radar device 'detected' transmissions rather than 'received' them, the radar device merely noting the existence of such transmissions. Had the court decided the radar detector was illegal to use, so would the countless microwave oven leakage detectors found in repair shops and councils' environmental health departments have also been illegal to use! Lord Justice Simon Brown

SMALL & POWERFUL!

THE SL ONCORE GPS RECEIVER

The smallest Oncore GPS receiver available to date, the SL Oncore, has recently been launched by Motorola. The SL Oncore GPS receiver has been designed specifically for automotive OEMs and system integrators. Although measuring only 40 x 80 x 12.2mm and weighing just 22g, the new GPS receiver delivers maximum performance and configuration flexibility.

The GPS has been built using high speed Motorola Integrated Circuits and like all Motorola Oncore receivers, the SL Oncore also offers fast start up times, signal requisition in a split second, simultaneous eight satellite tracking capabilities (typically the most in view at any given time) and enhanced performance in environments such as built up areas or dense foliage.

The product is available with a bulkhead SMB antenna connector for mounting the receiver, which allows the connector to extend through the system housing and eliminates the need for an expensive interconnecting cable within the housing. Additional options include a right-angled OX antenna connector and a rechargeable/replaceable battery for retention of time, position and satellite data for rapid start ups.

If you would like to find out more about the Motorola GPS receivers, a full list of European Distributors can be obtained from Tina Connolly at Motorola's Automotive, Components, Computer & Energy Sector, 27 Market Street, Maidenhead, Berkshire, Tel: +44 (0) 1628 763260, FAX: +44 (0) 1628 637059.

A BIG HIT!

The new AOR AR8200 hand-held scanner was a big hit at this year's Dayton Hamvention, with large crowds around the AOR stand. Pictured here is Phil Jeffery, Commercial Manager of Nevada Communications, who managed to get his hands on the radio before the show opened.

Phil commented "We believe this radio will quickly become the UK's most popular scanner, Nevada has ordered large quantities which should be arriving shortly". Judging from the reaction at Dayton, he could be right!

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and Mr. Justice Marice ruled that the radar detector devices are now covered by the Wireless Telegraphy Apparatus (Receivers) (Exemption) Regulations (SI 1989 No. 123) and as such is law. Legislation will be required to change this ruling.

Australia will allow her three existing national commercial TV free-to-air channels freedom of competition when they open digital transmissions - at least until 2008 when a fourth network will be given access to the digital spectrum. HDTV is timetabled to open Jan 1, 2000, the situation and progress of digital/HDTV will be reviewed during 2005.

Though it's rare these days to see a test card on any UK TV network, Snell and Wilcox have been working alongside the UK broadcasters to produce a test card suitable for the digital era. And so Test Card M has appeared - with certain familiar component parts - which will provide suitable test and measurement of the transmission path to help maintain quality standards. Industry views are sought and the Test Card M may change slightly in the near future (is it M for MPEG?).

NEW DXTV CONVERTER

A completely restyled D-100 DXTV Converter is now available from HS Publications. Known as the DE LUXE, it is simple to operate and allows multistem TV sound via an f.m. radio. It has easy-to-read tuning scales calibrated in DX channels and covers virtually all v.h.f. and u.h.f. terrestrial frequencies, including special Russian and CIS channels in band II. However, it's main feature is variable vision i.f. bandwidth reduction. A reduced bandwidth lifts the reception threshold thus helping to resolve weak signals that are normally lost in the noise when using a conventional TV with its inherently wide i.f. bandwidth.

Selectivity is improved too, thus helping to separate interleaved DX channels in Bands I and III. Automatic gain and i.f. bandwidth control maintains optimum picture definition when widely fluctuating signal strengths are encountered, for example, during Sporadic-E openings. It also includes an automatic band-scanning facility, which is useful when a Sporadic-E opening is imminent and there is an output for an optional DX signal alarm module which emits a tone immediately reception occurs.

The new D-100 DE LUXE DXTV Converter.

The Milton Keynes Amateur Radio Society are holding their Annual Radio Rally at Bletchley Park Museum on Sunday 13 September 1998 starting at 9am. Entry fee is £1 and as usual there will be full refreshments and all facilities, including Morse tests on demand, talk-in on 145.550 and 433.550MHz.

The Museum will be specially opened for those who wish to look around it and this will be at the extra charge of only £1. More details from Dave G3ZPA on (01908) 501310 or Verdon GÖRKV on (01908) 672920.

Annual Radio Rally

Stand Alone

As UK distributor of Advanced Stand Alone Prediction System (ASAPS), the professional grade h.f. propagation prediction program from IPS Radio and Space Services, Simon Collings announces a new version of this package: ASAPS continues to be P&R. An upgrade from DOS v2.0 and any previous Windows version is only £21.50 + £2.50 P&P.

A demonstration of the package can be downloaded from the website or may be obtained on floppy disk by sending:

Simon Collings, Radio Communications Consultant, 46 St Michaels Road, Cheltenham, Gloucestershire GL5 5RR, Tel/FAX: (01242) 541429, E-mail: simon.collings@cable.net.co.uk, Website: http://wkweb4.cableinet.co.uk/simon.collings

rallies

June 28: The Horncastle Rally is to be held at Horncastle Youth Centre. This Rally is held as a joint venture between the Youth Centre and the Fenland Repeater Group. The Rally is held on one level with very good covers for disabled visitors. Food and drink is available, including the now legendary Horncastle Bacon Butties. Tables are only £2 for six foot table (bookable and payable in advance). Cheque or bank transfer should be made payable to the Horncastle Youth Club, joint to; HS Publications. Known as the DE LUXE, it is simple to operate and allows multi-system TV sound via an f.m. radio.

July 5: The 9th York Radio Rally will be held in the Knavesworth Building, York Racecourse, York. Doors open at 1000 and admission is £1.50. Children accompanied by an adult go free and there is ample free car parking. There will be Amateur Radio, electronics and computers, Morse tests and repeater groups, refreshments and a licensed bar. Talk-in on S22, Further details from Pat Trask GODRF on (01904) 628036.

July 5: The 7th Sussex Amateur Radio & Computer Fair will take place at the Brighton Race Course from 1000 to 1600. There will be free on-site parking and admission to the event is £2. The rally is one of the largest in the South of England with over 100 trade stands covering Amateur Radio and CB radio, computer and electronics, etc. There is also a large B&Q display area. Refreshments and bars at reasonable prices and a picnic area with views over the South Downs makes this a rally not to be missed! Further details on (01273) 486704.

July 19: The McMichael Mobile Rally will be held at the Haymill Youth Centre, 112 Burnham Lane, Slough, Doors open at 1000. There will be trade stands, car boot sale, food and licensed facilities. Talk-in on S22. There will be disabled facilities also. Dave Chalita on (01628) 625720 or for information on bookings, ring (0118) 972 3504.

July 26: The Colchester Radio & Computer Rally is to be held at St. Helena School, Sheepen Road, Colchester, adjacent to the Colchester bypass, Avenue of Remembrance. Doors open 1000 till 1600. There will be a wide range of radio and computer traders, amateur Radio, car boot sale and a Bingo &razy. RSGB Morse Tests on demand - don't forget to bring two passes and a passport size photo. Admission is £1.50. There will be simple free parking and disabled parking which is adjacent to the entrance with full access for wheelchair users. Contact Len Brackstone on 46 St Michaels Road, Colchester, adjacent to the Colchester bypass, Avenue of Remembrance. Doors open 1000 till 1600. There will be a wide range of radio and computer traders, amateur Radio, car boot sale and a Bingo &razy. RSGB Morse Tests on demand - don't forget to bring two passes and a passport size photo. Admission is £1.50. There will be simple free parking and disabled parking which is adjacent to the entrance with full access for wheelchair users. Contact Len Brackstone on (01206) 486704.

Part of Bletchley Park Radio Rally outside the Mansion back in the summer of 1997.
New Editions

Now available from the Danish Shortwave Club International (DSWCI) are the new editions of the annual publications for DXers, the Tropical Bands Survey (TBS), edited in its 26th edition by DSWCI Chairman Anker Peterson and the Clandestine Stations List (CSL), now in its 14th revision, is edited by Finn Krone.

To obtain your copies, contact DSWCI, c/o Bent Nielsen, Egekrogen 14, DK 3500 Vaerloese, Denmark. Costs are: 50 DKK, 8 USD, 5 GBP, 13 DEM of 10 IRCs per issue. However, if a DX club orders a total of 20 copies or more, a 15% discount is given. Cash notes are accepted.

FREEDOM 10

The New Freedom 10 combination charger/invertor from Merlin Equipment is a complete power system in just one box! Designed for use in vehicles, boats, PV installations, remote locations and wherever mobile a.c. power is required, the Freedom 10 simply and silently converts 12 or 24V d.c. battery power to 230V a.c. mains electricity allowing the operation of computer, catering, communication audio visual, test and domestic equipment with the noise, hassle and expense of a generator. As soon as an outside source of power becomes available (i.e. a vehicle returns back to base) the unit automatically switches over to start charging the battery.

The highly efficient invertor utilises proven switchmode technology to provide up to 1kW of power continuously. However, appliances as large as 2kW can be operated for up to 10 minutes thanks to generous built-in surge capabilities.

Unlike most other combination charger/invertor units on the market, the Freedom 10's battery charger uses three stage charging techniques to ensure the batteries are charged in accordance to manufacturer's recommendations. These stages are called bulk, absorption and float modes.

Installation of the unit is very straightforward. Just three main connections are needed: a.c. input, a.c. output and d.c. connections. Even 4m of heavy duty cable is supplied for direct connection to the battery bank. Prices start at just £799, which is considerably less than a standalone 50A three stage battery charger and 1000W invertor.

To find out more about the Freedom 10's advanced functions, why not contact them direct at The Merlin Group, Unit 1 Hithercroft Court, Lupton Road, Wallingford, Oxfordshire OX10 9BT, Tel: (01491) 824333 or FAX: (01491) 824466.

PACK THAT TRUNK WITH OPTO

It is with baited breath that the UK scanning community await the launch of two new offerings from Optoelectronics, the Floridian radio specialists. The OPTOTRAKKER and the OPTOCOM will allow enthusiasts to monitor European trunked system. Something the disappointing Uniden BC235XLT failed to deliver since it only operated on the 800MHz band, which is fine for stateside traffic, but of little use in continental Europe.

Both Optoelectronics products allow the users to track Motorola systems. The OPTOTRAKKER is used in conjunction with a scanning receiver that allows computer control such as an AOR, Icom or suitably equipped Radio Shack unit. OPTOCOM is a high speed computer controlled receiver capable of scanning at a rate of 100 channels per second. Contained within, are the essential components of the OPTOTRAKKER allowing the receiver to also perform the Motorola trunked system monitoring functions.

Both of forthcoming products will be available from the usual Optoelectronics outlets. More information can be obtained from the web site at www.optoelectronics.com or via Haydon Communications Tel: 0181-951 5781, Nevada Communications Tel: (01705) 690626, or Waters & Stanton Electronics Tel: (01702) 206835. Keep a close eye on SWM for reviews of these products just as soon as they are released.
Now available from Icom (UK) Ltd., specialists in the field of radio communications, is the IC-Q7, the latest hand-held 2m/70cm f.m. transceiver to excite even the most seasoned amateur operator. The tiny IC-Q7 is a 300mW r.f. output transceiver incorporating a wide band receiver covering 30 to 1300MHz and capable of reception in a.m., f.m. and w.b.f.m. modes.

This state-of-the-art product with its ultra compact and lightweight design fits neatly in the palm of a hand or in a shirt pocket allowing excellent freedom of movement. The IC-Q7 is the perfect choice for those who require local operation and at a cost of only £215, it represents excellent value for money.

More information about the IC-Q7 is obtainable from Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD, Tel: (01227) 741741, Fax: (01227) 741742, E-mail: icomsales@icomuk.co.uk

RADIO AMATEUR AWARD

Communicate have recently heard from Roy Smyth GI4XCG, who has taken over as the Award Manager for the ‘Worked All GP’ (WAGI) Award. So, what are the rules?

Well, here they are: 1) the award is open to licensed amateurs and s.w.l.s. (on a heard basis), 2) all bands, 1.8 to 1296MHz, 3) cards must be for valid contacts on or after 1st January 1979 (1-1-79), 4) contacts via terrestrial repeaters or with mobile stations are not valid for the award, 5) the award will be endorsed as follows: A, mode, c.w., ss.b., RTTY, mixed, etc., B, Band, h.f. or v.h.f. (but not a mixture of both and 6) a check list of QSLs set out in log form and certified by two licensed amateurs or photocopies of QSLs must be submitted with all applications. Do not send QSLs!

The costs are as follows: Europe £3.50 (10 IRCs), outside Europe £4, US$7 or 12 IRCs. Payment to accompany all applications. Northern Ireland consists of six counties. These are: Antrim, Londonderry, Tyrone, Armagh, Down and Fermanagh. Please not that the city of Belfast is divided by the River Lagan into Co. Antrim and Co. Down.

Stations outside Europe require the following cards: two from each of Co. Antrim and Co. Down, one from each of the four remaining countries, thus making a total of 16 cards.

Applications for the award should be forwarded to: The Award Manager - WAGI, Roy Smyth GI4XCG, 58 Gilnahirk Road, Belfast, N. Ireland B7S 7DH.

FEEDBACK REDUCES PRICES

Feedback Instruments Ltd. can now supply the top quality Kenwood PAC and PAC-R regulated d.c. power supplies, extensively used by test engineers, universities, schools and electronics enthusiasts, at new, low prices, starting from as little as £122 for the PAC20-3. The range of six power supplies includes instruments with 20, 30 or 60V output at currents from 1 to 3A. All have low ripple and low noise characteristics, simultaneous setting and display of voltage and current with a 3 digit i.e.d. display for each and floating output terminals.

Four of the range - the PAC-R series - have remote control terminals on the rear panel, which can be used for the control of output voltage and current by external resistance or voltage. These PAC-R models also offer series/parallel operation, by which the output current can be increased by series operation and the output voltage by parallel operation, and a remote sensing terminal facility by which the PAC-R power supply allows monitoring of voltage at the load to stabilise the output voltage at the load.

Engineers and enthusiasts interested in taking advantage of the new low prices can reach Feedback Instruments on (01982) 653322.

SMC OPEN DAY

We have just been informed that SMC Ltd will be holding their usual annual open day at their Charders Ford HQ on Saturday 1st August. For more information Tel: Ailsa on (01703) 251549.

DOUBLE CELEBRATION

TransMissioner, FEBA Radio's exciting initiative to encourage support for Christian Radio, recently had cause for a double celebration. Both its first anniversary and its 400th member! TransMissioners is a group of people who have joined together in helping thousands of people in Africa, Asia and the Middle East hear the Gospel by radio.

Each month members of TransMissioners support a different radio programme - in a different language - by prayer and giving. Stations sponsor two minutes of broadcast time at £7 each month.

Programmes in Arabic, Hindi, Tibetan and Swahili are some of those that have been supported over the last year.

A regular flow of information about programmes and sponsors helps members to be closely involved with what they're supporting. They are also kept up-to-date with news about programmes they have already supported, showing how Christian lives are changed through radio.

If you would like to know more about TransMissioner, please contact TransMissioners, FEBA Radio, Ivy Arch, Worthing, West Sussex BN14 8BX. Tel: (0903) 237281 (24 hours) or E-mail: reception@feba.org.uk

SEND YOUR NEWS TO ZOE CRABB AT THE EDITORIAL OFFICES
ed's comments

The WEB We Weave

Many of you will be glad to know that we now have a web site and I guess some of you won't. The URL for our site is www.pwpublishing.ltd.uk This takes you to the main contents page for both SWM and our sister magazine PW. Take a look, if you have Internet access, and let me have your comments. The site will be developed considerably over the coming months, so keep an eye on what's happening. It is possible, to contact us here in the Editorial Offices, buy books and subscribe via the site as well as checking out what's coming up in future issues.

QRZ de G7TZC

Hi there everybody. Welcome to the first issue of Short Wave Magazine with yours truly at the controls. First-off I'd like to thank Dick for all his efforts over the past 147 issues, what a great job he's done transforming an ailing amateur radio magazine into a very successful listeners' monthly compulsion. On a personal note I'd like to thank him for bringing me on board and hence, allowing me to sit here composing this editorial piece. I sincerely hope that I too can have the same magnitude of influence on the success of this prestigious listeners' monthly bible - I certainly intend that I will!

It is now many years ago that a tender thirteen year old saved up for eight months, after having tinkered with many portable radios with 'short wave' coverage, to buy his first 'real' communications receiver. I remember well writing to a then, regular advertiser in SWM, the late Jack Tweedy, to ask what second-hand equipment he had available that was suitable for a keen fledgling s.w.l. Jack's prompt response had me visiting his 22 mile distant Woodhall Spa emporium to view the suggested radio. On offer, was a used, but clean Trio 9RS9DE. It was love at first sight - Sold! Many radios, much encouragement, and lots of years later here I am. In a position that even that youthful, totally committed short wave enthusiast never imagined possible.

I owe great thanks to many people to mention but a few, my departed grandparents Frank and Olive for much enthusiasm and hobby, related Christmas and birthday presents, my parents for so much patience and for allowing me to erect dubious antennas around the garden and fill their home with, "radio junk". In PW terms, my two Elmers, unfortunately both are now operating from that great shack in the sky, Tony G3JIN and Bob G3UNR, collectively they must have been blessed with the patience of Job as neither ever tired of my perpetual company and questions. Finally my school friends Chris Archer (now G4VFK) and David Dean for sharing interests and providing essential good friendship.

Coming Up

I genuinely want to know what you, the reason for all our efforts, the readers actually think about SWM. To this end, there will be a Reader Survey included in August's issue. Please, please take the time to fill it in so that your views can be heard. As an additional incentive, I have organised a prize draw, with a first prize of both, an RP Systems' active antenna and a Yupiteru MVT-7100 scanner. So watch out for the August SWM and be heard! Broadcast listeners will also be delighted to know that the latest Global Radio Guide will also be included free to UK readers.

Kevin Nice
Dear Sir

I am writing to compliment you on the improvements to SWM over the last few months. Reading the comments made by G.E.R. Denman and others in your Letters page, one might wonder what exactly they want from the magazine. Radio as a hobby is facing greater competition from other activities such as home computing and the Internet than ever, it also appears to me that the age of the average radio enthusiast is ever increasing. Unless 'new blood' is attracted to the hobby, in time it risks disappearing.

Unjustified whingeing will only hurt an already ailing pastime. Reviewing out of production receivers is not a waste of time - there may be many readers who do not have the funds to afford a new piece of equipment, and who may manage to purchase a used receiver. We are not all old enough to remember when the likes of the RA 17 were new!

I was attracted back into short wave listening about eighteen months ago after a gap of seven years. The reason for my return was SWM, I picked up a copy in WH Smiths and I was hooked.

Welcome back to the hobby Hugh - Ed.

Dear Sir

I read with interest B. Williams' account of the result of an interview between author Mike Graham, and Steve Douglass (Monitoring Times). Within the text of the article ends with "Having a cordless 'phone nowadays is like a bug in your own house for your neighbours' pleasure." The reality was that the Scanners already available at that time could easily tune the cellular frequencies by selecting around 407kHz and just scanning through about 15kHz. All due to the design of the scanner r.f. and i.f. stages. A little trimming of the u.h.f. tuner of the redundant B&W TV also due to the design of the scanner r.f. and i.f. stages. A little trimming of the u.h.f. tuner of the redundant B&W TV also time could easily tune the cellular frequencies for weeks or even months. The banning of the import of Scanners that could tune above 512kHz was suggested.

The reality was that the Scanners already available at that time could easily tune the cellular frequencies by selecting around 407kHz and just scanning through about 15kHz. All due to the design of the scanner r.f. and i.f. stages. A little trimming of the u.h.f. tuner of the redundant B&W TV also suggested.

The more astute service providers asked for something more secure. They got it in the form of digitised speech, now used on cellular telephones that outnumber the analogue types. They are only secure against casual listening. The dedicated, technical listener will attempt to demodulate the signals, whilst the security services have requested that the digitising and encoding is done only to a depth that they can easily break.

There was a court case, I recall, some years back involving a number of licensed radio amateurs who monitored certain v.h.f. frequencies and then discussed the results on the 2m band. It was reported, at length, in the New Statesman and even callsigns and frequencies were listed. The accused were all found guilty and received fines totalling £10,000 plus loss of equipment.

Duncan Campbell, who penned the piece, stated the users and their frequencies. Whether this was the cause, or just a tightening up of security those users started employing deep encryption techniques and/or a change of frequency.

Surely the moral is that if you have to monitor disclose nothing to anyone, and keep your frequencies in your head. Does SW/M intend to start an illegal intercepts column?

73 and good listening.

Paul Beaumont

Dear Sir

I'll be sorry if SW/M is ever limited to reviews of new equipment. In the 1970's I lived in London bedsits, never having outdoor aerials for my home-brew regenerative sets. Not ideal, but I had fun and learned a lot, often helped by SW/M.

I'm still having fun, but these days with a longwave, my Eddystones and R210. I value these for what they let me do, rather then their vintage. Also, like John Wilson, for the simple pleasure of using them.

L.M.B. and G.E.R. Denman's 'minority interest' propagation articles help me get the best from my r.f.s. They also help me get the best from brand new equipment. Please don't ditch these articles, or the equipment reviews, as both are worth reading.

Dr S.M. Newstead

Nuneaton

Warks

As the old saying goes, "one man's meat is another man's poison". Diversity of interests is what makes not only this hobby, but the world too, varied and appealing. Long live differing opinions. Here at SW/M we will continue to provide a broad coverage of radio related topics. - Ed.
Bandscan Europe

As I write this, Britain is engulfed in a molten mass of football mania, with Tesco, one of the country's leading supermarket chains, selling 40000 televisions costing £169.00 in the course of a single week. However, it's comforting to know that radio is still important in many people's minds. In fact, radio is currently so financially attractive that a group of entrepreneurs, led by former pirate radio man Paul Rusling, is behind a bid to launch a new long wave broadcasting station beaming programmes from the Isle of Man to the mainland.

It seems that the Manx government, the Tynwald, is being persuaded to licence 278 kHz for a high-power station on the tiny island midway in the Irish Sea between Blackpool and Ireland. This frequency was allocated in the last round of international agreements to Belarus, but now the Isle of Man International Broadcasting Company has secured the rights to this channel.

But anyone wanting to start a high-power long wave station should study the workings of Atlantic 252, the long wave station in the Republic of Ireland which beams a menu of pop music to Britain. The Irish station had tremendous difficulty in getting the huge antennas needed for long wave sanctioned by the local authorities, and today has to spend more than £500000 each year on electricity alone.

Despite this, and similar problems affecting the proposed Radio Delta, a long wave operation to be based in the Netherlands, Rusling is someone who does not want to be defeated. He has assembled a team of financiers and broadcasters to put the Isle of Man on the international broadcasting map.

Personally I am a little doubtful that we shall ever hear long wave signals from the island, but I am prepared to be proved wrong.

Difficult Discussions

BBC World Service is currently engaged in difficult discussions with Britain's Foreign Office - the international radio service's paymasters - over its budget. The BBC is seeking an increase of around £8 million in order to maintain its existing output and is threatening to cut complete language services if additional funding is not forthcoming.

The German language service is one which has been named as a likely candidate for closure, although this may be sabre rattling on the part of Bush House strategists. Some years ago the Managing Director of BBC World Service said that the German service would remain on the air as long as the BBC has an f.m. transmitter in Berlin. That transmitter is still on the air, and its licence runs until well into the next century.

This September marks the 60th anniversary of the German service, and celebrations are being planned by Bush House staff. The mood at the parties will be very muted if indeed the German service is axed, just as the Finnish service was at the beginning of the year.

At the same time, BBC World Service is appealing to the government for funds to make some specialist television programmes to supplement its radio output. These programmes would be separate from the 24 hour-a-day television news service, BBC World. Instead they would be 30-minute programmes in languages like Russian, Korean and Azeri, and made available for airing in existing local and national television services in countries where those languages are spoken. The BBC is clearly worried about the continued spread of television in some of its most important markets, and wants to fight to retain a foothold.

Digital Delivery

Swiss Radio International plans to drop its analogue satellite channels in favour of digital delivery during the next six months. This means that if you are listening to the 24 hour-a-day English-language service on Astra, you’ll have to buy a new piece of equipment to receive something called ADR (Astra Digital Radios).

ADR has been promoted heavily in Germany for satellite radio listening and tens of stations are using this particular form of transmission. But outside German-speaking countries, penetration is all but non-existent. This could prove problematic for listeners initially, but provide a great incentive for dealers in the UK and elsewhere in Europe to sell the ADR receivers.

Uniquely in the international broadcasting world, Swiss Radio has started a process of consultation with its listeners on this proposed change. If you want to let SRI know your opinion, drop a line to English Service, SRI, Giacomettistrasse 1, CH-3000 Bern 15, Switzerland, or FAX: +41 31 350 9569.

Hotting Up

In Africa, things seem to be hotting up for satellite radio services. WorldSpace, an entrepreneurial company based in Washington DC will launch the first of three digital radio satellites towards the end of this year. AfriStar will deliver digital-quality radio to a new generation of receivers on the ground, and more African broadcasters have signed up to provide programming over this new system.

At the recent Africa Telecom event in Johannesburg, WorldSpace announced that both the Libyan Broadcasting System, the national broadcaster in Liberia, and Sanfu FM, Uganda's first private station, will be broadcasting via the WorldSpace system. Already announced are contracts with the Kenya Broadcasting Corporation and financial news provider Bloomberg.

There is still hesitation on the part of the big international broadcasters to sign with WorldSpace - the digital transmission system is proprietary (in other words the specification has not been released by the company) and there are doubts whether the satellite signal can be received anywhere other than direct line-of-sight between the satellite and the receiver. This begs the question whether there is any advantage in buying one of the new WorldSpace receivers - which will retail at around US$300 in the world's poorest continent - over investing in a fixed dish to receive the combined digital television and radio service offered by South Africa's MultiChoice direct-to-home operation.

Services Independent

I was pleased to learn that Rwanda is seeking to take its state-controlled radio and television services independent from the government. The Rwanda Office of Information is seeking consultants who will put together a plan to cut the staff numbers from 400 to 200 and make all the country's radio and television services self-funding through commercial ventures.

This is the first step towards making freedom of speech commonplace in Rwanda, which is still suffering after the bloodletting of recent years. Sadly there is still a "hate radio" on the air, probably beamed in from rebels in Tanzania, inciting more violence. The Voice of the Patriot seems to be an offspring of the infamous Radio Mille Collines which, in 1994, incited Rwandans to murder Tutsis and moderate Hutus.

Radio has been used to incite violence and murder in many places around the world - the example from Rwanda is particularly appalling. It is to be hoped that this latest hate station is soon silenced.
ot sunny weather usually brings it with a number of thunderstorms and they can be a serious problem for anyone using an outdoor antenna. Apart from the danger of lightening during storms, transmitters carry an electrical charge which will be deposited on the antenna by any land upon it. A very high potential will quickly build up unless there is a low resistance path between the antenna and earth.

To avoid this hazard always disconnect an external antenna from your receiver and effectively earth it when not in use - don't wait for a storm to arrive!

**Long Wave Reports**

Note: lw & mw frequencies in kHz; s.w. in MHz; Time in UTC (=GMT).

Unless otherwise stated, all logs were compiled during April.

NY on 1500, which reached Brian Keyte (Scotloway, Scotland) picked up the broadcasts from two stations in St.John's, Newfoundland - VOCM on 590, rated S10222 at 0450UTC and CJYQ on 930 (S10211 at 0500). At 0500 he heard CJYQ in Halifax, Nova Scotia, on 920, which was peaking S10222. Better conditions on the 10th enabled him to receive WBBR in New York, NY on 1130 (S10333 at 0540); WEAF, Boston, MA on 850 (S10333 at 0545); WMBZ, Boston, MA on 1030 (S10222 at 0543); WINS New York, NY on 1010 (S10333 at 0550); CJFX Aylesford, NS on 580 (S10222 at 0552); also WNRB in Boston, MA on 1510 (S10333 at 0555).

The broadcasts from WDBW in Boston on 1510 were used to point a condition sorter by Harry Richards (Barton-upon-Humber). They were poor during April but on May 1st he logged their transmission as 24232 at 0350. He also heard WGEN in New York, NY on 1520, which rated 23232 at 0350.

The sky waves from some mw stations in N.Africa, Europe, Russia and Scandinavia also reached our shores after dark. However, with the longer hours of daylight George Millmore (Wootton, loW) found to be very poor during most nights in April by UK contributors.

The propagation of m.w. transmissions over transatlantic paths was particularly good reception of the Polskie R-1 broadcasts via the Atlantic 252 and Ireland.

**Medium Wave Reports**

The propagation of medium wave transmissions over transatlantic paths was found to be very poor during most nights in April by low power transmitters from Europe, Russia and Scandinavia also reached our shores after dark. However, with the longer hours of daylight George Millmore (Wootton, loW) found to be very poor during most nights in April by UK contributors.

**Short Wave Magazine, July 1998**
We can supply any ham radio item - phone for deal
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ALM AR -8000 Scanner
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- Computer control outlet
- Password Protect
- 30 ch. per second search
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- 1000 Alphanumeric Memories
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AM computer receiver. The
remote black box plugs directly into your PC. Because it can be
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New NRD-545 Receiver
- 0.3 MHz
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- 10MHz-3GHz
- 3 Digit Display
- Includes AC Charger

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- 10MHz - 1.4GHz
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This portable active antenna covers 300kHz - 30MHz and also pro-
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24 Hour Digital WallClock
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Ham Radio's Biggest Catalogue. £3.95 inc post.
Appley, WYFR via Okesanbebe, USA 17.555 (Eng to Eur, Africa 2000-2000) 4435 at 2030 in Morden; R.CI via Sackville 17.820 (Eng to Eur, Africa 2000-2130) 3635 at 2045 in E.Bristol; R.CI via Sackville 17.870 (Eng to Eur, M.East, Africa 2000-2130) 3333 at 2046 in Truro; R.New Zealand Int 17.675 (Eng to Pacfic areas) 2025 [1207 Fri-Sat - 0457] 1543 at 2106 by Richard Reynolds in Guildford; R.Taipei Int via WYFR 17.750 (Eng to Eu 2200-2300) 4544 at 2206 in Bridgwater; WHR South Bend, USA 17.655 (Eng to E.U., Eur 1900-2100) 4444 at 2210 in Woodstock.

Broadcasts from many areas may be heard in the 15MHz (19m) band during the day. In the early morning they include the Voice of Nigeria via Ikorodu 15.120 (Eng to E.U., Nigeria 0600-0700), rated 3564 at 0630 by David Edwardson in Wallingford; R.Japan via Nayabi, Gabor 15.235 (Eng to M.East, N.Africa 0700-0800) 3322 at 0730 in Appleby; BBC via Masirah Is, Oman 15.310 (Eng to S.Africa 0630-0915, 1000-1400) 5445 at 1000 in Mauritius; R.Australia via Shepparton 15.415 (Eng to Asia 0100-0600, 0600-0900) 4444 at 0930 by Stan Evans in Freshwater Bay; VOA via Greenville? 15.135 (Eng to Eur, N.Africa 1330-1400) 5455 at 1330 in Truro; BBC via Cyprus 15.575 (Eng to M.East, E.U. 0900-1500) 4444 at 1433 in Woking; VOA via Moroccan 15.410 (Eng to Africa 1600-2000) 4232 at 1600 by Gerald Guest in Dudley; VDRJ Tehran, Iran 15.084 (Home Sire relay) 5445 at 1620 in Liverpool; VOA via Botswana 15.445 (Eng to Africa 1830-1900) 4444 at 1835 in Freshwater Bay; VOA via Cyprus 15.135 (Eng to E.U., N.America 1700-1800) 4232 at 1710 in Colyton.

Later, Vatican R, Italy 15.570 (Eng to Africa 1730-1800) was 4444 at 1748 in Woodhall Spa; Channel Africa via Meyerton 15.240 (Eng to W.Africa 1800-1830) 4444 at 1805 in Bridgwater; RBNB Brazil 15.265 (Port, Eng, Ger to E.U. 1630-2020) 2412 at 1839 in Nevy; R.Nederlands via Bonn, Ned Antilles 15.315 (Eng to Africa 1830-1900) 4444 at 1835 in Plymouth; R.Africa via Sackville 15.305 (Eng to USA, Canada 1830-1900) was 4444 at 1900 in Lisieux; during the afternoon the BBC via Antigua, W.Indies 15.220 (Eng to Eur, N.America 1800-2130) 4553 at 1820 in Colyton; China R.Int 15.165 (Eng to S.Africa 1900-1930) 4444 at 1930 in Galashiels; Voice of Indonesia, Jakarta 15.150 (Eng to Europa, Africa 2000-2100) 4444 at 2000 in Scalloway; HCJB Quito, Ecuador 15.115 (Eng to Africa 1900-2200) SI044 at 2141 by Martin Cowin in Kirdy Stephen; R.Taipei Int via WYFR 16.600 (Eng to Europe, Africa 2200-2300) 4232 at 2200 in Morden; R.CI via Sackville 15.305 (Eng to USA, Canada 1830-1900) was 4444 at 1900 in Lisieux.

The broadcasters now using the 13MHz (22m) band include DW via sines? 13.790 (Eng to WAfrica 0600-0650), rated 5444 at 0638 in Nobris; R.Australia via Shepparton 13.605 (Eng to Pacific areas 0600-0800), received at 0730 in St Mary's, IoS; R.Austria Int via Moosbrunn 13.730 (Eng to O.E.U., 0730-0900) rated SI044 at 0742 by Francis Hume in N.Bristo, SRI via Sottentor? 13.685 (Eng, Ger, Fr to Asia 0700-1030) 4553 at 0930 in Dudley; R.Australia via Shepparton 13.730 (Eng to Asia, Pacific 1330-1400) 3333 at 1300 in Truro; R.Prague via Litomyshl 13.580 (Fr to WAfrica 1430-1457) 4444 at 1433 in Freshwater Bay; UAE, Dubai 13.630 (Eng to WAfrica 1600-1640) 4383 at 1631 in Bridgewater; R.Netherlands 13.765 (Eng to Africa 1730-1800) 4444 at 1745 in Woodstock; R.Africa via Khashl5.590 (Eng to Africa 1830-1900) was 4444 at 1800 in Colyton; DW via Wctacthal 13.790 (Ger to S.E.U. 0600-2000) 5445 at 1820 in Liverpool; WHR South Bend, USA 13.760 (Eng to E.U., Usa 1500-2100) 4444 at 1900 in Mordor; R.CI via Sackville 13.650 (Eng, Fr to Europe 1900-2200) 4444 at 2007 in Osted; R.Havana Cuba 13.605 (Eng (ussb) to E.U. 2030-2130) 3333 at 2030 in Truro; R.Havana, Cuba 13.715 (Eng to Rou 2030-2300) 3222 at 2045 in Abedin; R.Indonesia 13.795 (Eng to Africa 2000-2130) 4444 at 2110 in E.Bristol; Christian Science SVB via WSHB Cypress Creek, USA 13.770 (Eng to E.U., WAfrica 2000-0000) 4444 at 2230 in Kikelle.

In the 11MHz (25m) band R.New Zealand broadacast to Pacific areas on 11.905 (Eng 0459-0730) has been reaching the UK. In E.Bristol it rated 2322 at 0715. Also heard during the morning were HCJB Quito 11.960 (Eng to E.U. 0700-0950) - a potent 4444 at 0700 in Dudley; VOA by Philippus 12.010 (Chin to E.U. 0900-1100) SI011 at 0923 in Mascelefield; R.Prague, Czech Rep 11.640 (Eng to Turi 1030-1057) 4444 at 1030 in Morden; R.Korea Int via Sackville, Canada 11.715 (Eng to Asia, America 1030-1100) 4444 at 1100 in Morpeth; R.EVE via Noblesse 12.035 (Sp to E.U. 0700-1700) 5565 at 1110 in Plymouth.

During the afternoon the Voice of Vietnam, Hanoi 12.020 (Eng to Hanoi 1200-1430) was 4211 at 1330 in Truro; R.CI via Skelton, UK 11.895 (Eng to E.U. 1330-1430) 3433 at 1348 in Freshwater Bay, Isle of Wight; R.Jordan via Al Karah 11.690 (Eng to W.Eur, E.U. 1300-1533) 5535 at 1500 in Hernresi; Voice of Russia 11.665 (Eng) 4444 at 1520 in Woodhall Spas; R.Australia via Shepparton 11.660 (Eng to Asia 1330-1730) 4444 at 1530 in Ipswich; R.Bristol, UK 11.605 (Eng to E ur, 1545-1600) 4444 at 1545 in Appleby; R.Pakistan, Islamabad 11.570 (E.U. 1600-1630) heard at 1615 in St Mary's, IoS; BSK/SIA via Riyadh 11.715 (Ar to M.East, N.Africa 1700-1730) 0322 at 1720 in Woking.

Later, R.Kuwait via Kabil 11.990 (Eng to E.U., 1900-2100) was 4554 at 1810 in Wallend; BBC & Skelton & Woffington, UK 12.095 (Eng to Eve, NW.Africa 1900-2040) 5454 at 1810 in Warrington; W.Eur, N.America 1600-0300) 4553 at 1820 in Colyton; China R.Int
### MEDIUM WAVE CHART

<table>
<thead>
<tr>
<th>Freq (kHz)</th>
<th>Station</th>
<th>Country</th>
<th>Power (kW)</th>
<th>Listener</th>
</tr>
</thead>
<tbody>
<tr>
<td>801</td>
<td>Lisboa</td>
<td>Portugal</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>783</td>
<td>Redruth</td>
<td>UK</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>756</td>
<td>Plymouth</td>
<td>UK</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>720</td>
<td>Monte Carlo</td>
<td>Monaco</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>702</td>
<td>Tune (Ojedeida)</td>
<td>Tunisia</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lots Rd, Ldn (BBC4)</td>
<td>UK</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ernie Strong, Ramsey, Cambs.</td>
<td>UK</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clare Pinder, while in Appleby.</td>
<td>UK</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

During the evening the Voice of Vietnam, Hanoi (9.840 to Eur 1800-1830) was 32342 at 1815 in Bridgewater; Africa No.1, Gabon 9.580.

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

**Listeners:**

- Martin Dale, Stockport
- France-Inter, while in York
- Simon Honek, B. Boston
- Craig Printz, while in Appleby
- Tim Smyth, D. Fernandish
- Dave Stevens, Swansea
- Emile Strong, Rambo, Chicago
- Thomas Myers, Tune
- Tom Wicor, Plymouth

---

Short Wave Magazine, July 1998
Off The Record

Over the past few months I have received many comments on the monotonous unadventurous programming offered by most British local commercial radio stations. The link between most of these sound-alike stations falls into two categories.

Firstly many of the major radio companies have shares in several stations so that the outlets they operate are as you would expect a High Street chain store to be. The second factor is hidden behind the computer systems they now use.

Gone are the turntables, cartridge machines, and tape recorders, even CD players have been relegated for use only in relative emergencies. Powerful computer systems like Selectol will choose the music depending on the criteria fed into it by the programme manager.

While another computer system, the one I was introduced to, was called Enco-DAD, provides the selected music in pristine quality to an Air Kirsten 2000 mixing desk. This is in essence a fully automatic radio station that can run totally unattended.

News or announcements can all be digitally recorded, and as with the advertisements can be programmed automatically or may be recalled by simply touching the computer screen. For production purposes, this system is quite brilliant, no more recording and splicing tape, just the ability to save any digitally recorded material.

The audio has cut and paste facilities, like a word processor, so electronic editing can take place. If you happen to make a hash of it, a touch of a button takes you back to the original, so you can do it again. It is also possible to do instant requests, providing the listener chooses one of the 3000 songs that have been captured in the computers hard drive system.

The commercial advantages of this system are colossal, with substantial savings on staff and record library space. The disadvantages appear to be due to the restricted selection of music and the inability of presenters to build a show around their personality and area of expertise.

Because the system is so time orientated, many aspects of which are outside the presenters control, the DJ is required to work to the minute. It is also possible to do instant requests, providing the listener chooses one of the 3000 songs that have been captured in the computers hard drive system.

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AIRMASTER 2000
Software decoder for ACARS

AIRMASTER 2000 is Lowe’s ACARS Windows based decoding system. Hardware and software is supplied consisting of a small demodulator built into a 25 way D-type plug and the decoding software. The plug connects and derives its power from a COM port on the PC. The software is installed on the PC hard disk drive. The receiver or scanner is connected to the other demodulator connection.

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North East, Unit 18B, Airport Industrial Estate, Newcastle, NE3 2EF,
Tel 0191 214 5424, Fax 0191 214 0761
South West, 117 Beaumont Road, St Judes, Plymouth PL4 9EF
Tel 01752 257224 Fax 01752 257225
JRC NRD545

The latest model in the JRC range, the new NRD 545, which is their first receiver using DSP (Digital Signal Processing) from the IF stages onwards. The DSP enables a wide choice of digitally implemented filters to be provided, together with IF shift and continuously variable passband width. The combination of these facilities gives the NRD 545 a level of performance that has previously been unheard of in a receiver costing less than £10,000.

Every equipment reviewer that has had the opportunity to try the NRD 545 to date has been amazed at the performance that JRC engineers have managed to cram into this small box.

Lowe Price £1595.00 Carriage £10.00

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Price now £125.00

Other bargains available:

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>MLBAMK1</td>
<td>£54.00</td>
<td>SP1</td>
</tr>
<tr>
<td>MLBAMK2</td>
<td>£60.00</td>
<td>SP2</td>
</tr>
<tr>
<td>EMF</td>
<td>£49.00</td>
<td>SP3</td>
</tr>
<tr>
<td>Mini Windom</td>
<td>£33.00</td>
<td></td>
</tr>
</tbody>
</table>
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Breaking new ground in the field of micro-processor technology design, the FT-100 is a new all-band, all-mode transceiver providing 100 W output on all bands and offering unique, user-friendly, high-tech features. Processing and performance capabilities of many high-grade models as a compact mobile expert.

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Tel: (01297) 34918 Fax: (01297) 34949. Open 10-5pm Monday, 9-5.30pm Tuesday-Saturday. E:mail: regward@smc-comms.com
As some of you will have noted from my comments in earlier reviews, I had been looking forward with great anticipation to the arrival of the NRD-545 at my test lab. Having been associated with JRC equipment for over 20 years, I have a high regard for the inherent quality which comes with the JRC badge, and I have seldom been disappointed. The first receiver which we brought into the UK was the NRD-505 back in the mid 70s, and this was one of the first general coverage receivers to offer phase locked loop technology allowing full h.f. coverage with excellent stability and resettability (in other words if you went off to some other frequency, you could return to the original and expect to be there with no loss of accuracy). What a receiver!

Built to last forever, and I'm sure that every one we sold is still giving perfect service today. Not that we sold many, the price at the time was staggering, about half the price of a house, and if you added the matching transmitter and power supply it would have cost more than a house. In this context, today's JRC prices are incredibly low, and the NRD-545 outstandingly so. Incidentally, Bob Ellis is lying when he says that I am old enough to remember the first JRC equipment from 1915. As a collector I only wish I had some examples from then to go with my 1915 "Transmitter WT No. 1" from the Soho Wireless Works. Sorry - reminiscing again.

Landmark for the Millennium?

Why was I waiting so eagerly for the NRD-545? because I had the pleasure of reviewing the baby
"I frankly wanted the NRD-545 to be another 'landmark' receiver for the turn of the millennium."

Looks The Part

It certainly looks the part and seemed almost familiar when I first put it on the bench. Styling clues were already evident in the NRD-345 and the JST 145/245 transceivers, and the distinctive sweep of the front panel line across the top of the main tuning knob is very attractive. Interesting to note that Icom have used the identical styling feature in their latest transceivers, such as the Watkins-Johnson HF 1000 and the amateur radio transceivers from the 'Big Three', and just whilst providing excellent results by measurement, the end audible result was often slightly unsatisfactory because of low level "Ugly-Gurgly" noises as the adaptive filtering tried to get to grips with signals close to the noise floor of the receiver and strange effects when tuning in towards a strong modulated signal. I hoped that the NRD-545 would prove to be better in these respects and make everyone else sit up and take notice. I frankly wanted the NRD-545 to be another 'landmark' receiver for the turn of the millennium.

Prod Left or Right

The buttons grouped around the main tuning knob (which seems perfectly weighted) start with a pair of left and right arrow keys which step the tuning in the same tuning increments as the tuning knob. If you are using the finest resolution of the tuning system and you prod the left or right button, you may be misled into thinking that nothing is happening, because there are ten tuning steps to each increment shown on the frequency display, but by use of the 'Step' button you can change the increments by factors of ten, in other words, change to 10Hz, 100Hz, 1kHz and back to 1Hz. The system does not end here, because a dig through the operating manual tells you that JRC have provided facilities to set up the receiver to your own specification, and that includes the options of 1, 5, 6.25 and 9kHz which neatly covers medium wave, short wave and CB channel steps. Very clever and very thoughtful. Having mentioned the user set-up options, I will just say that there is a list of optional settings on page 23 of the manual which should cover everything that an owner would need to customise the NRD-545, covering even obscure items such as bypassing the front-end filters, changing the RTTY shift and best of all, turning off the annoying 'bleep' which accompanies every key press.

Short Wave Magazine, July 1998
PSR239
200 channel VHF/AIR/UHF/900MHz portable scanning receiver.
Specifications: ★ 200 programmable channels
Frequency range: ★ 68-88, 108-137 (AM), 137-174, 380-512, 806-960MHz
Features: ★ Access to 31,000 different frequencies ★ 10 key direct access ★ 10 scanning banks for grouping frequencies ★ Direct access to desired scan bank while scanning ★ Upper and lower limits frequency search ★ Priority channel ★ Air band reception ★ One temporary monitor channel ★ 2 second scan delay

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PSR250
20 channel UHF/VHF portable scanning receiver.
Specifications: ★ 20 programmable channels
Frequency range: ★ 68-88, 137-174, 380-512MHz
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Specifications: ★ 50 programmable channels
Frequency range: ★ 68-88, 108-137 (AM), 137-174, 380-512MHz
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<thead>
<tr>
<th>Product</th>
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<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palstar COMBINED 3-IN-1 UNIT</td>
<td><strong>£69.95</strong></td>
<td>Active electronics allow almost lossless matching of your antenna to the receiver.</td>
</tr>
</tbody>
</table>

**NEW LOW PRICE ..../99 £4.75 P&P**

### SCANNER NAVIGATION

<table>
<thead>
<tr>
<th>Product</th>
<th>Price</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite Pre-Amp</td>
<td><strong>£49.95</strong></td>
<td>Improves the reception of your scanner with this Japanese made low noise pre-amp. A fully adjustable gain control -48dB to +20dB ensures best possible performance. 3 band pass filters reduce interference. Includes LAT/LONG, UTM, Ordnance Survey, Swiss, Swedish, German &amp; Maidenhead grids.</td>
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<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Price</th>
<th>Details</th>
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<tbody>
<tr>
<td>AOR</td>
<td>FTR 3990</td>
<td><strong>£125.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
<tr>
<td>AOR</td>
<td>MP3710</td>
<td><strong>£59.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
<tr>
<td>DRAKE</td>
<td>DR 4100</td>
<td><strong>£399.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
<tr>
<td>SONY</td>
<td>SW 7600G</td>
<td><strong>£99.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
<tr>
<td>YAESU</td>
<td>FT 2900</td>
<td><strong>£145.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
</tbody>
</table>

### USED EQUIPMENT

### SCANNING RECEIVERS

<table>
<thead>
<tr>
<th>Brand</th>
<th>Model</th>
<th>Price</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>AOR</td>
<td>FT 7700</td>
<td><strong>£145.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
<tr>
<td>DRAKE</td>
<td>DR 4100</td>
<td><strong>£145.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
<tr>
<td>KENWOOD</td>
<td>TK 2000</td>
<td><strong>£99.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
<tr>
<td>TUNTEC</td>
<td>TY 500</td>
<td><strong>£75.00</strong></td>
<td>Narrowband &amp; 1300MHz, 100 Channels.</td>
</tr>
</tbody>
</table>

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Log Periodic WideBand Beam Antenna

- Covers 150-1300MHz with over 6dB gain at all frequencies!
- 16 elements (Bonged length being 1.4m)
- Fitted "N" type 5002 socket
- Power rating: 500W transmits
- Lom 11-12 dB F/B 15dB

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- 30kHz-30MHz.
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- S Meter.
- Limited stocks at this price.

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- Store 128 memories
- Link to your radio with adaptor lead

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AR-8200

NEW! AOR SCANNER

A NEW SOARED PRICED COMMUNICATIONS RECEIVER

An English-made shortwave receiver at an affordable price

30kHz-30MHz.

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S Meter

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- 400 memories
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- 9 digit LCD
- Supplied complete with Nicads & charger.

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Scanning Secrets...£16.95 p& p £2.75
Scanner Builts 2...£16.00 p& p £1.25
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Farrar's Craft Free Lifting...£19.95 p& p £2.75
Marine Starting Electronics...£19.95 p& p £2.75
North Atlantic Flight Comm...£15.00 p& p £2.75
UK Scanning Free Chart...£19.00 p& p £1.00
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- AM/FM/WFM
- 800 Memories
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BN Plug for 50-FB...£3.75
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N type for 50-FB...£3.95

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Die 9.7mm less 1.386 per 10mtr @ 1000MHz....£59.95

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Fully moulded for full weather protection.

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20 meter s/w receive end fed wire antenna. Bolun fed, uses high quality "Flex Weave" copper wire. 1-30MHZ

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http://www.nevada.co.uk
I apologise to those who like bleeps with everything, but I prefer a dignified silence. Rolls Royce don’t (yet) have bleeps. Oh yes, I also like the peak-hold facility on the signal strength meter which is succinctly described as “User function 9(2)”. Remember that!

Like A Tiger Unleashed

The button marked ‘Sweep’ looked inviting so I pressed it and entered start and stop frequencies (easy) followed by a poke at the ‘Run’ button. The sweep started but at such a P-E-D-E-S-T-R-I-A-N rate that I started to yawn. I thought that this couldn’t be true and reading the manual was directed through a tortuous series of cross references to find that the sweep rate can indeed be changed to almost anything you want, hurtling across the short wave spectrum like a tiger unleashed. The provision of a sensitive all mode squelch system makes the sweep function very useful, and as it is running right now, I find it tempting to go and listen to each signal the receiver encounters, but the Editor is waiting for this review… Yes, so what else did you discover Mr Wilson? - Ed
Other buttons around the tuning knob cater for comprehensive and easy to use scan facilities and the memory channel scrolling. There are 1000 memories available, each one storing frequency, mode, if.f. filter bandwidth, a.g.c. setting, r.f. attenuator on/off setting and tuning steps. Not as comprehensive as at least one other h.f. receiver on the market, but more than adequate. From any of these functions a simple press of the ‘Freq’ button restores the tuning knob as the controller (as it should be in a real receiver). Mode selection is by a horizontal row of buttons under the ‘S’ meter, each button having a dual toggle action selection, f.m./f.m.w. on the first, a.m./a.m.s. (synchronous a.m.) on the second, u.s.b./l.s.b. on the third and c.w./RTTY on the fourth. An interesting feature is that whatever i.f. bandwidth you chose for any particular mode is remembered by the mode selection, so you might find that switching from one particular mode to another only involves a single press on the ‘Freq’ button and not necessarily switching in the i.f. selectivity department. As with any d.s.p. facility which a receiver user could demand, at least in the i.f. selectivity department. As configured in the NRD-545, the incoming r.f. signals are first converted to a high i.f. of 70.455kHz (as in all previous JRC receivers since the NRD-505) then down to 455kHz and finally to 20.2kHz where the digital bit occurs. There seems little point in diving off into technical explanations of d.s.p. because I’m no expert and you dear reader are probably less interested in the technicalities than how the receiver behaves in digging out signals of interest, and finally the Notch control. This is a most impressively engineered notch which chops down interfering signals like a Canadian lumberjack in a redwood forest and leaves them lying on the ground. Not only that, once you have manually twiddled the notch to down the interfering signal you can select auto tracking and let the d.s.p. take care of it automatically. A delicate touch is needed initially, and sandpapering the fingertips is recommended, but once you have the hang of it, the facility is one you won’t want to be without. There - I’ve mentioned d.s.p., which is the reason for the NRD-545’s existence and also the reason for my desire to do this review.

On the face of it, d.s.p. technology should be capable of providing every possible operating feature which a receiver user could demand, at least in the i.f. selectivity department. As configured in the NRD-545, the incoming r.f. signals are first converted to a high i.f. of 70.455MHz (as in all previous JRC receivers since the NRD-505) then down to 455kHz and finally to 20.2kHz where the digital bit occurs. There seems little point in diving off into technical explanations of d.s.p. because I’m no expert and you dear reader are probably less interested in the technicalities than how the receiver behaves in digging out signals of interest, and finally the Notch control. This is a most impressively engineered notch which chops down interfering signals like a Canadian lumberjack in a redwood forest and leaves them lying on the ground. Not only that, once you have manually twiddled the notch to down the interfering signal you can select auto tracking and let the d.s.p. take care of it automatically. A delicate touch is needed initially, and sandpapering the fingertips is recommended, but once you have the hang of it, the facility is one you won’t want to be without. There - I’ve mentioned d.s.p., which is the reason for the NRD-545’s existence and also the reason for my desire to do this review.

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and that's where my experience comes into best use. On the face of it, the d.s.p. system in the NRD-545 should fulfil everyone's dream of having fully variable bandwidth, programmable for any mode, adaptive noise filtering, automatic 'seek and destroy' notch for single and multiple signals, infinitely variable passband shift in any mode, digital demodulation of all modes and so on. What a combination.

**Faster Than An F-16 At Top Gun**

Does it do all of this? Well the somewhat insignificant little button marked 'NR/BC' and tucked away by the 'clock' button can work miracles with noisy signals, bringing voices up from the vasty deep and making them stand out in the clear, and the 'BC' or Beat Cancel function can seek and destroy single and multiple heterodynes faster than an F-16 at Top Gun, although the manual notch takes some beating. At the end of the i.f. chain, the NRD-545 d.s.p. works well, but of course the signals arrive from the antenna at the other end of the receiver where r.f. performance is all important.

How does the '545 compare in r.f. performance to other receivers in the market place. Well, whilst its behaviour under my normal testing regime was good enough to put it into the 'A' stream, there were no areas in which it advanced much beyond the NRD-535, but of course the '535 was a good performer in the r.f. department. Using the default 'INTER' filter settings of the d.s.p. i.f., which were 2.4kHz for s.s.b. and 4.5kHz for a.m., the sensitivity came out at -123dBm on s.s.b. and -105dBm for a.m., both for 12dB SINAD. This is quite in line with current receivers but as I have explained before, I like to normalise my dynamic range testing to a sensitivity of around -117dBm so that the intercept point measurements can be directly compared, and having done that the NRD-545 delivered a +19.5dBm 3rd order intercept point and a dynamic range of 96dB on s.s.b. at 20kHz signal spacing, and using my test for 2nd order performance with input signals of 6.5MHz and 7MHz whilst measuring the product at 13.5MHz (you will recall that this is to show up any problems with strong signals from two broadcast bands producing spurious signals due to a lack of front-end preselection) I obtained a 2nd order intercept point of +82dBm and a dynamic range of 204dB. This is a good result and shows the beneficial effects of having front-end preselection, but it still ain't as good as a Collins 515-1.

The reciprocal mixing performance was good and this is a reflection of the cleanliness of the synthesised local oscillator. The figures are given in Table 1.

<table>
<thead>
<tr>
<th>Signal spacing (kHz)</th>
<th>Level of interfering signal to degrade wanted signal SINAD by 3dB (dBm)</th>
<th>Reciprocal mixing ratio (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>-62</td>
<td>69</td>
</tr>
<tr>
<td>10</td>
<td>-45</td>
<td>86</td>
</tr>
<tr>
<td>20</td>
<td>-40</td>
<td>91</td>
</tr>
<tr>
<td>50</td>
<td>-32</td>
<td>99</td>
</tr>
<tr>
<td>100</td>
<td>-23</td>
<td>108</td>
</tr>
</tbody>
</table>

These figures place the NRD-545 high on the totem pole, but the result at 5kHz spacing was difficult to determine because of a plethora of audio tones generated within the receiver at close signal spacing. I can only deduce that the d.s.p. system was being slightly confused by what was going on, because I have not experienced this effect on other, more traditional receivers. The...
"Brave man that I am, I connected a real antenna (eight metres of wire) and had a twiddle round the medium wave."

measurements were taken, as in all my reviews, in the u.s.b. mode with 2.4kHz i.f. bandwidth.

**Peculiar Effect**

It was when I was measuring the a.m. sensitivity that I realised that something didn't sound quite right and decided to do some careful tuning around. I discovered that tuning through my a.m. test signal, modulated to a depth of 60% at 1kHz, resulted in a most peculiar effect.

The signal sounded perfectly normal when tuned spot-on, but at around 400Hz off-centre, which is still well within the nominal 4.5kHz bandwidth of the receiver, the audio became distorted. Tuning further revealed a dead spot at which the recovered audio disappeared completely, only to reappear as I carried on tuning, but with increasing distortion evident. As tuning continued and the signal fell outside the nominal filter passband, the 'S' meter continued to read at a lower level until at about 8kHz from the nominal centre frequency when it suddenly 'stepped' down and vanished. This effect was identical on each side of the nominal frequency, and was exactly the same when the test was carried out at several r.f. frequencies within the tuning range of the '545. Just in case the modulation depth was causing a problem, I repeated the test at 30% modulation but the strange effects remained.

Brave man that I am, I connected a real antenna (eight metres of wire) and had a twiddle round the medium wave. On 909kHz there was the BBC loud and clear at 30dB over S9. However, at ±400Hz off-tune, the poor old announcer sounded like he was being strangled, and after passing through the dead zone where the modulation disappeared, I found that the signal remained at S3 outside the filter passband but sounded just like s.s.b. when received on an a.m. receiver. The "monkey chatter" carried on for about 7 to 8kHz on either side from 909kHz when it vanished. The problem with this effect is that the monkey chatter overlaps into the chatter from the adjacent station and trying out the receiver on 9.5MHz there was a continuous S3 to S5 'monkey chatter' between every single short wave station (remember the 5kHz spacing on short wave), making the receiver useless for checking out weak signals.

Now I have seen comments in another review that the NRD-545 was the finest amateur receiver ever to have been in the shack, and searching the Web sites came up with other comments that on 40m it was the best amateur receiver ever tested. Well, it's a fact that on s.s.b. or c.w., the NRD-545 behaves impeccably, with no sign of the a.m. problems, but I have been taught to be careful when checking equipment and whilst it is always tempting to have a twiddle around the 80 metre amateur band, it's also essential to remember that these receivers are going to be used by keen broadcast listeners and they are not going to be happy with the a.m. on the NRD-545.

**A Worthy 'landmark' In Due Course**

I was sufficiently alarmed to feel that I should ask for comment on this finding so JRC were contacted regarding the problem. This all came as a great disappointment because in every other respect, the NRD-545 was performing perfectly, with the d.s.p. functions providing everything that a utility or amateur radio listener would want. The ECSS works well, as does the synchronous a.m., the styling and presentation of the receiver is just about perfect, and with the optional v.h.f. converter fitted it should be a desirable radio. It is, I have to say, close to my ideal h.f. receiver and should be a worthy 'landmark' in due course, but for the moment I'll stick to old fashioned crystal or mechanical filters for determining the i.f. bandwidth of my receivers and wait for something to be done to the a.m. department of the NRD-545. If a.m. is not your particular field of interest, then the NRD-545 is very attractive and you should take a listen to it - in fact that's the best advice for anyone - go along to your nearest supplier and take a listen. Que! (remember the 5kHz spacing on short wave), making the receiver useless for checking out weak signals.

Now I have seen comments in another review that the NRD-545 was the finest amateur receiver ever to have been in the shack, and searching the Web sites came up with other comments that on 40m it was the best amateur receiver ever tested. Well, it's a fact that on s.s.b. or c.w., the NRD-545 behaves impeccably, with no sign of the a.m. problems, but I have been taught to be careful when checking equipment and whilst it is always tempting to have a twiddle around the 80 metre amateur band, it's also essential to remember that these receivers are going to be used by keen broadcast listeners and they are not going to be happy with the a.m. on the NRD-545.

**The Reponsce from Japan**

We put John's findings to JRC in Japan, the following is their response.

"Thank you very much for your review article in amateur radio magazine. We would like to comment against your review article as follows:

1. **Distortion of AM detection**
   We have found that there was a problem of AM detection algorithm by DSP at the last step of its development. So, the initial several sample units have not been modified. Our mass production sets have been already modified. If you have a chance, we would like you to evaluate our mass production set again. Or, please try to replace the ROM which we shall send you.

2. **Monkey chatter**
   The digital IF filter is normally with sharp attenuation. So, the monkey chatter might be caused occurred at outside the filter passband. It is not easy to correct this phenomenon. Please adjust the bandwidth by BVC and tune it, and you may search even weak signal.

This NRD-545 is the model in which we JRC have our confidence. We are sure that NRD-545 will be the best selling one quite soon.

Best regards"

**JRC Design Department - Japan**

Please note that this reply is direct from Japan with no editing. So please, only those fluent in Japanese, need criticise the language!
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ICOM IC-8500
"Next generation" technology brings you super wide band, all mode coverage from 0.1-2GHz. It's a professional quality communications receiver with versatile features from high speed scanning to computer control.

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AR-3000A
This highly acclaimed receiver has set its own place in today's demanding market. Your listening horizons are truly extended by its Rx range of 100kHz to over 2GHz and high level performance is achieved by its electronically switched 15 band pass filter system.

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BEARCAT UBC-9000XLT
An amazing receiver with coverage from 25-1300MHz. 500 memories give ample storage along with auto store, selectable mode, turbo scan (100 channels per sec) alpha numeric facility and much more.

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SCANNERS

AOR AR8200
The latest all mode innovation in handhelds. There's too many features to list.

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AR-8000
Soft case for AR-8000 ................ £18.95
Airband filter ................ £29.00

MVT-7100EU
Wideband handheld scanner covers 500kHz-1650MHz. (All mode).

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ICOM IC-R10
The latest high tech scanner. Covers 500kHz-1300MHz. (All mode).

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TARGET HF-3
Budget communications receiver. Comes complete with mains PSU and long wire aerial.

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HF-3M as above plus WEFAX decoder ................ £199.95
JRC-NRD-345G ................ £669.00
JRD-54S ................. £1549.00
Drake R-88 ........ £965.00

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ICOM PC-1000

£349.00

ICOM UT-106
DSP digital filter for PC-1000. Just plug into the PC-1000 and away you go.

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R-7000 VGC ................ £79.95
TS-5700 (Tx disabled) ........ £949.95
ERO-100 As new ................ £399.95
SW-3SE As new ................ £199.95
BG-9000 XLT As new ................ £219.95
AR-3030+VHF VGC ................ £479.95

Short Wave Magazine, July 1998 29
TECHTOYZ MICRO COUNTER
Optoelectronics are ready to pioneer the market by proudly introducing the latest in technology for frequency counter, the
Techtoyz Micro counter. It is the smallest frequency counter in the world with a frequency coverage of 10MHz-2GHz.
The AA alkaline battery which powers the counter acts as the antenna, so no external antenna is needed.

SALE PRICE
£79.95

Optional antenna ............................................. £9.95

Micro DTMF Decoder ........................................ £49.95

Q-TEK APOLLO 2000
A brilliant new compact indoor antenna that covers 0-1650MHz and is just 20" tall (collapsed). Supplied with coax and BNC plug fitted.

ONLY £49.95 P&P £5

Comments from John Griffiths
I have to say that I'm not a fan of indoor antennas like this or earlier desk mounted versions tended to look like a real sci-fi invention. However, it was supplied by the quality of construction of this piece of equipment and it appears to be up to the job it is designed to do. Without getting technical, the Apollo 2000 claims to be able to cover 0-1650MHz. I used it between 100-400MHz appraoch and was surprised by what it was able to do. It produced clear copy and there was good reproduction with very little breakthrough.

OUR PRICE
£49.95 P&P £8.50

Q-TEK D.C. 2000
A high performance wideband antenna offering superb performance from 25-2000MHz, transmit ranges: 5m, 70cm, 27cm & 23cm (power handling 200W). Fitted with low loss 'F' type connector. Supplied with mounting brackets.

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OUR PRICE
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Allows the connection of any HF antenna to any scanner that has a BNC connector. Simply connect the long wire antenna to the push terminal on the top of the interface and attach to your scanner in place of your existing antenna.

ONLY £12.95 P&P £1

COMMENTS FROM JOHN GRIFFITHS
I mounted this on my AR-2000 and was well pleased with the results on HF. Verdict A dear winner and well worth the reasonable quid.

SCANNING ANTENNAS

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QS-200 Air vent holder .......... £9.99 P&P £2

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Short Wave Magazine, July 1998
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Comments from John Griffiths
In rounding up, the intruder performed better than I expected and with little fuss in mounting and connecting up. It appears rugged enough to live out of doors and will also fit nicely on the wall - perhaps an outside wall being the ideal though I have to admit having no problems with my inside one. I found it a pleasing addition to any set-up - with cable correctly mounted and run - it should look professional and very much a part of the kit in the shack. I would suggest that this is the antenna many of us have long been looking for and therefore have no hesitation at all in saying it is definitely the best.

UK Scanning Directory
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Short Wave Magazine, July 1998
Peter Julian G7PRO tells of how he went about customising his Tandy PRO-50 scanner. His labours yielded a much improved radio.

When I saw Tandy selling the PRO-50 scanner for £49.99 in the January sales, I couldn't resist the offer. For some time I had been considering buying a simple, uncomplicated radio. With the PRO-50 I was pleasantly surprised. This type of design has a tuned front-end unlike the ultra-wideband scanning receivers which use a high first intermediate frequency and band pass filters. The sensitivity was satisfactory, especially on u.h.f. and despite the number of frequencies listed in the manual, on my set I could only find two major birdies in each of the v.h.f. bands and none in the u.h.f. band. (I class major as ones which open the squelch even without the rubber duck antenna connected.) Even these did not totally 'lock-up' the receiver when used with an external antenna.

However, to get this result on u.h.f. I must admit to changing the rubber duck antenna supplied with the set to the type used on the AR1000 with no loss of sensitivity. When using the supplied antenna there were five birdies which stopped the radio’s progress during search but with the other antenna, none. Not that the Tandy antenna isn't any good, it's fine, but for some reason it does appear to resonate too easily with some of the internal signals.

The Modifications

Protection

The first internal modification I made was to fit back-to-back protection diodes across the antenna socket. As a licensed radio amateur, I didn't want to cause any damage by accidentally squirting too much r.f. into the receiver's front-end when doing various tests and experiments in the shack. It's a simple job to solder two 1N4148 diodes (as in Fig. 1) across the BNC socket from the centre to the earth solder tag, keeping the wires as short as possible.

Putting It On Hold

I sometimes find it useful to punch in a frequency and monitor without entering it into memory. With the PRO-50 you can enter a frequency and then in order to listen, you press one of the search buttons. However, immediately a search button is pressed, the scanner shoots off in search mode, away from the entered frequency. In order to make it stay put, you first have to open the squelch, enter the frequency, press search and then press monitor before again closing the squelch.

To move along each frequency step manually, the squelch has to be open. When the set stops in search mode, if you then wish to stay on that channel after the transmission has stopped, the monitor button has to be pressed. This action enters the frequency into the monitor memory. I decided that a hold switch would be useful which enabled a frequency to be entered and the search button pressed without having to open the squelch or use the monitor memory. This then was my next modification.

Micro Control

The microprocessor within the PRO-50 controls both scan and squelch from the same input line. There is no apparent reason why the microprocessor has to control squelch and so I proceeded to separate the operation.

To get started the case needs removing. This is accomplished as follows. To open the case the battery should be removed and the four screws on the rear removed. The back can then be gently pulled off. Note that with the battery removed there is only about an hour before memory information is lost.

Moving on to the p.c.b.s now. First of all two tracks on the top board have to be cut, the one carrying the squelch/scan stop information to the microprocessor and the other carrying the squelch mute control from the lower digital board. No boards have to be removed from the set to do this and Fig. 2 shows the circuit modifications and additions for this and a tape control modification.

Solder Pads

On the squelch/scan track there are two little solder pads. On my set, I cut between these pads.
From the radio side, a diode was soldered across to pin 3 of the board interconnecting plug. If you have a surface mount diode then the other pad could be used instead of pin 3. On the squelch mute control track use was also made of a tiny solder pad to anchor the collector of a small signal switching transistor. The emitter was soldered to a land on the earth track.

A 47kΩ resistor was then connected between the base of the transistor and the radio side of the diode. This allows direct control of the squelch by the scan line from the r.f. amplifier.

Some signs of activity having taken place!
'PRO-50 MODS
Peter Julian Customises his Tandy PRO-50 Scanner

Fig. 3: The tracks to cut and where to fit the additional connections.

![Diagram of the PRO-50 circuit](image)

and demodulator integrated circuit (IC2).

Then a 2.2MΩ resistor was soldered to pin 3 and connected to a switch and another diode from the switch to pin 11 of the interconnecting plug. Now closing the switch will stop scan or search but will not open the squelch.

The solution seems to work well but does appear to have introduced a fractionally longer delay time between the end of the squelch closing and scan starting. I think this has something to do with a small time constant being added onto the scan line with the additional components.

A slightly more elaborate electronic switch with a higher impedance input than the combined single transistor and 47kΩ would probably overcome this, but in practice I didn’t find it worth the extra bother. In fact, I personally find the extra delay time quite useful.

Some Suggestions
When carrying out this modification I would make the following suggestions:
1) Use a fine tipped bit on the soldering iron.
2) Fold a piece of card over the side of the case to protect it from being scratched by the jaws and drill slowly using a hand drill. A rectangular slot can be easily formed from filing two holes drilled side by side. A suitable needle file should be used.
3) Hold the case gently but firmly in a vice with card to protect it from being scratched by the jaws and drill slowly using a hand drill. A rectangular slot can be easily formed from filing two holes drilled side by side. A suitable needle file should be used.
4) Hold the case gently but firmly in

Tape Control
The modification to the hold circuitry made redundant the PRO-50’s original transistor switch (Q201) used to open and close the squelch. This seemed a bit wasteful, so I decided to use it to provide a facility to switch a tape recorder on and off. I prefer not to connect external devices directly to the scanner. So I decided that using an opto-isolator was the answer. This allows an external interface to be plugged into the scanner which through the opto-isolator will enable the interface to switch a relay.

One set of relay contacts can then be connected to the tape recorder’s remote socket. The circuit of the tape control add-on is shown in Fig. 2. Please note that switching to hold will automatically activate the tape recorder but the system will also work in all other modes. I found that manual or monitor modes are probably the preferred method of use.

Using a 2.5mm socket is a good way of connecting the scanner to the interface. The components are not critical. Apart from the opto-isolator, all the components came from my ‘junk box’ and both the external interface and the opto-isolator circuit were assembled onto pieces of Veroboard. My unit features all p.n.p. type transistors in the tape control add-on.

Depending very much on the type of tape recorder being used, it might be possible to fit the relay board internally within the machine. Obviously if you are using a micro-style note taker then I guess you’re left with having a trailing lead set-up.

Image Problems
As might be expected with such a cheap radio, image problems on the mid-band v.h.f. proved a problem with f.m. broadcast signals breaking through quite strongly.

"Why don’t the designers put the local oscillator frequency below the tuned frequency instead of above?"

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"The design problem with this type of filter is choosing the right value of components so that the filter actually tracks in step with the received frequency."

Their high first intermediate frequency which renders them fairly immune to image signal reception. The PRO-50 is only dual-conversion and has a first i.f. of 10.7MHz and therefore is prone on mid-band v.h.f. signals to images from 21.4MHz above and on high-band v.h.f. and u.h.f. 21.4MHz below the actual tuned frequency. Notch filters are a good way of eliminating or at least considerably reducing the problem.

This solution is fine if the set is left monitoring one frequency, but when the radio is scanning or searching and looks at frequencies near the one to which the notch is tuned, the signals will be attenuated. My solution is a notch filter which will tune in step with the scanner.

The circuit for such a filter is shown in Fig. 4, here using a potentiometer to tune manually. The variable voltage produced by the scanner to tune its own front-end can also be used to tune the filter so it tracks automatically.

Correct Values

The design problem with this type of filter is choosing the right value of components so that the filter actually tracks in step with the received frequency. Reference to the circuit diagram of the PRO-50 provided me the resistor and capacitor values, but as for the inductor values and Varicap diodes, there were only part numbers which did not correspond to any numbers I could find in reference books!

However, all was not lost. Tandy at Bilston Road can provide the components. At first I was going to use the component values for the antenna circuit until I realised that these were for frequencies some 21MHz away from those in need of notching out. On reflection, I decided it would be better to use the local oscillator values since the oscillator runs 10.7MHz nearer to the image frequency.

Finding the value of Cx needed a little experimentation. For mid-band v.h.f. it would need to be slightly less than the value used in the oscillator circuit. The circuit was made up, again, on a tiny piece of Veroboard with all the components mounted on the top side except the Varicap diode which was soldered across the track side. (You need a steady hand and possibly a watch maker's eye glass to do this). A short length of coaxial cable with a BNC plug on one end was connected to an antenna socket and the filter was wired across this. A temporary control for the Varicap was set up as in Fig. 4. An antenna and the scanner were duly connected.
The prototype tape control unit.

I tuned the PRO-50 to a broadcast image between 69 and 70MHz and the control voltage for that frequency was measured at test point TP4 which is located by the power socket.

The filter was then tuned using the Varicap until the signal disappeared or was degraded as much as possible and the voltage at point X noted. The tuning slug could also be adjusted slightly but the trimmer was best left mid position. If the voltage on the test set-up was much higher than that measured at TP4, then the capacitor value needed to be reduced. When the two voltage measurements were virtually the same.

Setting Up

I fitted the filter into the radio and connected the voltage control line to TP4. Input and earth leads must be kept as short as possible. A stout piece of stiff wire connecting the top of the filter to the BNC socket and another piece soldered from earth to the nearest transformer can, kept the filter firmly fixed. Final adjustments were then made to the trimmer and transformer core using images of Radio 2 and Classic FM. The easiest way to do this is enter one frequency in a memory (Radio 2 Fx - 21.4MHz), then switch-on hold (assuming that this mod has been done of course) then press manual, enter the second frequency (Classic FM Fx - 21.4MHz), press either the up or down scan button and press monitor.

Then by pressing either manual or monitor the radio can be toggled quickly between the two frequencies as adjustments are made. Tune the filter by adjusting the transformer core on the lower frequency and the trimmer on the higher one. I found that when the filter was connected to TP4, some of the birdies increased in intensity. Connecting a choke in line as close to TP4 as possible cured the problem completely.

The final circuit for the mid-band v.h.f. notch filter is shown in Fig. 5. In use the filter gives some effective reduction of image break through of the broadcast signals when the scanner is used with a helical or whip antenna but, if a base station antenna is used, although there is still some reduction, it is often not sufficient to allow the squeal to remain completely closed. Obviously, results will vary according to how close the scanner is to the broadcast transmitters. In areas of very high signal level, the filter on its own will be insufficient to give a lot of improvement but at the very least it should reduce the bandwidth covered by the image signal with negligible insertion loss to other signals.

Images From The Other Side

It should be possible to make a similar filter for high band v.h.f. remembering that on this band the local oscillator runs 10.7MHz below the received signal. However, for me, image breakthrough on this band was not a real problem and, anyway, inserting a second filter would probably have meant extra band switching to take the filters in and out of circuit in order to prevent unwanted interaction between them. If anyone has any further development of this modification, I'm sure SWM would be interested to hear from you.

Indeed we would. If you have any modifications that you have successfully carried out to your scanner or any other piece of monitoring equipment that has improved its performance, let me know. You can E-mail me or drop me a line at the Editorial Offices. We may be able to publish your mods. - Ed. SWM

You Will Need

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold Switch</td>
<td></td>
</tr>
<tr>
<td>Resistor 47kΩ</td>
<td>1 off</td>
</tr>
<tr>
<td>2.2MΩ</td>
<td>1 off</td>
</tr>
<tr>
<td>Diode 1N4148</td>
<td>2 off</td>
</tr>
<tr>
<td>Transistor BC107 or similar n.p.n. switching transistor</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous Slide switch, micro miniature 2-way.</td>
<td></td>
</tr>
<tr>
<td>Tape Control</td>
<td></td>
</tr>
<tr>
<td>Resistor 1kΩ</td>
<td>2 off</td>
</tr>
<tr>
<td>10kΩ</td>
<td>1 off</td>
</tr>
<tr>
<td>Diode 1N4003</td>
<td></td>
</tr>
<tr>
<td>Transistors BC303</td>
<td>1 off</td>
</tr>
<tr>
<td>BC187</td>
<td>2 off</td>
</tr>
<tr>
<td>Opto-isolator 5F618-2 (CY94 Maplin)</td>
<td>1 off</td>
</tr>
<tr>
<td>Miscellaneous 6V relay; 2.5mm socket; 2.5mm plug.</td>
<td></td>
</tr>
</tbody>
</table>

Other plugs and sockets as required to connect to tape recorder.

Notch Filter | |
| Resistor 10kΩ | 1 off |
| Capacitors 22pF | 1 off |
| 1nF | 1 off |
| Trimmer 10pF (WL69 Maplin) | 1 off |
| Inductors RFC | |
| Service Manual Ref. no. | Tandy part number |
| HVU306A silicon Varicap diode D10941 | 7550-337 transformer CO4509 |
| The following items obtained were from directly from Tandy at: InterTAN UK Ltd., Bilston Road, Wednesbury, West Midlands, WS10 7JN. Tel: (01922) 433000. |

The PRO-50 service manual was, at the time of writing, available from any Tandy dealer.
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SPEECH PROCESSOR increases the average power of sideband transmissions by 10dB and together with enhancement of higher voice tones increases the intelligibility of your signal. It sounds nice too. SP1000, PCB and hardware kit £27.50. Ready built £42.75.
AUTO-TONEBURST provides 1750Hz for 500mS for repeater access, 28 x 28 x 14mm. AT1750, PCB kit £5.00. Built £7.50.
KAYTONE end of transmission morse letter K. Ideal for busy bands to help you be heard in the QRM. KT1000, PCB kit £9.00. Built £15.50.

SEND SAE FOR CATALOGUE
"It's easy," I said to Graham Tanner, our 'SSB Utilities' columnist, "to find the location of an air base. Just look up the latitude and longitude as stated in one of the published Supplements!"

He wasn't that impressed. What if there were readers who didn't know about latitude (lat) and longitude (long)? We'd confuse them. Fair point. After my crash course in this subject, you'll be able to navigate yourself anywhere in the world! Here goes.

Going Round In Circles

Before getting complicated about lat and long, let's start with the familiar, humble, circle. Actually, they are full of surprises, being the shape which maximises area while minimising circumference. A circular field contains the most grass yet needs the shortest run of fence to enclose it.

Then, the ratio of circumference to diameter (i.e. divide circumference by diameter for any circle) is always a fixed amount what we call pi. Also, we find that our number system can't write pi (unless we use up an infinite quantity of decimal places), yet pi is real enough and even comes into all sorts of radio and electronics calculations.

Enough of the magic of the circle (as distinct from Magic Circle, a club for magicians). I've described the circumference as the actual thing you draw to make a circle on paper, or the fence enclosing a circular field.

The centre of the circle is smack bang in the middle, like the bull's eye on a darts board. Any straight line that starts at the edge of the circle, goes through the centre and stops when it meets the edge opposite to where it started, is a diameter.

The centre is the point through which all diameters pass. If you start at the centre and go along half a diameter to the edge of the circle, this is called a radius.

Now, you'll need a protractor. One of those circular (or half-moon shaped) plastic things with angles marked on it, as sold in stationery shops. (I don't know why they're called that, they're also stationary - well have you ever seen one on the move?).

The full circle type is best. Around the edge are marked 360 equally-spaced notches. Each lies, of course, at the place where one of the diameters meets the circumference.

If you draw the radius from one notch to the centre, then draw another radius from the adjacent notch (also to the centre), you get two radius lines that are so closely spaced, they're hard to tell apart. The angle between them, measured where they meet at the centre, is one degree (1°). Nothing to do with the degrees proof of JW's wine, although all this geometry could drive you to drink (or chocolate in my case!).

It takes 360° to go round a full circle. Interestingly, 90° gives the immediately-recognisable perpendicular right-angle. Half-way round a circle, then, is 180°.

Here Is The News - I Mean NESW

On ordinary maps, it's conventional that the top edge faces the North Pole. Where's that? Now you need a globe, the sort that looks like a football with a map of the world painted on it and able to spin round.

The earth really does spin and in exactly the way shown by the globes that you can be in stationary (or moving) stationers. It does it without being held up by a pair of spindles or even the mythical Mr. Atlas. But, it behaves as if those supporting spindles were there.

Look at the globe again. One spindle, the one nearest to the British Isles, is attached at the top, i.e. at the North Pole. So, the other spindle, at the bottom, near Australia, is at the South Pole.

Now back to a map. The top points to the North Pole and the bottom to the South Pole. Start with a pristine map, just off the press, and fold it in two so that it looks like the way a newspaper is folded. Open it out. Do you agree that the fold runs from top to bottom, north to south?

Now, make a fold at right-angles to the first one. Open out the map, north at the top. The second fold runs from west (over to your left) to east on the right. If a protractor is laid on the centre of the map with the northwards fold running through the 0° mark, then east would be at 90°, south at 180° and west at 270°, which is the basis of steering a compass heading. Hence, North-East-South-West, NESW, running clockwise round the protractor or map.

Go Globular

The planet earth is a sphere, like a cricket ball. Just like the ball that Wallace hit for six onto the roof of the stands, it's actually slightly flattened. I'll ignore It takes 360° to go round a full circle. Interestingly, 90° gives the immediately-recognisable perpendicular right-angle. Half-way round a circle, then, is 180°.
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The side keypad provides four arrow keys presented as a single 'rocker' resulting in more natural and intuitive navigation through the on-screen menus. Tuning is accomplished via a variety of controls including a side panel indented main tuning dial, arrow keys and keypad. A larger than average back lit LCD with contrast control provides operational data with the ability to add 12 character text comments to each memory channel and search bank, a text search feature simplifies identification and recall of stored information. A high resolution signal meter and multi-function band scope is provided with adjustable width and save trace functions. The scratch resistant "military green" cabinet has a quality feel.

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As if this was not enough, optional internal SLOT CARDS (which fit into the AR8200 base) extend the AR8200 capability even further:
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The Long & The Lat Of It

that and pretend it really is a sphere. We also call a sphere a globe, hence the name of the object you find at the stationer's.

When big companies become multi-national, they say that they've become 'global'. A spherical company just doesn't sound the same.

A sphere also has a centre and of course diameters and radii. The earth's average diameter is 12742 kilometres ('average' because it's not a perfect sphere, but a flattened one). There are more magical properties, as spheres enclose the greatest volume in the smallest surface area.

If you wanted a tank of hot air, make it spherical as this gives the least chance of the heat being lost through the surface material. The Houses of Parliament are rectangular so as to allow easy escape of all the hot air generated by the occupants, indeed some people allude that the debates are a load of, shall we say, 'spheres'.

A cricket ball has a seam, partly so as to keep the likes of Dominic Cork in business, but more because they couldn't stitch it together any other way. Some cheap globes are made in two halves and have a seam in the same place. The earth has no such seam, but I'd like you to pretend that it has; call it the Equator.

Latitude

In Fig. 1 I've shown our earth as if it's a glass sphere. So, you can see its centre. The axis on which it rotates, that's to say the diameter that joins the poles, is also shown.

A radius goes from the centre out to the equator and this radius line is perpendicular to the axis of rotation. Actually, you could draw any number of radii from the centre to the equator, depending on which country they emerge in at the surface. In Fig. 1, I've just shown one example.

The equator is an example of a line of latitude. Let's have another one, also in Fig. 1. Another radius is at 45° to the first one. The idea is to make a mark on the surface of the globe where this radius ends. Then, draw all possible radial lines at 45° to the first set of lines.

This is just an imaginary exercise, there are lots of them. An infinite number, in fact. They'd all lie on the surface of a cone.

Anyway, where they pass through the surface of the sphere, they mark out another line of latitude. It's parallel to the equator, 45° from it and below (south) of it. So, it's the 45° South line of latitude (and you can see why these lines are also called 'parallels', this is the 45th parallel in the southern half of the globe).

Longitude

Lines of longitude are shaped differently. In Fig. 2 I've taken half a glass sphere, looking like a stationery shop globe before they join the two halves together at the seam (I mean equator, I mean 0° latitude line). I've still shown the rotation axis; the South Pole is there, but I've cut off the North Pole. You'll just have to use your imagination.

This time, I've drawn out a radius but a whole diameter line that's perpendicular to the rotation axis. I've drawn a line of longitude from one place where the diameter emerges at the surface of the sphere, my line of longitude then goes through the South Pole and back round to the other end of the diameter. Although not shown, it carries onto the North Pole and finishes back where it started.

Moving 15° round, I've drawn another diameter line and its corresponding line of longitude. Notice that all lines of longitude go through both Poles. They are not parallel.

The line that goes through Greenwich has been chosen as the 0° longitude line. These lines are also called meridians, so this is the Greenwich meridian. There's nothing special about Greenwich (I don't mean to offend readers who live there), they could have chosen Paris or New York to mark the central meridian. But, no fighting please, Greenwich won.

If you look at a map, West is to your left. If the map shows Greenwich, then anywhere left of that town is west of it and anywhere to its right is east of it. Likewise with lines of longitude. In Fig. 2 I've shown a line 15° west of the Greenwich meridian.

What's Time Got To Do With It?

Imagine watching the earth rotating from a fixed point in space (the Sun will do) and waiting until some town like Greenwich came into view. When Greenwich directly faces the sun, it's mid-day there. Obviously, it takes 24 hours for Greenwich to come round again.

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Meantime, it's gone right round through 360° in 24 hours. How far in one hour? It's 360/24 = 15° per hour. Every 15° round the earth is a time zone difference of one hour.

What they did in the days of sailing ships was to set an accurate clock (such as a Harrison's Chronometer) to Greenwich time. Many days into the voyage, the ship's navigator waited for local mid-day when the sun was at its highest point. The chronometer was now read. If it showed, say, 2pm for Greenwich time, then the ship must be 2 x 15 = 30° back from Greenwich which is on the 30° west line of longitude.

Note that this doesn't fix the ship's position. It could be anywhere on the line. To find the exact position requires knowing the latitude too. Where the lat/long lines cross, that's you! These days, chronometers are confined to museums.

For a fraction of the price, you can buy a Global Positioning System (GPS) receiver that fixes your location by satellite. It still tells you lat/long as the answer, though!

In fact, GPS is so accurate that the earth's flat points become important. Much of the original surveying and mapping of the earth is very slightly inaccurate, partly for this reason, and only GPS is accurate enough to show this problem. A more precise charting of the earth's surface is to the World Geodetic System of 1984 (WGS84), that's what your GPS tells you, it's also why aeronautical charts are being updated for greater accuracy.

How Much Further?

I haven't finished yet! Since you brought up the subject, latitude can measure distances. The lines are parallel, that is to say, spaced the same distance apart, wherever they are on the earth's surface. Right? Wrong! The earth is flattened, not a perfect sphere, so there will be small errors when measuring in this way.

Ignoring this, for now, each degree of latitude is a line drawn round the earth, as we've seen. A degree on a protractor seems tiny but, on the earth's surface, it's huge. It needs sub-dividing.

Just like an hour is divided into 60 minutes, so a degree is split into 60 equal parts - also called minutes. You'll believe me that a minute can be further split, 60 equal ways again, and we call these seconds.

So, a latitude line might be at N50°35'6" (fifty degrees, thirty-five minutes and six seconds North). You'll see this abbreviated (e.g. to WGS84 standard) as N503506. Watch out, though, as most older aeronautical charts show degrees and minutes only, with the minutes as a decimal fraction number (the example above is N50°35.1' or even N5035.1 in abbreviated form).

As for distance, they decided that one minute of latitude was a convenient size and called it a nautical mile (nm). Wrong, of course! The flattening of the earth's sphere leads to small errors and eventually navigators gave up this idea. Instead, the International Nautical Mile has been re-defined as 1852 metres. Precisely.

Don't forget that longitude is also subdivided into degrees, minutes and seconds (or minutes as a decimal fraction number). Longitude runs from 180° (South Pole) via 0° (the Equator) to 180° (North Pole). As for longitude, though, it starts at the Greenwich Meridian 000° and goes half way round the world, in degrees east, until it reaches 180° or, instead, goes the other way round from 000° and reaches 180° via degrees west.

An example longitude could be E030°9'3" or, abbreviated, E0300903 or, with decimal minutes instead of seconds, E030°9.05 which can also be abbreviated to E03009.05. So, watch out and don’t let these different formats confuse you.

A closer look at Fig. 2 shows what happens when a longitude line passes over a pole. It's reached the 'back half' of the sphere. Half-way round a circle is 180° round, you remember. So, our longitude lines are suddenly re-numbered at the poles, all changing by 180°. The 0° line becomes 180° 'seen from behind', likewise 15° West becomes 180 - 15 = 165° East.

As longitude lines converge, the distance between them is of little help.

At the poles, they all join together so GPS would show rock-steady N90°00'00" at the North Pole while the longitude display would fluctuate wildly.

Standing at the North Pole, whichever way you face, you'll be looking along a longitude line. All these lines travel round the earth and meet up again at the South Pole. So, whichever way you face - you can only look southwards!

Watch Out For OSGB

The Ordnance Survey of Great Britain (OSGB), nothing to do with ordinance - that's nasty things like guns - have their own grid for drawing horizontal and vertical lines all over their maps. Very useful they are too, in a parochial way. There's one grid for Great Britain and a different one for Ireland.

Unfortunately, relating the OSGB National Grid (nothing to do with electrical power distribution, although I suppose National Grid PLC mark their cable on OSGB maps!) to lat/long isn't easy. If you must plot a lat/long co-ordinate on an OS map, then lat/long markers are helpfully placed round the map's edges but not on the body of the map itself. You can put them there with a pencil, but you'll need a long straight-edged object so as to join the corresponding marks on opposite edges of the map.

Have you understood all that? Right, plot N51°37.07' W000°16.35' and see where it is. Yes, it's me - the co-ordinates of my house. If you want to know where that it, see the heading on my 'Airband' column in this magazine!
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Why doesn’t the vertical antenna get more respect?

Joe Carr K4IPV explains.

The vertical antenna has a certain charm for people who lack space in which to erect an antenna. People with small gardens can still wring a fair amount of performance out of a simple vertical. Yet verticals - especially ground mounted verticals - have a bad reputation in many quarters. Let’s take a look at these issues and see how they can be solved.

I first heard about verticals being ‘worthless’ from some older amateur radio operators, all of whom had 15 to 30m towers topped off with rotatable Yagi or cubical quad antennas. Yet, my mentor, Mac Parker W4I1 has a Hygain trap vertical for 40 through 10m mounted on the ground, and a special coil to adapt it to 75/80m. And it worked fine on his smallish hillside site. Mac’s transmitter was a Johnson Viking Ranger that put out about 65W a.m. and 90W c.w.

I also met a young fellow in the Potomac Valley Radio Club, one of the most competitive ‘contesting’ clubs in the USA, who used a vertical. He lived in an apartment flat in Washington, DC that didn’t have a small yard, but rather it had none at all. He used the same vertical as W4I1, but mounted on the building’s flat roof. A set of radials all around the antenna acted as a ground plane. This young man turned in impressive scores on every contest, and had worked nearly 280 countries with his amateur radio set-up. And what kind of transmitter did he have? Was it a kilowatt blowtorch? No, it was more like a soggy match than a blowtorch. He owned a Heathkit DX-20 with the outboard VF-1 variable frequency oscillator. I don’t recall the actual power level of the DX-20, but I don’t believe it was around 50W or so.

Vertical Antenna Designs

A look at Fig. 1 shows the basic design of a vertical antenna. In its ground mounted version it consists of a radiator element connected to the output of a generator, which might be either a signal source or signal sink. In the case of a transmitter, the signal source is the transmitter and coaxial cable between the transmitter and the antenna. In the case of a receiver the ‘generator’ is actually a signal sink (the receiver’s antenna input circuit) and the coaxial cable.

The radiator is installed perpendicular to the ground, so will produce vertically polarized signals. When used on receive, the antenna responds best to vertically polarized incoming signals, although the response to horizontally polarized signals is not zero.

The radiator can be a length of copper wire similar to the wire used in horizontal antennas such as the dipole. This material is not self-supporting, however, so requires a support at the top end. A variation on the theme is to use a length of thick-walled PVC plumbing pipe with the wire run inside of the pipe. This is the approach taken by people requiring a ‘hidden’ antenna. The PVC pipe is styled a ‘flag pole’, and who (even on the homeowners association board) can criticise a little old-fashioned flag-waving patriotism?

More commonly, perhaps, is the use of copper or aluminum tubing for the vertical radiator element. Copper works well, but is expensive and turns a rather unpleasant shade of green within a few days of installation. Aluminum...
situation. On the plus side, the omnidirectional pattern means that we can transmit or receive in either a strength or a weakness depending on the reception. This pattern is received equally well in all directions. This pattern is shown in Fig. 2a is omnidirectional, i.e. it radiates or receives in all directions. This is a good idea when the directivity of the desired station is not known. The down side is that radio reception is basically an exercise in signal-to-noise ratio. An omnidirectional antenna provides no directional discrimination, so all same and near frequency stations are audible at the same time. One of the principal uses of directional antennas is to attenuate unwanted natural or manmade noise sources as well as other signals. This facility is lacking in vertical antennas. I believe this is one factor in the claim that verticals are ‘worthless’.

The elevation pattern is tilted upwards at an angle from the earth’s surface. This angle of radiation is another reason for varying opinion about verticals. When angle of radiation is high, the length of the skip zone is shorter than when the angle is low. DXers like horizon-hugging angle of radiation whenever possible. The quarter wavelength vertical has a relatively high angle of radiation. As a result, DX performance may be compromised, and this may be still another factor in the lack of respect accorded verticals. However, if you go to a 1/2, 5/8 or 3/4 vertical, the angle of radiation decreases substantially. Impedance matching problems are different in those verticals, but they are easily handled.

Earth Losses And The VSWR Delusion

The quarter wavelength vertical antenna is a resonant antenna fed at the base. The feedpoint impedance will be between about 2 or 3Ω to a maximum of 37Ω. When the impedance is 37Ω it makes a reasonable match to 50Ω coaxial cable. In that case, the lowest possible v.s.w.r. is 52/37 = 1.41. If the impedance is lower than 37Ω, the minimum possible v.s.w.r. is higher than 1.41 (perhaps quite a bit higher).

A lot of sweat and tears are expended trying to make the v.s.w.r. of antennas as small as possible. To get to 1:1 v.s.w.r. is something of a holy grail quest. But it’s also sometimes misdirected. Although there are good reasons for trying to get as low a v.s.w.r. as possible, it’s not always reasonable. An erroneous belief exists that there is a one-for-one improvement in antenna efficiency for decreases in v.s.w.r. It’s not quite that simple. Also, in vertical antennas particularly the v.s.w.r. might be artificially low because of earth losses.

From time to time we hear that a particular antenna has what seems to be a far too low v.s.w.r. When you see a 37Ω antenna fed with 52Ω coaxial cable sporting a v.s.w.r. less than 1.41, then there is reason for suspicion.

Vertical Radiation Patterns

It is customary to publish antenna patterns in both horizontal and elevation planes, and that is how I will present the patterns for vertical antennas. But first let me remind the reader that these patterns are merely slices taken from a three dimensional solid.

The horizontal and elevation aspects of the vertical’s radiation pattern are shown in Fig. 2a and Fig. 2b. The elevation pattern shown in Fig. 2b assumes a ‘perfect’ earth. To visualise the three dimensional pattern from which these are derived imagine a New York bagel. Those torous shaped blobs of bread can be sliced horizontally through the middle (as is the usual custom). Instead of spreading jam on the two halves, lay one half flat on the table. That ‘half bagel’ is a reasonable approximation of the vertical antenna’s three dimensional radiation pattern. After you have properly visualised the radiation pattern, pick up the bagel, slather jam or marmelade all over the flat surface exposed by the cutting, and enjoy a nice snack - true bagel afficienados will reel back in horror...only cream cheese is a proper bagel topping!

I once used the doughnut as a model for radiation patterns, but found that not all countries make doughnuts in the American manner. We make them torous shaped with a hole in the centre. In some other countries they are often solid.

The horizontal (azimuthal) radiation pattern (Fig. 2a) is omnidirectional, i.e. it radiates or receives equally well in all directions. This pattern is either a strength or a weakness depending on the situation. On the plus side, the omnidirectional pattern means that we can transmit or receive in

"A lot of sweat and tears are expended trying to make the v.s.w.r. of antennas as small as possible."
Another suspicious case is the antenna that is too broad banded. High Q antennas are relatively narrow banded, so the v.s.w.r. rises dramatically either side of resonance. A low Q antenna, on the other hand, is broad banded as shown by the fact that the change of v.s.w.r. at frequencies departed from resonance is more gradual. The problem, and the reason for the suspicion, is that the Q of the antenna is determined largely by the length-diameter ratio of the antenna. For wires at high frequencies (h.f.) the L/D is huge, so the antennas are relatively high Q. You will see the v.s.w.r. change rapidly at frequencies away from resonance. Similarly with aluminum tubing antennas. The value of L/D is less than for equivalent lengths of wire, but it is still high.

One reason why a vertical antenna would show abnormally low v.s.w.r. and Q figures is ground losses. A quarter wavelength vertical lacks the 'other half' that is seen in the dipole, so it seems to lack a place for currents to flow on the alternate half cycles. The antenna is said to have an image in the earth because of displacement currents flowing in the earth. These currents are created by the electrical fields and the capacitances between the radiator element and the earth (Fig. 3). These currents return to the generator through the high resistance of the earth. Currents originating out to about 0.4 are significant in this respect. Because the pattern is omnidirectional, the 0.4X zone is all around the antenna (Fig. 4).

The reason for the depression of the v.s.w.r. and Q values is that these currents add a separable loss to the equation. After all, the resistances and currents are real, so by I/R we expect that some power is dissipated heating the soil. While that might not be such a bad thing in winter time, especially for hibernating earth worms, it is not exactly good for the efficiency of the antenna. Any time an unwanted resistance is introduced to the antenna circuit, the apparent Q and v.s.w.r. figures are affected. The direction of v.s.w.r. change may give a warm, fuzzy but false feeling that all is well (and that our vertical works better than the other guy's vertical - but false feeling that all is well (and that our vertical is a reliable guide)).

Earth System

One of the principal reasons why the vertical antenna is believed to be such a poor performance is that too many of them are built with rather poor earthing. The earth system shown in Fig. 5 is used by many builders. The earth side of the transmission line from the receiver or transmitter is connected to a earth rod. The earth rod might be part of the mounting for the antenna, or a separate earth rod driven into the soil adjacent to the mounting. The problem is that the earth currents from out as far as 0.4X must still flow through high resistance soil to reach its destination at the earth rod.

No matter how long the earth rod might be, it does not mitigate the effects of that long resistive path. One source that I consulted suggested that a current path for a 31m band quarter wavelength vertical, which extend out to 0.4 X = 12.4m, would be on the order of 10kΩ. Of course, this figure is for a single pencil-thin piece of soil over the entire length, so when spread out over the entire circle around the antenna is considerably less. If, for example, we model or antenna so that the resistances are calculated by 0.1ι around the antenna, the actual ground resistance is on the order of 10000Ω/3600 = 278Ω.

The solution to the problem is to lay down a pattern of radials around the antenna (Fig. 6). Radials are wire conductors radiating out from the mounting point of the antenna. If the radials are mounted above ground, or in any way insulated from ground, they should be quarter wavelength long. But if the radials are in contact with the ground, either on the surface or buried (which is better from a safety perspective), then they can be any length. Currents flowing to the end of the radials can just keep on flowing into the earth, rather than being reflected as they are in above-ground or insulated radials. As a practical matter, the most effective length for buried radials is 0.4X. On multiband systems, make the radials 0.4X at the lowest frequency of operation. The higher frequencies are then taken care of as well.

How Many Radials Are Enough?

This is one of the primary questions to ask when constructing a vertical antenna. The quick answer is "the more the better". I have substantially improved the performance of verticals by going from a ground rod to a ground rod plus two 0.25X radials. Old timers at the local radio
Uniden Bearcat 9000 XLT - AM/FM/WFM switchable base station HF/VHF/UHF scanning receiver. Covers 25-550 and 760-1300MHz. Features 500 memories, auto sorting, backlight and orange LCD display. Scan rate of 100/300 channels/sec. £259.95 + £10 P&P.

Yupiteru MVT-7100 - All mode switchable handheld HF/VHF/UHF scanning receiver. Covers 0.5-1650MHz. Features 1000 memories, over 500 pass memories, 10 limit search banks, 12 step sizes. Comes complete with earpiece, belt clip, wrist strap, rechargeable batteries, PSU, in-car adaptor and telescopic antenna.

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store tell us that four radials is the magic number. And indeed a four-radial vertical (Fig. 7a) works better than a two-radial version. The *Engineering Handbook* of the National Association of Broadcasters (USA) uses the figure 120 radials for a.m. broadcast verticals, but that is in response to an FCC regulation. Some professional and high level amateur antenna books recommend 50 to 60, or 50 to 90 radials depending on which source you select. Clearly, digging up your garden to lay down 120 (or even 50) radials is not desirable. Most amateur radio texts recommend between 14 and 16 radials (Fig. 7b) on earths that the return on investment above that number is diminishing.

We can do a simulation to determine the effectiveness of radials. Keep in mind that "all models are false, but some are useful". The falseness derives from the assumptions made or not made in the model.

Let's create a model in which there are 'radial resistors' of soil arranged around the antenna's 360° pattern every 0.1°. That means we will have 3600 soilistors (I didn't really say 'soilistors' did I?), each 10kΩ, arranged in parallel. The total resistance is 1000Ω/3600 = 2.78Ω. Now, let's replace the soilistors one-by-one with copper wire, 0.4X long. A length of a certain gauge copper wire that is 0.4X in the 31m band has a resistance of close to 1Ω.

Now let's replace 10kΩ soilistors one-by-one with 1Ω copper wires and see what happens to the total ground resistance. The total radials resistance will be 15kΩ, where N is the number of radials.

We must find the parallel combination of the total soilistor resistance and total radial resistance. I wrote a Visual Basic program to do this job (Qbasic no longer being supplied on Windows machines). A file was created on a diskette that contained 3600 values. The first value assumed no radials, and the last assumed all radials (3600). Each step in between had one fewer soilistor and one more radial than the previous step. The data were then ported over to an Excel spreadsheet so they could be graphed on an X-Y scatter diagram. The total number of data points was too large to see the curve in a meaningful manner, so I plotted just the first 30 data points (Fig. 8).

Notice the shape of Fig. 8. The resistance drops very rapidly as each new radial is added from 1 to about 15 radials. Above 15 radials, however, the change of resistance for each additional radial is very small, the curve being almost asymptotic. The cost and effort required to add radials after 15 is simply too great for the return on investment. As a result, I tend to accept the amateur limit of 14 to 16 radials as valid.

Keep in mind that this is a rather simple minded model, and would probably not suffice for professional antenna engineering use. However, it amply demonstrates the problem and the reasoning between setting a sixteen radial limit.

Now let's take a look at one more thing before concluding. Figure 8 shows the elevation pattern of a quarter wavelength vertical antenna over a less than perfect earth. This particular pattern was modeled using an 'urban and industrial area' ground and no radials. Now compare it with the 'perfect earth' elevation pattern in Fig. 7b. Note that the poor earth raised the angle of radiation. The effect of this change is to shorten the skip zone for DX reception or transmission. As a result, people with this type of earth may moan that they "can't hear over the horizon with a vertical". A few radials would depress the angle of radiation and lengthen the DX legs of the antenna.

**Conclusion**

Much of the bad reputation endured by vertical antennas, especially ground mounted verticals, is due to either incorrect expectations regarding signal-to-noise ratio and angle of radiation, or poor performance arising from earth resistance. The first two are alleviated by understanding the nature of the radio propagation to and from verticals and using it to best advantage. The other problem is alleviated by installing at least four, and preferably sixteen 0.4X radials to form an improved ground system.

Note: The antenna patterns shown in this article were modeled using NEC-Win Basic by Nittany-Scientific.

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*UK readers only. Contents subject to change
The Lafayette receivers may not be that well known to British short wave listeners but the company, basically a distribution company in America, imported and exported quite a few nice examples of radio sets from the mid 30s to the late 70s. A couple of them are detailed here that, if found at rallies, car boot sales and so on, could be of interest to those just starting and should not cost an arm and a leg.

The HE-30 Receiver

The HE-30, supplied under the Lafayette banner, is a single conversion, 4-band receiver covering 550kHz to 30MHz. A bandspread facility offers seven portions covering the 80 to 10m amateur bands. Available on the second-hand market for small sums, this set could make an ideal starting point in short wave listening.

This 9-valved receiver bares a close resemblance to the Trio 9R59D set, in fact when the cover is removed, the i.f. transformer cans bare the TRIO legend. The set is different though in that it offers the facility of a Q multiplier in place of a straight b.f.o.

Circuit Description

Fig. 1: Block diagram of the Lafayette HE-30 RX.

There is a bandspread function that gives seven slices which cover the 80 to 10m amateur bands, there being two slices for the 80 and 40m allocation to accommodate the US amateur bands.

Controls

Two large knobs are provided for main tuning and bandspread tuning. Large cast flywheels are attached to the rear of these controls which does help in the 'feel' of the tuning but as a cord drive is used between the controls.

Frequency Coverage

The actual coverage is as follows:

<table>
<thead>
<tr>
<th>Band</th>
<th>Frequency Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Band 1</td>
<td>550 - 1600kHz</td>
</tr>
<tr>
<td>Band 2</td>
<td>1.6 - 4.8MHz</td>
</tr>
<tr>
<td>Band 3</td>
<td>4.8 - 14.5MHz</td>
</tr>
<tr>
<td>Band 4</td>
<td>10.5 - 30.0MHz</td>
</tr>
</tbody>
</table>

Further 6BE6 is used as the main local oscillator feeding an injection signal to the mixer on the high side of the antenna frequency.

Two stages of i.f. amplification are provided, using 6BA6 valves. A 6AV6 operates as the Q multiplier and b.f.o. A Q Multiplier is a circuit designed to increase the Q or sharpness of a tuned circuit, in this case the i.f. transformer circuit, and thus improve selectivity and gain. As the gain of the Q multiplier stage is increased though, the circuit breaks into oscillation and acts as the b.f.o.

Trying to use the Q Multiplier does take some getting used to. In fact, I was not able to make it work as it should, and simply reverted to using it in the b.f.o. mode only.

A 6AV6 is used as detector, a.g.c., and audio pre-amp, which feeds a 6AQS as the audio output stage. A 5Y3/5CG4 is used as the full-wave rectifier producing the h.t. for the set.

There is no stabilised supply provided for the oscillators and this is something that could be added, a small OA2 for instance could be employed in the role. All the valves use 6.3V heaters and a pair of 6.3V dial lamps are also fitted to illuminate the scale.
The HE-30 (upper) and HE-80 receivers. Band-spread scales are the lower of the two on each set.

and the tuning capacitors, the tuning lacks the ultimate smoothness of a geared drive.

A main function switch selects either OFF, ON AM, standby, or ON CW/SSB. In the s.s.b. position, h.t. is applied to the Q Multiplier/f.f.o. An audio gain, an i.f. gain and an antenna trim are provided along with a.v.c. ON/OFF and an audio noise limiter, which proved rather ineffective and simply distorted the audio. A bandsweep completes the control compliment for this set.

On the rear wall are terminals for antenna, earth, speaker and a pot to set the S meter zero level. It is interesting to note that the large i.f. transformer cans are stamped with ‘TRIO’, the obvious maker from whom Lafayette imported these sets.

The HE-80 Receiver

Having a very similar styling and frequency coverage to the HE-30, the HE-80 is slightly larger and has the additional coverage of the 2m band plus a 100kHz calibrator facility.

There appears to have been at least two versions of this set. The HE-80WX, marketed in the USA, had coverage of the 6m band in place of the 2m band on the UK version. The set is single conversion on the short wave bands, whilst it operates in dual conversion mode when on 2m.

The 2m coverage provided is from 142 to 148MHz, this is tuned on the receiver as 5 to 11MHz, but it has its own scale on the dial and separate antenna socket on the rear. Due to the open nature of the set’s construction, there is a small amount of leakage, i.e. short wave signals being heard whilst tuning the v.h.f. band.

Also, due probably to poor design, there are quite a few ‘birdies’ to be heard, i.e. not actual received signals but mixing products giving loud blips across the tuning.

The HE-80 uses 10 valves in the main receiver, two more as the rectifier and stabiliser, and three valves in the 2m converter, i.e. 15 in all.

Available on the second-hand market for small sums, this set could make an ideal starting point in short wave listening.
Interior of HE-80 with the p.s.u. on the right, i.f. along left wall, detectors and a.f. output along rear wall. Two metre converter upper right.

On the HE-80, the b.f.o. and Q Multiplier are separate functions. The Q Multiplier works quite well in this set, being used on c.w. or crowded s.s.b. signals it does reduce the bandwidth and lifts the gain quite effectively.

The 100kHz calibrator is useful, but I feel it would have been more useful as a 1MHz calibrator. The crystal could be changed quite easily though. Again, as in the HE-30, the noise limiter is fairly ineffective, giving more distortion than noise limiting.

In Use
Operation of the receivers is straightforward enough, the required band is selected and then tuned as required. To set up the bandspread, the main dial pointer is first placed at the pre-marked spot on scale, these small markers are provided for each amateur band, two for the 80 and 40m sections.

Whilst not in use, the bandspread dial should be 'parked' at the right-hand end of the scale, this ensures the main dial reads accurate. With the main dial set to one of the bandspread marks, the bandspread tuning can now be used with the frequency being read off the lower bandspread markings.

The antenna peak is adjusted for best signal, very strong signals can be limited by adjusting the i.f. gain control on the HE-30 and r.f. gain on the HE-80. With the b.f.o. switched on, c.w. and s.s.b. signals can be resolved, the gain of the received signal being adjusted either with the i.f. gain pot or the antenna trimmer.

The sensitivity and selectivity of the sets are nothing to shout home about, the specifications are good enough though for general listening, ideal for those just starting out on the short wave path and not wishing to take out a second mortgage for the pleasure!

The Q Multiplier, on the '80, takes some getting used to. As the selectivity control is advanced, a notable increase in gain takes place. Advance the control too far and the i.f. stage bursts into oscillation.

At this point, the selectivity is backed off a touch and the tuning rotated to achieve the best signal reception. The Q Multiplier is useful on c.w. stations, it really narrows down the bandwidth nicely, and on s.s.b., it can be used to get rid of adjacent signals to some extent.

Using the set with a 40m long wire produced good enough results on the amateur bands with more than enough gain for the commercial bands. Eastern European stations, South Americans and Asian alike were received on the 41 and 31m bands whilst WA/KA 4, 6 and 9 where heard on 20m, 5B4, ZS and VU on 15m.

The set would suit young and old alike, as it is simple to operate and requires only the smallest of table tops. The cost of either set should be quite reasonable and even worth buying just to play with or try out a few modification ideas on. Happy listening! SWM
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E-mail

Three came in by this route. The first one was from Maury I121171 who is the SWL Manager for ARI and has a monthly column in Radio Rivista. Maury says I'm dedicating too much space to readers band reports, since there are many newsletters from which to retrieve data from - the DX News Sheet springs to mind.

Perhaps Maury has missed a point here - in my experience only a tiny proportion of listeners subscribe to such newsletters, and anyway by the time a reader's report reaches the issue it's history anyway! For example, on May 11 started a column to reach the Editor on May 18, ready for you to read in the July issue, which is on sale on June 26th. Personally I try to reflect in the column what appears in the mail, so the more questions the better.

The second one is from Neil Radley, who has tried listening to the new band - I assume Neil refers to the 73 or 136kHz - but all he can hear is 'a digital signal of some sort'. Two possibilities arise here.

Firstly it might be Morse Neil is listening to - sorry if that seems a bit obvious! - and secondly it might well be pick-up through the earth system. Any 'normal' antenna will be extremely low impedance compared to that of any normal earth system so that any earth current signals will predominate. The answer then is to put up some sort of balanced antenna or Multiple Earth) wired - houses built in the last decade or so are PME, but earlier ones are not. If the wiring is older, a physical check on its condition is worthwhile.

If you use an antenna system which requires earth for proper operation, for example the end-fed wire, you might want to isolate the receiver from the mains earth. Make a check - connect the live side of the mains through a 13A fuse straight down to the r.f. earth for one full second. Switch off and check whether the fuse has blown - if it hasn't, your radio earth isn't good enough for safety.

If your house is pre-PME, doing the same check on the mains earth might justify a panic call to your local electrician! If you must use the traditional earth, be sure yours is connected nearer to ground than the mains earth or use a counterpoise. That way there is no common piece of wire to couple noise into the r.f. side. Finally, feed power to the station by way of an earth leakage breaker (ELCB) just in case.

Post

Beginning with some c.w. from Ted Tredwell. Ted has a magnetic loop, GSRV and an HF6 vertical. He finds the HF6 better than the others on 21-24-28MHz but this does seem to depend on the time of day.

Even more plaintively, Ted says the grass is growing so fast he can watch it, so every few days he has to trim it from round the base of his vertical!

A new contributor is Martin Goodey from Holy Vale, St Mary's, Isles of Scilly - just four days ago my XYL and I passed his front door not knowing he had written to me! Martin has an AR7030 and end-fed 25m wire antenna with which he has logged on 21MHz Y59NXN, ZD9CO, ET3AA, 9K2ZZ, 9K2XUR, 9K2UR and P43A. A short burst or two on 18MHz yielded HS2SY, HS2YS and P43A.

Our next port of call is Oxford, and Paul Goodhall who had his listening time cut short when his wife was hospitalised leaving him to do the family chores. Our best wishes and hopes for you both. As with most contributors this time, Paul found openings on 28MHz, interestingly finding 4X4s on the band while 21MHz was unproductive on 14MHz Paul noted the long-path VK opening around 0730.

On Top Band, Paul noted VE3BMP/V and EA1DVY. Among Scottish islands, GM3VLB/P was on Staffa for about 25 minutes only, while GMOKJW/M was on Stroma. GM3LB/V reappeared from Colonias, GMKJ/JW/M from Eady, GM3LB again from Ulva, GMKJ/JW from Westray, and GM3LB back on Mull. GMOKJ/V popped up from Burra, GM3LB/V from Arran, then Islay, Pladda and GB2HI was on Handa. GM3LUV also operated from Arran, and GM3LB/V showed up from Holy Island (The GM one that is) working GMOAXY on 21-24MHz, while 25MHz was poor on 5MHz Paul noted the long-path VK opening around 0730.

On Top Band, Paul noted VE3BMP/V and EA1DVY. Among Scottish islands, GM3VLB/P was on Staffa for about 25 minutes only, while GMOKJW/M was on Stroma. GM3LB/V reappeared from Colonias, GMKJ/JW/M from Eady, GM3LB again from Ulva, GMKJ/JW from Westray, and GM3LB back on Mull. GMOKJ/V popped up from Burra, GM3LB/V from Arran, then Islay, Pladda and GB2HI was on Handa. GM3LUV also operated from Arran, and GM3LB/V showed up from Holy Island (The GM one that is) working GM0AXY on the island of May. GM4CH/KP was on the Isle of Ewe, and Scalpa was also represented. All these for the Islands of Scotland Award open to s.w.l.s. Details from Dave Warburton GM0ULV, Law Vista, Errol, Perthshire, Scotland PA27QO.

Here & There

Some to look out for, courtesy of DX News Sheet/DX News Magazine.

CY9AA will be on from June 25 to July 15, by VE9AA, 9N1UD between 5 July and November will be K4IJU, and the hope is that a Father Moran Memorial station may be set up, using his old call. Bahamas will be activated between July 10 and August 2 by N4JQG as K6AFP, white 5×50G hopes to be there on August 24 from Coco Cey, the C6 call not known at the time of writing.

Bill Rindone VE7SBO in DX News Magazine notes the deleting of Southern Sudan from the IOTA Countries list and the reasons. More important, Bill notes that he still has the logs for all the 25 DX operations he did over the years and would be pleased to help any one still lacking a card. Note that he was also VP9GSE.

During the summer, keep an open eye for the IOTA Contest on 24/25 July, and the various IOTA operations outside the contest too.

Wrap-up

That, alas, is all we have space for. Letters please to the E-mail address above or to Box 4, Newtown, Powys SY16 1ZJ as the first of the month as usual.
Book Reviews

Crystal Set Building and More

*Volume 6 & 7 The Xtal Set Society Newsletter*
Published by The Xtal Set Society, PO Box 3026,
St. Louis, MO 63130, USA
ISBN 1-887736-09-3
168 pages. 229 x 152mm Soft cover
Price £10.50 from the *SWM* Bookstore.

What is amazing about this, the latest offering from The Xtal Set Society, is that not only is there a society devoted to crystal set 'technology', construction and design, but that so much can be written about so simple a concept.

You can get a lot of fun out building a crystal set. It is the ideal starting point for a youngster as there are no batteries to buy and all the components are remarkably cheap.

This book, along with the others in the series, is highly recommended.

Heathkit. A Guide to the Amateur Radio Products

*By Chuck Penson WA7ZZE*
Published by Electric radio Press
248 pages 281 x 217mm Soft cover.
Price £21.95 from the *SWM* Bookstore.

This is the complete story of Heathkit written in a very readable manner. Heathkit somehow managed to overcome the major problem that seems to afflict a lot of kit manufacturers - it perfected the ideal instruction manual.

The bulk of the book is taken up by detailed descriptions of every model produced by the company, but the chapter on the history of the company makes compelling reading. Did you know, for instance, that the company was founded by Edward Heath around the turn of the century and that its first kit was an aeroplane in 1926? Or that, like so many hobby radio companies after the war, it got into the electronics business via war surplus equipment? It's all in this book.
MilAir

Our weeks of chaos at work and a recent family illness have meant that I am writing this month's column a week later than normal. As a consequence I have managed to catch some of the action on the first two days of Exercise Brilliant Foil. As a major part of the southern portion of the exercise was to be based along the Southwest Approaches, I decided to make the 225km round trip to spend some time listening up on Berry Head on the South side of Torbay and also a short time at Yeovilton.

Both St. Mawgan and Yeovilton were due to have aircraft based which were involved in the exercise, so far I have heard 11 and 25 Squadron Tornados at St. Mawgan but at the time of writing I have not confirmed any aircraft at Yeovilton. There were supposed to be Portuguese F-16's and A-7P's at Yeovilton but surprise, surprise!!! - They appear to have been cancelled.

The AWACS controlling events was 'MAGIC 90' who was working in close liaison with 'Crowbar', one of the primary frequencies in use was 378.675 (TAD 070), the AWACS was heard calling several stations including Neatishead and Staxton. The enemy forces were referred to as 'RAQIS' and involved attacks by RAF and French Air Force aircraft mainly operating from Landevaise in Northwest France. I observed a flight of six Mirage 2000s cross Berry Head on route to some range targets and then I presume to attack St. Mawgan. They then worked London Military on 275.475 before returning to France working French Military in the form of RAKI Radar on 249.85. MAGIC 90 also identified a flight of Entendards who were on route to intercept some Sea Harriers out of Yeovilton. The AWACS then moved frequencies to 374.85 (TAD 501) where several hostiles were intercepted on route to Pembrey and other ranges.

A full report on Brilliant Foil will appear in a future column, please send any reports of aircraft, intercepted on route to Pembrey and other ranges.

Airband Radios

When I read through my post, probably one of the most common questions I get asked by readers is what is the best radio to use for airband listening. This is always a difficult question to answer as all radios have different facilities that each individual feels are useful. Up to now I have elected not to comment or make any recommendations on any particular radio but as a letter has reached me from Maureen asking about a specific radio, i.e. the Signal R-525, I will endeavour to answer. Maureen wants to buy a new radio to replace her husband's ageing hand-held, a Yupiteru MVT-7000. She has heard good reports on the R-525 and wants to try to buy a second-hand one, consequently she asks for my comments on the radio.

To start with, it is a little awkward to use not having a numerical keypad for direct frequency input, but you soon get used to this. It only has 60 memory channels which can be a bit restrictive and the scan is quite slow compared with modern scanners - but if you want a radio that can pull in those elusive signals then this is the set for you. In my opinion, probably one of the most important considerations is the sensitivity of the radio, or in other words its ability to pull-in weak signals that cannot be heard on other sets. Even though it is over 10 years old, the R-525 can still compete on sensitivity with modern sets. I have compared a R-525 alongside an Icom R500 and the R500 only just out-performed the R-525 on the airbands. Not bad for a radio built in 1986 and about one fifth the cost of the R500!

If you think that your husband places excellent sensitivity above the need for hundreds of memory channels then he will not be disappointed with the R-525. It should be noted that the R-525 is now treated almost like a collector's item, they are uncommon on the second-hand market and are usually snapped up quite quickly. Despite its age you can expect to pay between £225 and £300 for a R-525 in good condition, also if you can wait, look out for one that has had the upper frequency coverage extended from 380 to 400MHz, listed in different books. Personally, I was always of the opinion that the callsign was 'Blackcat'. Three years ago I was working at Mildenhall, whilst we were out on the airfield a car pulled up next to us and from the insignia it was obvious that it was the 352 SOG commanders vehicle. Painted on the door of the vehicle was a black cat so I am assuming that is the callsign. Incidentally, one reader asks why Mildenhall and Lakenheath are featured so much in the column - The answer is simple, I get more letters about these two airfields than any others, if readers want to write to me about other airfields I will be glad to include their comments.

Mildenhall

Mervyn from Norfolk and Rob D, have both written to me regarding the same subject. They have both queried whether the callsign for the 352 Special Operations Group (SOG) at Mildenhall, is Blackcat Ops or Blackhat Ops. Rob has several airband publications and he says that both callsigns are
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**ACCESSORIES**

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Short Wave Magazine, July 1998
Propagation Forecasts

How to use the Propagation Charts.
The charts contain three plots. The lower dashed line represents the lowest usable frequency (LUF), or ALF (Absorption Limiting Frequency). The chances of success below this frequency are very slim.

The middle line indicates the optimum working frequency (OWF) with a 90% probability of success for the particular path and time.

Lastly, the upper dashed line, represents the maximum usable frequency (MUF) a 50% probability of success for the path and time.

To make use of the charts you must select the chart most closely located to the region containing the station that you wish to hear. By selecting the time chosen for listening on the horizontal axis, the best frequencies for listening can be determined by the values of the intersections of the plots against frequency.

Good luck and happy listening.

July 1998
Circuits to London
Propagation Extra

Ron Ham’s barometric pressure chart, taken at Storrington, W. Sussex, May 1998.

May 1998

May Data

10.7cm Flux
Eff. Sunspot No.
K Index
AP Index
-Log X-Ray

The 10.7cm solar radio flux is used as an indicator of the general level of solar activity.
The K and AP indices are measures of geomagnetic activity.
The K index ranges from zero (very quiet) to nine (severely disturbed).
K values of five or greater correspond to geomagnetic storm conditions that can relate to poor propagation conditions.
The AP index ranges from 0 to 400. An AP of 30 is the threshold for geomagnetic storm conditions.

Day of the Month
TEP Reception

Since last autumn, TEP (Trans-Equatorial Propagation) signals from south-east Asia have been encouraged from India by Lt. Col. Rana Roy. Now, via Dutch enthusiasts, we learn that a TEP path was established between Europe and Botswana last March with signals from Italy (IA) and Spain (E2) on the 14th and 15th respectively. Of greater importance was the reception of the Egyptian ERTU-2 900W Dumyat relay on the 28th, identified by Arabic text and the Egyptian flag. This is comforting news confirming the DXTV equipment has been working correctly!

The next Sporadic-E opening materialised on May 1st with a sustained late afternoon bullfight from Spain (TVE-1) on Channels E2 and E4.

When To Look

As you read this column, several ‘goodies’ should have already been logged via Sporadic-E propagation. If you have missed them, there is still plenty of time left.

Perhaps the best times to try are between 0500 and 0800UTC and from 1700 until 2000UTC for Middle East reception and late evening for Transatlantic reception. These are only approximate times and reception can occur outside these periods.

How much time is devoted to monitoring depends upon personal commitment and lifestyle. Dedicated enthusiasts have been known to plan their annual holiday around the traditionally ‘best’ DXing dates so as not to miss anything but usually a certain well-known law guarantees two weeks of blank screen!

Peter Barber (Coventry) is retired and monitoring begins before breakfast and ends at bedtime with each session lasting five to ten minutes with gaps of around 30-60 minutes initially, extending later in the day to around two hour gaps. If anything is heard on the scanner or seen on the TV, monitoring is continuous.

Remember, Sporadic-E openings can occur at anytime and without warning. Sometimes an opening may only affect Channel E3 and not others so it pays to check each channel frequently rather than waiting on one particular frequency.

Notch Filters

In most areas of the United Kingdom, Channel RI (49.75MHz) is virtually unusable due to the presence of baby alarms and other carriers operating around 49-50MHz. When strong, this interference may extend down to Channel E2 making this channel also difficult to DX.

In Italy, some cordless telephones are sold with a booster and external amplifier to cover distances of up to 5km, according to David Bocca Corsico of the Italian DX Group. Apparently, these telephones are illegal and other people can eavesdrop, although Channel RI may be attenuated somewhat. In practice, careful adjustment of the filter can reduce the interference effect on an RI picture, thus making it more watchable than without one fitted.

Simon Hockenhull (Bristol) has added such a filter in anticipation of the coming season and confirms that Channel E2 is now completely void of interference. Carefully orientating the antenna for minimum pick-up of local interference may also provide a solution.

Keep Writing!

Please send your DXTV and f.m. reception reports, news and information to arrive by the first of the month to: Garry Smith, 17 Collingham Gardens, Derby DE22 4FS.

Fig. 1: Spanish (TVE-1) news reporter seen via Sporadic-E.

Fig. 2: Egyptian ERTU-2 news opening graphics. The same opening sequence was seen in the UK via F2 propagation in 1991 from the 900W Channel E2 relay at Dumyat.

Fig. 3: 'Trois' (Netherlands) identification caption received earlier this year in Bristol by Stephen Mitchie.

DX Television

Months of Sporadic-E inactivity finally came to an end on April 18th with a demo minute display of RAI UNO on Channel A. The month had been generally inactive apart from noise-level Dutch NED-1 signals from Lopik on E4; this has been the only way to prove that the DXTV equipment has been working correctly!

The next Sporadic-E opening materialised on May 1st with a sustained late afternoon bullfight from Spain (TVE-1) on Channels E2 and E4.

Ghana: E2 Kisi, E3 Jaman, E4 Acre
Nigeria: E3 Sokoto, E4 Ibadan and E4 Kaduna
Spanish Equatorial Guinea: E2 Malabo
Zimbabwe: E2 Gweilo (may no longer be operational), E3 Bulawayo, E4 Harare
Kenya: E2 Timbavoa (may no longer be operational)

New Graphics

Central Television have introduced new continuity graphics. Instead of the circular symbol theme the new identification features the name CENTRAL in bland lettering on a coloured background, thus following in the style of Carlton (London area) who own the station.

The graphics are themed and seem to reflect the type of programme which follows. For instance, prior to Coronation Street the ‘N’ in CENTRAL depicts a smoking chimney.

Readers’ Letters

Martin Dale (Stockport) has successfully repaired his sliding rotor drive motor following storm damage. The stability of the support mast has been improved by routing it through a piece of waste pipe secured to the chimney stack. For v.h.f. DXing, a Band I dipole has been fixed to the rear of a redundant Band III antenna he discovered in his attic, thus saving mast space.

Some interesting information can be unearthed via the Internet as Tom Crane (Essex) recently discovered. It concerned the method by which Dutch and Belgian cable TV companies pick up terrestrial signals from the east coast of the UK for distribution via their cable networks. Apparently they use very large antennas, including a large satellite-type dish feeding a conventional Yagi. The idea being very high gain coupled with a very narrow beamwidth, much less than a Yagi exhibits.

Gigantic dishes are being used in Cyprus by local terrestrial and cable broadcasters to pick up ET-1 and ET-2 from Greece for local distribution. The square dishes are estimated to be about 50m across! They form part of a network.

Simon Hockenhull (Bristol) has added such a filter in anticipation of the coming season and confirms that Channel E2 is now completely void of interference. Carefully orientating the antenna for minimum pick-up of local interference may also provide a solution.
terrestrial TV network, or possibly microwave link, and are directed towards Rhodes, a distance of around 350km.

Spy cameras are part of everyday life in the United Kingdom and few public places are without them. L.J. Lewis (Romford) has heard that some shopping centre security cameras transmit to a central control and monitoring department using normal u.h.f. TV frequencies.

Has anyone accidentally discovered some of these transmissions while tuning through the u.h.f. band or do they use f.m. video or encryption for added security? Can anyone comment further on this topic?

**FM DXing**

During Sporadic-E activity, Continental stations can sometimes be received loud and clear using nothing more than a basic f.m. radio with a telescopic rod antenna. For serious DXing, a receiver with an accurate digital frequency readout is essential to enable stations to be correctly logged and hopefully separated from strong adjacent channels. Although expensive, RDS receivers are even more of a bonus as these display the name of the station being received.

External antenna is desirable for serious work, even if only a dipole. Multi-element arrays with eight or more elements are available for the real enthusiast although these might attract adverse comments from neighbours because of their size.

An external antenna is desirable for serious work, even if only a dipole. Multi-element arrays with eight or more elements are available for the real enthusiast although these might attract adverse comments from neighbours because of their size.

**Service Information**

**Lithuania:** CET has now been adopted which means that clocks will show UTC + 2 hours this summer. The TV6 (Moscow) relay in Vilnius on Channel R26 has changed from SECAM to PAL.

**Sweden:** Digital TV transmissions have now commenced from the following transmitters:- Stockholm E59, Linköping E42, Göteborg E40, Uppsala E40, Malmö E22, Norrköping E36, Västerås E33 and Hörby E22. Channels E60 to E69 are to be released for digital broadcasting in the near future.

**Belgium:** A 169 version of the Philips PM5644 test card is being aired via all VRT-1 transmitters.
Abbreviations

AIC Aeronautical Information Circular
a.m. amplitude modulation
CAA Civil Aviation Authority
GASIL General Aviation Safety Information Leaflet
kHz kilohertz
MHz megahertz
n.d.b. non-directional beacon
u.h.f. ultra high frequency
v.h.f. very high frequency
v.o.r. very high frequency omni-directional radio range

Radio Procedures

Although we think of air travel as fast, there are speed limits in certain types of airspace. When aircraft maintain separation by 'see-and-avoid' in visual conditions, speed must be restricted to give conflicting flights time to manoeuvre.

Another reason for speed limitation is to enable Air Traffic Control to position flights accurately, for example when lining up an arrival stream for approach to a runway. Speed also affects descent rate which, if incorrect, could cause the aircraft to crash into a tall obstacle.

When Air Traffic Control (ATC) doesn't need to coordinate aircraft at a particular speed, the pilot is told "No ATC Speed Restriction" and you now know why. Full details in AIC 35/1998.

Non-Radio Procedures

Outside controlled airspace there's no requirement for radio, as L. Moverley (London) has noticed. Pilots watch out for each other and give way according to the Rules of the Air, as detailed in the Aeronautical Information Publication, AIP (from the CAA, but your local flying club will have a copy). Or most teach-yourself-flying books in the local library will give some information.

The rules were originally developed from their seafaring equivalents, so pilots stay to the right of any straight-line feature (e.g. railway) that they are following, avoid oncoming aircraft by turning right, and give way to aircraft on their right. If the weather deteriorates below Visual Meteorological Conditions minima, a diversion to the nearest aerodrome is needed, or even a precautionary landing in a field.

Receiver Hardware

I hope to help K.M. (Nottingham) who, in the May 'MilAir,' asked about military antennas. Now, I don't know what they use on ground installations. The portable control caravan at previous Halton Airshows had separate antennas for v.h.f. and u.h.f. Not surprising, they might want to transmit (as opposed to just receive) on both channels simultaneously. I couldn't see what antennas were involved, they were hidden in radomes. The size and shape, though, was compatible with some simple vertical element.

At Duxford, I noticed discones on the control building roof. The frequency was no signal, this area being known as the cone of silence.

Jacques has heard the nautical term "being on the range" if a ship is correctly steered in a narrow passage by lining up shore beacons. I've tried this myself at the entry to a port with shoals to either side, but I'm not aware of this term in current British usage. Could it be, again, local to North America?

Arthur Oglesby (Harrogate) actually flew the Swallow that Chris illustrated for us in May. He reports the need for full left rudder on take-off, I don't advise trying this with cross-wind from the right! Could the engine's torque reaction have exacerbated this effect, Arthur?

As a general note, the photos give ambience to the column but aren't usually the subject of discussion in the text - unless a reader enquires specially as in this case.
So, will something like this help? I can’t predict the individual circumstances prevailing at any particular installation but it doesn’t seem likely that the airborne or vertical antennas will really be that much better than an Air-44 or a discone. Some antennas will underperform unless provided with the added complication of a ground-plane.

The best advice is to mount the antenna as high as possible, away from obstructions. Waterproof all external connections. Minimise the feeder run and only use good quality cable.

What will happen when the v.h.f. band is reduced to 8.33kHz channel spacing? At last, new equipment is starting to appear that will cope. Meanwhile, Neil Radley reports success with the AR5000 which he says will tune the new channels. Please note that I haven’t access to an AR5000 to try myself, but I suggest finding a busy a.m. frequency and then confirming that no signal is heard when 8.33kHz off-tone. The display might indicate 8.33kHz spacing but it’s important that the filters actually achieve adjacent channel separation.

Perhaps you can update us when you try this out, Neil? Please note: E-mails from the UK take longer to reach me than first-class post. Someone at the Editorial Offices has to print them out and post them to me!

Information Sources

If you would like a list of the ‘official’ vendors who supply aeronautical charts and frequency lists to the public by mail order, then request my Airband Factsheet. It’s free if you send a reply-paid, self-addressed envelope (to hold two A4 sheets) to the Editorial Offices at Broadstone (don’t send to me, I’ve not got a photocopier!).

Included is a chart of North Atlantic supersonic routes, the only chart available to enthusiasts (as far as I know after an extensive search). For example, referring back to ‘SSB Utilities’ in May, route SL4 is shown (including the acceleration point at which it starts).

Frequency & Operational News

Information via the CAA from G4SIL 2 of 1998 and Martin Sutton (AP amendments).

Aerodromes: Guernsey gets new Standard Terminal Arrival Route 1H, Jersey’s new ones are 1P, 10 & 1R. As queried in May, route SL4 is shown (including the acceleration point at which it starts).

Airways: Where A2 crosses the international boundary in mid-Channel, the reporting point is now called DEVAL. New route UY90 runs TUTON to SKESO and new route Y91/Y919 is via points TINAN, LUMEK and BUKLI (UY91 starts at KURAD); both route from west of Exeter out towards the Channel Islands. UW560 no longer has a section from Southampton to Brookm Park, this is replaced by UW561. UW550 has new point BOLTA to the east of Teeside. New route UW551 (just mentioned) runs KONIK, KESON (south of Norwich), Brookm Park, Southampton.

Beacons: The Stornoway n.d.b. SAY changes from 669.5 to 411kHz. Reporting points. New ones are ATWEL and FILET. I’ve got more details that I won’t bore you with here unless someone writes in asking for them.

The next three deadlines (for topical information) are July 7, August 10 and September 7. Replies always appear in this column and it is regretted that no direct correspondence is possible.

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73 from Dave G4KQH, Technical Manager.

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Many independent newsagents also stock copies of SWM and if you want to make sure you don’t miss out ask your newsagent to reserve a copy for you on a regular monthly basis.

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73 from Dave G4KQH, Technical Manager.
Satellite TV News

In my wilder days of youth as a s.w.l. - circa 1960, Fort Lamy, Chad was regarded as a good radio DX catch in the 5MHz band - it always evaded me! And now 38 years later - and now eligible for Saga membership - to check out Eutelsat II F4 @ 7°E on April 25th and see emerging out of the noise 'NEWSFORCE SNG4' on colour bars alternating with 'ALFATAH BROADCAST CHAD' (11.145GHz HQR)

The late at night signal - 2330UTC - continued for an hour interspersed with, I assume, the local TV channel output comprising a staged song and dance spectacle, based around a revolutionary theme which included the Red Flag. Anticipating trouble brewing in this South Saharan state, I checked the news and papers but nothing has developed requiring a digital SNG unit in the main town, N'Djamena.

Welcome at Sandown

Sandown, Isle of Wight, welcomes satellite dishes it seems as Jim Scofield has established his earth station just round the corner from Roy Carman. A 1m dish, dual universal l.n.b. into a Strong SRT 339 LTP analogue and Nokia 9600 digital receivers. He comments that American sports such as basketball, baseball, ice hockey, football are featured nightly on Intelsat K (21.5°W) but in digital - too many to mention.

One tragedy seems to unfolded however was the religious gathering in Mecca, Saudi Arabia, with hundreds of thousands in attendance, a stampede and many people were killed in the stampede. This was carried Westbound into the 'States via Intelsat K (11.558GHz Hor digital) April 9th at 1730UTC.

Edmund Spicer is currently sitting French exams at a Surrey University, the family home is near Littlehampton and has used the Telecom satellites (5°W in particular) as a source for everyday French language listening - he's watched Telecom 2B on his 5°W fixed dish since 1993 and hopes to sail through his examinations - we hope so too!

Apart from the several 'in the clear' TV channels Edmund enjoys the numerous French radio stations available on the different audio subcarriers. On the M6 TV channel (12.522GHz vert - 7.25MHz audio subcarrier) there's been carried for years an encrypted 24-hour radio channel - a metallic sound with data bursts at regular intervals and listed as 'Mood Music'!

More recently, this channel went into the clear with a varied selection of music styles, completely at variance with any other French radio station. Astra (19°E) French radio channels such as RFI, Cherie FM and RTL-2 are Edmund's favourites, check out Astra 12.129 and 12.207GHz vertical.

Jim Scofield (above) loves sports, so does Dean Rogers (SE2) - I've now put them in touch incidentally! Eutelsat 7°E again and Dean watched the 24th April live Formula-1 racing, San Marino feeding into ORF, Austria (11.095GHz hor; audio commentary + FX 6.60; fx 7.20MHz). The main international feed

Sporting types

The past few weeks has seen a predominance of sporting type feeds, not only the London Marathon but the Boston Marathon was carried on April 20th via Intelsat K reports Roy Carman (Sandown, loW). Another perhaps bizarre sport for Europe is American football which has seen a considerable rise in popularity in recent years. Roy caught them on April 18 via PAS-3R (43°W, 12.620GHz Ver) with Barcelona v. Amsterdam, the next day it was Scotland v. Germany (12.705GHz hor, PAS-3R).


Chad TV received at midnight via 7°E.

After a 10 death coach crash near Valencia, the news feeds via Intelsat K.

...were followed by a series of local station test cards.

NTSC test patterns ex USA...

...source unknown, all via Intelsat K @ 21.5°E.

Short Wave Magazine, July 1998
was carried elsewhere on 7°E in SIS but the "local" Australian feed was in clear PAL, the same race meeting was carried on ITV + SkySports, the "local" feed into ORF was continuous and uninterrupted. The ITV feed for this event was carried via PAS-3R @ 43°W.

Dean is keen on golf and is considering a digital receiver purchase to access the European Tour Golf feeds this Summer (feeds are SkySports; The Golf Channel + an international feed), can anyone advise likely birds and frequencies please, they have previously used Orion-1 @ 37.5°W.

For satellite digiters check out Intelsat 1°W 11.622GHz vertical, at S/R 4201 and FEC 2/3 there will be found "Service 1" on a Saturday afternoon featuring pony trap racing, a Scandinavian favoured sport. This hot tip from John Womersley (Bradford) who is an enthusiastic viewer of Scandinavian programming on both 1°W Intelsat and 5°E Sirius-2. He's compiled a teletext guide for Scandinavian and several German services, a hot satellite news service can be found on SAT EINS (Astra) on page 517 though in German, listings of other satellites are found on pages 675 through to 678.

Now I'm of Saga membership age I found an appropriate interview/conference feed on Intelsat K 11.680GHz horizontal, 4th May at 1800UTC, this concentrated on the problems of old age and organised by 'Age Concern'. And May 10th checking out PAS-3R and a quite dramatic funeral, police and armed military keeping the crowds at a distance, the coffin, cortege, a mega funeral in fact, uplinked by Telefonica out of Madrid at 1800. I wondered if this a Mafia occasion ?...funerals, Saga, Age Concern, I sound like an analogue geriatric sat-zapper...pass my hot water bottle please...

The Ariennespace logo as seen prior to the Hot Bird 4 launch.

Another Italian test card, this time the TEN-10 Sydney Master Control (MCR) via Intelsat K digital.

A news feed for TV3, Spain from Washington in digital.

**Intelsat K carried this Australian NINE NETWORK ident with their coverage of the Australian Grand Prix.**

The Ariennespace logo as seen prior to the Hot Bird 4 launch.

**The Australian**

**NINE NETWORK**

**APG 1998**

**Seen In digital!**

**The Geostationary Arc**

Attempts to control the recent rather cavalier regulation of the broadcasting spectrum in Greece has delayed the opening of the Multichoice Hellas/Nova pay-TV. The state broadcaster now has the say-so as to who opens what and they're delaying the potential rival Nova package until July at least when decisions may be forthcoming as to future digital aspirations. Nova reckons to open with an 18 channel package via 13°E Eutelsat with dedicated Greek services, two transponders have already been booked for the anticipated service.

Disney Channel has opened on Orbit 2 but Middle East digital package with dubbed programme services (24-hour) as a free standing service to existing subscribers. And a new MTV service opens into the Nordic region June 14th via Sirius-2 @ 5°E. With an MTV-Russia upcoming this will bring the regionalised services to six. And the lucky folk in Hungary will be able to view Nickelodean from the Autumn, either via satellite, cable or MMDS.

**Eutelsat are placing a new satellite - Europeast-1 - at the controversial 29°E slot to launch in the year 2000 offering Ku-band downlink services across Europe, into mid Asia and the Middle East. Their press release mentions their awareness of Astra at 28.2°E and Eutelsat's plan claims a peaceful co-existence with their near neighbour.**

**Intelsat" de-orbited" their long lived senior '502 bird on April 14th after over 17 years in orbit, it's final operational slot was at 40.5°W in C and Ku-band service. The original expectation was for an orbital service of seven years. Another old timer, Anik-C2, was terminated January 7th after 14 and a half years of orbital action from an expected life on launch of more than eight years. And new kid on the Brazilian block is Intelsat 708 now slotted at 50°W and offering a DTH (direct to home) service into Brazil running three x +50dBW transponders on boresight.**

This hot tip from Monte Eurasiasat 1 launch into a 42°E slot alongside Turksat-1C offering 32 Ku-band transponders for TV and telecomms. Aerospalitale will construct the new bird and retain a 49% partnership with Turk Telecom 51%. Main ground control will be at the existing Golbasi base, Turksat which will be upgraded in readiness for the launch. Eurasiasat as a company will be located at Monaco gaining tax advantages and avoiding EU regulatory guidelines.

**Digital Arts & Music**

SVT (Swedish TV) and the BBC are in talks over the formation of a digital arts/musical digital channel to partner ARTE. The service will be dubbed into Swedish. SVT plan a 24-hour news channel to open Spring '99 following the opening of two other digital channels 'Channel One' and 'Channel Two'. These will also parallel transmit in analogue. All of these new channels will be available in terrestrial digital at start-up end '99. An interesting specialist channel, the Russian NTV, is to be included as part of the French CanalSatellite digital package at £6 monthly subscription.

Attempts are being made to 'save' the failed to orbit AsiaSat-3 that didn't make orbit December 25th. The plan is to fire the satellite's station keeping rockets to make the craft leave it's incorrect Earth orbit, sail round the moon and on its return try to make it hit a geostationary Earth orbit. Mid May should see success - or failure! AsiaSat the company stress that the insurance payout for the lost AsiaSat-3 is sufficient to fund the replacement AsiaSat-3R now under construction for another launch attempt by the Russian Proton rocket ex Baiknour during March '99.

Good news for cheaper MPEG receivers next year with smaller, lower power consumption ICs carrying increased circuit packaging, reducing component counts and improving reliability, likely to be into quantity production Spring '99. Circuit alignment will now be reduced and new chips from Philips suggest working voltages can be down to 1.8V.

There is talk of a USA priced MPEG IRD down to $200 retail mid '99. Estimated cost of making a CAM operated MPEG IRD receiver is around $130 currently at the factory gate - I assume this is a Taiwan factory!
If you've got Internet access you'll be delighted to hear that I've finally updated my Web pages! All the links have been updated and I've included one or two new features. The first is the proper version of Gordon West's GWinProp for Windows. My original attempt to put this on the site failed because I uploaded the wrong version - sorry to those who were disappointed. All is okay now and the correct version has been on the site since the beginning of May. If you don't have a flashy PC you may be interested to know that I have also uploaded a DOS version of Gordon's propagation program. The function and output is very much the same as GWinProp but it will run happily on a much more modest PC. If you know of any other good propagation tools, please drop me a line with the details. Please don't E-mail a copy of the program without first asking if I want it. I know this sounds silly but otherwise my E-mail gets clogged-up with huge messages and it takes an age to check my mail.

Setting Standards

I've had my wrist slapped and quite rightly too! Anthony Stewart of Kingham whilst complimenting me on my general accuracy, pointed out that I was lapse in the names I had given a couple of transmission modes. In that column I had talked about a mode called FEC or SITOR-B. Of course the correct description of the mode is FEC SITOR-B. Now this may seem picky but it raises an important point when dealing with the more complex modes and is actually relevant for the simpler modes too. The problem is that, without clear standards, the newcomer can very easily get totally confused. A classic example is good old Morse Code or should that be c.w. or perhaps A1A or just Morse and is that with a capital letter or not! You see what I mean. To be precise, the system should be called Morse code using c.w. This is because the transmission code is Morse and the actual radio transmission mode is called Continuous Wave or c.w. This latter mode can also be described as A1A which is an international system for classifying modulation systems. This breaks down as follows: A (Double sideband) 1 (A single channel without the use of a modulating sub-carrier) A (Telegraphy for aural reception) - phew!

So you can see that the newcomer has to understand all these variations before he or she can start reading and using frequency lists with confidence. If the most basic modes get this complicated, how on earth can we cope with the more complex systems? It's actually quite easy as a number of experienced amateur and professional monitors have developed some useful standards. The best amateur source of this information is the various guides produced by Joerg Klingenfuss. Joerg has been in the business longer than he probably cares to remember and has to face-up to the problems of naming new modes as they have appeared. The problem is that many listeners (and professionals) continue to abbreviate the full mode description which then leads to that confusion starting to creep in.

To help put matters a little straighter, I'll run through a few of the more common modes with their standard description and a selection of the "slang" names you will often find being used. As I've already covered Morse code based systems, let's start with the basic Radio Teletype Systems. Incidentally, RTTY is a generic term used to describe just about all printed text radio transmission systems. ITA2 - International Telegraph Alphabet No2 - This is the basic standard RTTY system that's been used extensively by radio amateurs but in their case it's called AMTOR mode A. SITOR-A - Now this mode is obviously very closely related to SITOR-A. Despite the similarity of the name, the actual make-up of the signal is quite different. Whereas SITOR-A sends the data in bursts, SITOR-B sends a continuous stream of data. Why the difference? Well however, you will find this mode called plain RTTY, Baudot (after the man who invented the five digit code) and ITA2. You will also find this same transmission system used to convey other alphabets such as Cyrillic and Arabic. SITOR-A - This is the common chirp-chirp-signal that's been used extensively for ship-to-shore communications. You will also find a near identical mode used by radio amateurs but in their case it's called AMTOR mode A. SITOR-B - Now this mode is obviously very closely related to SITOR-A. Despite the similarity of the name, the actual make-up of the signal is quite different. Whereas SITOR-A sends the data in bursts, SITOR-B sends a continuous stream of data. Why the difference? Well SITOR-A is used when just two stations want to communicate, whereas SITOR-B is a broadcast mode for contacting many stations. So what about the slang names? Well SITOR-A can be ARQ, SITOR, AMTOR or CCIR476-4. This latter is not really slang as it's the number of the International CCIR recommendation that defines the code used for both SITOR-A and B. SITOR-B can be FEC, AMTOR or CCIR476-4. One of the most common naming errors is the general use of the terms ARQ and FEC. These stand for Automatic Repeat reQuest and Forward Error Correction respectively. You cannot use these terms to fully describe any mode as they are a general term for the overall mode type. Any mode that uses some form of automated repeat request could be generally described as an ARQ mode but this wouldn't necessarily be very helpful if you wanted to try and receive it. The same is true of FEC. A quick check through the Klingenfuss Radio Data Code Manual reveals around fourteen ARQ based modes and a further six that could be described as FEC. So you can see that the slang names can be very misleading. If you want to find out more about the various data modes and how they work then you need to get yourself a copy of the Klingenfuss Radio Data Code Manual which is available from the SWM Bookstore.

Grey Line Aid

One of the tricks used by most DXers is to make good use of the enhanced propagation that exists during the Equinox and during the Equinox and during the F2 layer. As you can imagine at any one time there is effectively a band of the Earth that rests in this twilight zone between day and night. However, you will find this mode called plain RTTY, Baudot (after the man who invented the five digit code) and ITA2. You will also find this same transmission system used to convey other alphabets such as Cyrillic and Arabic. SITOR-A - This is the common chirp-chirp-signal that's been used extensively for ship-to-shore communications. You will also find a near identical mode used by radio amateurs but in their case it's called AMTOR mode A. SITOR-B - Now this mode is obviously very closely related to SITOR-A. Despite the similarity of the name, the actual make-up of the signal is quite different. Whereas SITOR-A sends the data in bursts, SITOR-B sends a continuous stream of data. Why the difference? Well
night. This area is appropriately called the 'grey line'. The ionosphere undergoes a number of significant changes as the Earth rotates and one of the side benefits is that h.f. signals can travel over much greater distances than normal during this period.

Although the effect is present in the morning and evening you will usually find that the morning gives the best results. This is because all the local interference levels (TVs and home computers) are usually much reduced first thing in the morning. In order to make best use of this very handy phenomenon, you need to know what countries are affected by the 'grey line' at the same time as you. Because of the Earth’s movement around the Sun this will vary depending on the time of year. So what you really need is some form of prediction tool to help you.

The latest program to come my way is AZMAP by Paul Burton (AA6Z). This is a very simple Windows95 based program that produces a circular projection of the Earth’s surface which can be centred anywhere you care to specify. It was originally designed to help radio amateurs adjust their beam antennas by providing heading information. However, the main feature of interest to short wave listeners is the built-in grey line predictor.

This literally produces a grey line or band on the screen and provides an excellent illustration of the ‘grey line’ position. Another great feature is that it can be set to run in real-time so it will continue update the position of the line every few seconds. You also have the facility to manually enter any time of day you wish to see what it does to the ‘grey line’ position. All in all this is a very useful program and well worth a look. If you want to try a copy it can be found in ftp.funet.fi/pub/hainfinisc.azmap.zip.

If you know of any other interesting propagation or mapping programs please drop me a line with the details.

RadioRaft Tuning

First of all if you’ve not tried RadioRaft yet then please do so – it’s an excellent decoding package. If you find you like it, then please remember to register not only to get the full version but to support the author in his efforts to improve the quality of your hobby!

One of the common problems that face new RadioRaft users is getting to grips with the tuning system. In almost every other decoder the tuning aid is usually some sort of frequency meter that tells you when the data signal lines-up with the decoder’s tone and shift settings. However, RadioRaft uses a very different system and it’s this difference that causes the problems. If you’re really new you will find RadioRaft’s tuning display in the top right-hand corner of the main screen and it looks like this — SIGNAL —

Many new users expect this function as a frequency meter with the ideal setting being an even spread of the hyphens. Whilst it is correct to link lengthening of the lines with the best signal, the lines have a very specific function. The lines on the left are used to indicate the error rate of the signal and the hyphens meaning that this aspect of the signal is improving. Rather then being a precise measure of the error rate it really just shows how well the received signal matches the data patterns that would be expected from the selected mode. The lines on the right have a totally different role and are used to show the quality of the signal with more lines meaning better synchronisation.

So as you can see it’s not really surprising that some newcomers get a little confused if they try to use the RadioRaft system like a conventional tuning aid. So what about the tuning accuracy? One of the benefits of a software decoding systems such as that used by RadioRaft is that the program can, in effect, tune itself and decide the appropriate tuning point. The only problem is that you do need to get the signal roughly in tune. Now the best way to do this is by ear, but you can only do this if you have enough experience to know what a correctly tuned signal should sound like.

So where do you start? Well the first thing is to understand what we mean by a correctly tuned signal. In theory, if you can hear the two warbling tones of the data signal this should be good enough. In practice you can improve your chances of reliable decoding if you make sure the two tones are nicely placed in the audio passband of your receiver. If you take it that many h.f. data signals use a shift of 400Hz then the two tones will be spaced by 400Hz.

Next we need to look at the typical passband of a communications receiver. Although the full communications quality speech band runs from 300Hz to 3.4kHz, most communications receivers use a rather restricted range of around 300Hz to about 2.4kHz. As the frequency response of the receiver will roll-off towards the edges of this band we ideally need to find a safe place somewhere in the middle. As usual, there are some conventions or industry standards that we can use.

The most important single frequency is 1275Hz which is normally used for the lower of the two tones. Now this may seem an odd frequency to choose so let’s explain where it came from. Back in the early days of data comms over telephone lines, moderns were very simple, slow speed devices that relied on the use of just two tones to send data at around 300baud.

Much of the pioneering work was done by the Bell company of America and they had to face a similar problem of finding the best frequencies to use to send data down a ‘phone line. The final solution was to use a tone spacing of 200Hz with frequencies of 1275 and 1475Hz. It was this agreement that set the standard – hence the use of 1275Hz for radio. So getting back to the original problem. With a lower tone of 1275Hz the higher frequency must be this plus 400Hz i.e. 1675Hz. The next problem is how to get used to the sound of these two frequencies.

Another way to train your ear is to use the spectrum analyser facility built into Hamcomm to set the tuning. To do this start Hamcomm and go to the “Keying” menu and select ‘Var? (…..)’ set this to 400Hz. Now go to the ‘Mode’ menu and select ‘sPectrum’. You should than be presented with the display shown in Fig. 1. All that’s left is to tune-in a suitable RTTY signal so that the two humps representing the signal align with the two vertical bars on the tuning display. When you’ve done this the sound you will hear from your receiver is the sound you need to get to know. You will find that you can very soon learn the sound and then you should find that the quality of your data decoding improves significantly.

If this doesn’t crack the problem, then it could be worth trying some audio filtering. Let’s just explain why you may need this. Although software decoders such as that used by Hamcomm, JV Fax and RadioRaft are very versatile they can be adversely effected by any interfering signals that may be present along with the wanted data. The best way to get rid of the interference is to use some filtering to limit the band of frequencies to those required by the data signal. The best way to do this is with some good quality I.F. filtering in your receiver.

However, there are not too many receivers on the market that offer much flexibility in this area. The most popular solution therefore, is to use some external audio filtering. With the advances in digital technology you will find that DSP filters offer excellent results at a pretty good price. If you’re into the second-hand market or would prefer an analogue filter, keep a look-out for the excellent Datong FL2 and FL3 units. These are very good filters and are also easy to use.

I do however, offer a word of warning when using filters - please don’t ‘over-filter’ the signal. By this I mean don’t be tempted to narrow the bandwidth too much, or you will end up making the signal worse not better. The trick is to always keep the filter at least 10% wider that the required bandwidth - if in doubt back it off!
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Info in Orbit

The residential conference on weather satellites held in Newport by the Remote Imaging Group at the beginning of May was a great success - judging from my experiences and the feedback that I received. A separate report will appear in Short Wave Magazine.

NOAA-15 Launch...and Problems

The launch of the latest American WXSAT NOAA-15 provided a few surprises! My pre-launch enquiries of the NOAA operations team confirmed that the a.p.t. transmitter (which provides the 137MHz band signal) would be activated shortly after successful injection into orbit - as has been the case with previous NOAA WXSATs. The official post-launch operations schedule lists the timeline along which the various on-board systems are activated, tested and formally declared operational. As an example, the infra-red sensor sub-system is subjected to 'evacuation' prior to 'switch-on'. This allows out-gassing and minimises the subsequent precipitation of contaminating material when the cooler is switched on. This is the reason for the 15-days delay before infra-red imagery is obtained.

The launch was on schedule on 13 May and I received my first pass in Plymouth a few hours later - at 0840UTC on 14 May. It was immediately obvious that all was not well. I have a roof-mounted crossed-dipole feeding a low-loss matched cable into a PROscan receiver - and the signal on 137.50MHz was very low. It was then that I was reminded of the parable of the Emperor's new clothes - was it just me? I sent an E-mail to the WXSAT list concerning the weak signal, and it crossed with dozens of other mails reporting very weak signals - so it was not just me!

My first NOAA-15 picture shows lines (image data) missing where the signal strength simply dropped away for several seconds, and, on occasions, even minutes. Fig. 1. The following passes similarly provided very low signal strength. An extract of the NOAA daily report from 15 May is shown in Fig. 2 I have added a brief explanation where appropriate.

Latest tests: As at press deadline the NOAA operations team switched the WXSAT from 137.50 to 137.62MHz to check out the transponder; there appears to be no improvement.

NOAA-15 Pictures

On 15 May I obtained the marginal picture Fig. 3. Then images started arriving on disk from correspondents. Alan Jarvis sent me Fig. 4, his recording of a NOAA-15 pass received on 17 May.

Alan, Les Hamilton and I spent a considerable time discussing WXSAT matters at the RIG conference, and I was delighted to have such an opportunity to meet so many like-minded people.

Other WXSATs

METEOR 3-5 pictures unexpectedly improved in April. A close examination of earlier METEOR images always showed jitter, in which lines were marginally displaced sideways to varying extents. Meanwhile, NOAA-12 and 14 continued to behave nominally and the visible-light images - even from NOAA-12 which has an orbit near the terminator - have been of excellent quality.

Both OKEAN-4 (or 1-7) and SICH-1 have been heard transmitting on 137.40MHz. My own images were limited in quality by the low satellite elevation.

News From EUMETSAT

METEOSAT-6 was the prime geostationary European imaging WXSAT until METEOSAT-6 was successfully commissioned; this became the prime spacecraft from February 1997. On 14 January this year METEOSAT-6 was commanded to start drifting eastwards and was scheduled to arrive at its new slot at about 62°E (over the Indian ocean) for the 18-month long INDOEX project.

METEOSAT-6 and -7

Currently located at longitude 0° (over Greenwich) METEOSAT-6's position will be adjusted for the mission exchange with METEOSAT-7 (currently at longitude 10°E), expected to happen on 3 June. From that date M-6 becomes the backup WXSAT.

METEOSAT Year-2000 Tests

Simulated Year 2000 PDUS and WEFAX data will be provided in June and August; during these tests PDUS data will not be encrypted. EUMETSAT is to conduct this test in which WEFAX and PDUS
users can check whether their systems are at least, in principle, able to function correctly during the transition through the 1999 year-end. On 17 June, users taking part - that is, everyone who wishes to test their system (no formal application is required) will need to set their computer’s clock from 1125UTC to 2325UTC for day 365 1999. There will then be a set of transmissions of PDUS and WEFAX images until 1250UTC (actual real-time) when the test ends. More information is or will be available on the ADMIN slot transmitted on channel A2 from METEOSAT.

Those running the Windows98 operating system should check the manual carefully to ensure that this particular clock change will not compromise their system. Like many others, I have an official beta copy waiting to be installed on my backup computer for test purposes.

Satellite Receiving Stations - From Russia

For some time now we have been able to collect a transmission schedule for OKEAN 1-7 from the Scanex site on the Internet. This site is hosted by the Research & Development Centre, Scanex, based in Moscow, which also produces commercial hardware for receiving several imaging satellite systems. They currently produce systems for NOAA h.r.p.t. (ScanEX), RESURS (ScanER), a.p.t. satellites (Liana), METEOSAT and GOMS WEFAX (Liana-M), and GOMS primary digital format (Selena). The web URL is http://scanex.ss.msu.ru/

The ScanER personal ground station is designed for receiving data from the Resurs-01 series satellites which have spatial resolutions of 35 and 150m. These PC-based stations are designed for use at research and education institutions, environmental monitoring centres and everywhere where real-time satellite data are in use. One of the main goals of ScanER station design was to provide low-cost data acquisition systems. ScanER stations form a backbone in a scheme that the centre proposes to establish regional satellite data centres. The complete product includes a software suite for data processing, archiving and distribution.

The system includes the computer, a 1.6m antenna system and interface, together with the entire receiving system. Operator intervention is minimal. The price depends on the type of system required; as a guide, an educational standard system for receiving RESURS-01-3 costs about $115 000 US, or $145 000 US for the RESURS-01-4 satellite.

Interested parties can contact Scanex directly either by telephone:

Tel: +7(095) 939-5640, 246-2593, by E-mail scanex@scan.ss.msu.ru or by writing to Scanex 119021 Moscow, Lva Tolstogo st. 22/5

A full description of the features of this and other systems can be obtained from Scanex. I plan to provide occasional features on WXSAT hardware and systems from various sources in future editions. Features will include h.r.p.t. and PDUS systems.

Correspondence

At first glance, Fig. 8 might seen a little curious. It is actually a night-time ‘visible-light’ view of the eastern Mediterranean Sea as imaged by a DMSP satellite. The Defence Meteorological Satellite Programme is an American constellation and, thanks to Hank Brandli, a satellite meteorologist, I have received a number of pictures courtesy of the US Air Force Weather Agency (US AFWA), Hank helped to run the DMSP program between 1970-71, and then worked at Scott Air Force Base, and Kennedy Space Centre between 1971-76. Hank has continued to receive DMSP telemetry for the last 22 years. The DMSP satellites transmit unclassified but encrypted images on 2207MHz to sites world-wide.

Jack McEwen
GBHIK of Radcliffe, Greater Manchester, sent Fig. 9 - a picture from NOAA-14 received on 10 May. Jack makes the point that WXSAT pictures can be received on pretty basic equipment - he used a Uniden/Bearcat UBC3000XL scanning receiver fed from a 2m-band Slim Jim antenna. Jack uses a Pentium 166MMX computer running ‘WXSAT’. He adds that the picture is cropped but not enhanced.

Brian Powell recently upgraded his computer by adding a 200MHz CPU to help cope with the increasing workload (I also performed this upgrade - on Christmas Day); I hope Brian remembered to get a larger hard drive for the summer images. Brian has added artificial colour to the image.

Gordon in Grenada

Gordon Train is the software author who produced a satellite predictions program which runs on a computer of minimal specification. He obtained from Scanex. I plan to provide occasional features on WXSAT hardware and systems from various sources in future editions. Features will include h.r.p.t. and PDUS systems.

Gordon Train
G15345 of Grenada

Fig. 3: NOAA-15 0821UTC
15 May - the best section!

Fig. 4: NOAA-15 17 May from Alan Jarvis.

Fig. 5: METEOSAT-5 full-disc image during drift manoeuvre on 30 April courtesy EUMETSAT.

Fig. 6: Dish used for receiving RESURS satellite.

Fig. 7: RESURS-01-3 image May 1997 of ‘Oil drill polygons’ © published courtesy Scanex Centre. Original images show full resolution.

Fig. 8: ‘Visible-light’ view of the eastern Mediterranean Sea courtesy Scanex Centre.

Fig. 9: NOAA-14 image 10 May courtesy Brian Powell.
has also sent occasional images for inclusion in the column, so when he told me of his trip to Grenada in the West Indies I anticipated something unusual. It arrived in the form of a CD containing 75Mb of images and 173Mb of sound file versions of those images!

There are several images which I propose to include in later edition of the column.

**MIR Mortals**

Karl Hobson of Shipley noticed my regular reference to the well-known voice frequency of 143.635MHz for MIR (there are several others which are used for other forms of telemetry) and made a special effort to monitor it. From Karl’s letter, I assume that he does not yet have a satellite tracking program to produce a set of ‘listening times’, because Karl told me that he personally monitored the signal until, finally, at about 0430 (exact date and time not noted) he picked up the voices of the cosmonauts.

Having proved that he can receive the signals, he mounted a discone high above the chimney, and found a substantial increase in the total time for which he could hear the signal.

**Kepler Elements - MIR & Shuttle**

1) For a print-out of the latest WXSAT elements, MIR, and the Shuttle (if in orbit), send a stamped addressed envelope and secured 20p coin or separate, extra stamp. Transmission frequencies are given for operating satellites. This data originates from NASA. During Shuttle operations I send Kepler elements by return-of-post.

2) I also send monthly Kepler print-outs to many people. To join the list please send a ‘subscription’ of £1 (secured, plus four self-addressed, stamped envelopes) for four editions.

3) You can have the data as a computer disk file containing recent elements for the WXSATs, and a large file holding elements for thousands of satellites. A print-out is included, identifying NASA catalogue numbers for the WXSATs, Amateur Radio satellites, and others of general interest, ideal for automatic updating of your tracking software. Please enclose 50p with your PC-formatted disk and stamped envelope.

**The QFH project**

Two months back I referred to the construction of the quadrifilar helical antenna project notes kindly provided by Bill Sykes and Bob Cobey. Many requests followed this article and it is evident that several people are undertaking construction. I would be very interested to hear about the results when the various projects are completed. I am sure I speak for many when I say “Thank you” to Bill and Bob.

**Shuttle Schedule**

STS-88 Endeavour - First International Space Station component launch - Node-1 (Unity) is scheduled no earlier than 3 September.

STS-93 Columbia - no earlier than 3 December.

A comprehensive listing of all Shuttle flights and payloads, together with associated information is available from me as the Shuttle Pack. Please include a £1 and stamped s.a.e. for the A4 booklet.

**Frequencies**

NOAA-15 may use either 137.50MHz or 137.62MHz after tests (see above).

NOAA-14 transmits a.p.t. on 137.62MHz

NOAA-12 transmits a.p.t. on 137.50MHz

NOAs transmit beacon data on 137.77 or 136.77MHz

Meteor 3-5 and 2-2 use 137.85MHz

Okean-4 and Sich-1 use 137.40MHz

Meteosat-6 (geostationary) uses 1691 and 1694.5MHz for WEFAX

GOES-8 (western horizon) uses 1691MHz for WEFAX

MIR uses 143.625MHz for voice.
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SSB Utilities

One of the benefits of compiling this column is that I get to ask my own questions and get action want. For some time now I have been considering building-up a small h.f. listening station using a small receiver, a small a.t.u. and a simple wire antenna. I have in mind which receiver I will use (probably a small Sony), and the antenna will be a simple wire wound on some kind of spool, but I am having problems with a small a.t.u. The one that I use in my set-up at home is quite large, and is certainly not portable. So I thought that I would ask if anyone has any suggestions for a small a.t.u.

I am not looking for any fancy additional circuits in the a.t.u. (mine has a v.s.w.r. meter, which is not necessary), but it does need to be able to accept the signal via either low-impedance or high-impedance connections.

Has anyone any experience in collecting together such a small set-up, and can they offer any advice? Are there any recommendations for a ready-made a.t.u., or should I attempt to construct my own? Answers please!

EAMs

Kevin Wright writes to ask about a station that he heard reciting a long list of letters and numbers. The signals started with Croughton GHFS working station ‘Whizbang’, followed shortly after by a station with the callsign NEWSCAST. They arranged a 31 Alpha Conference, and NEWSCAST passed a long string of phonetic letters and numbers starting with ‘DI6TIE’. Kevin wants to know what was going on.

Well Kevin, these strings of letters and numbers are known as Emergency Action Messages (EAMs), and are not be confused with the similar sounding numbers stations as favoured by ENIGMA members. These EAMs are (allegedly) aimed at U.S. forces, usually (or once again, allegedly) the nuclear forces. I did a write-up about them a few years ago as a result of some information received from America. Kevin asks what the message meant, but I doubt very much whether anyone has ever succeeded in decoding these messages, so amateur efforts are really just limited to looking for patterns in the characters, transmission times, and details of who made the transmission.

Of the most significant patterns can be found in the pre-amble. EAMs can be broken down into a six-character pre-amble, followed by a variable length message. The message varies from less than 20 to those in the hundreds. The characters ones are quite short, usually only 20 characters. These codes probably represent the real message for the intended recipient, and it is thought that the recipient is identified by the six-character pre-amble. After careful monitoring for a few months, I noticed that these first two characters of the pre-amble are static for a few weeks, and then change to a different pair. There is no set length of time that these characters are fixed, but it does seem to vary between about 18 or 19 days, and about 30-or-so days.

If you have the time and patience, there is a simple method of checking these EAMs. Every time that you hear an EAM, make a note of the start-time, full message (both the pre-amble and the message), and also the transmitting station. These tach EAM is usually repeated twice, so check that you have noted everything correctly. When the EAM sequence is finished, count the numbers and letters in it, and make a note of that figure beside the EAM. If you do this over several days and weeks (this is where you need the patience!), you will see that certain EAMs start with the same first two characters - and after a while they will change to another pair. The trick is to identify exactly when they change from one set to another.

By recording the details of the transmission times and transmitting station, you will find that certain stations start their transmissions at certain times. You will also begin to notice other patterns, such as the way that some EAMs start with different numbers or letters and are much longer than regular EAMs. I'll leave you all to investigate these signals, and write-in with details of what you hear.

Questions

Kevin Wright gets a double mention this month, as his letter asking about EAMs also contained a logging of a Jago flight which deserves more explanation. He says that he heard a flight using the callsign Jago 12, but he could not find this callsign in any of his books. Well, here's the answer; it is a bit long-winded, but it does explain why this callsign is used.

Although the situation in the former republics of Yugoslavia has settled down in the past year, there are still plenty of military forces in the region prepared to go into action should the need arise. This is a UN operation, and the operation changes its name every few years as different UN peace accords become active. Initially, the operation was known as IFOR, and then became SFOR. Currently, it is known as Joint Guard.

Many aircraft involved in flights supported operations in the area use a three-letter callsign code to identify to everyone concerned that they are involved in UN and NATO air operations. Initially, the callsign codes were IF to IFZ, and then became SFA to SFZ. Now that the operation has been renamed as Joint Guard, the callsign ranges are JGA to JGZ. The final letter of the code is used to identify the country operating the flight, and the following have been noted... see table (right).

The Americans always like to make words out of their callsigns, and their code JGO is usually pronounced as Jago (or Jay-go) by the pilots.

So referring back to Kevin's original logging, the Jago 12 flight was a US flight. It is not really possible to work out exactly what kind of aircraft was involved in Kevin's logging, as the JGO callsigns are being used by all sorts of aircraft - VIP jets, transport aircraft, US Army aircraft and helicopters and even a belief contractor commercial airliners.

South America

A Mr. Sillifant from the West Midlands writes to ask about some signals that he heard in April. He seems to be a bit of a night-owl, as he was listening between midnight and 0100 (well past my bed-time!). He was tuning through the 5MHz aero band (5,460 - 5,730MHz) and came across two stations on frequencies that he had not heard before.

The first of these was Bombay ATC on 5.648MHz. I find this strange, as there is nothing listed for this frequency in any of the books that I have seen (CPL 10th Edition, Kingerfuss, Photavial). The second station was more interesting; on 5.595MHz he heard an unknown South American station which seemed to be conducting some kind of rescue service. Mr. Sillifant asks if anyone can provide any additional information on either of these stations. All that I can find in my books for the second frequency is the ATC area control centre (ACC) at Guayaquil in Ecuador, which in itself is a rare station to hear. I have never seen any loggings of this station before, has anyone else heard this station?

It could have been something like this

<table>
<thead>
<tr>
<th>CALLSIGNS</th>
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<td>JGA</td>
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<td>JGW</td>
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Shackware

I'll have been said again and again by the time I reach print but thanks, Dick, for your years as editor of SWM. Under your direction, SWM has been a consistently excellent magazine that previously I read avidly, and now happily contribute to. Here's to a long and enjoyable retirement (and many years at the radio sales! Congratulations to able assistant and now new editor, Kevin Nice.

(Occasional) Computer Cameo

Not actually quarterly any more but still, I hope, useful for those boot sale finds! This time it's the turn of the venerable ST, a 16-bit 68000-based machine that, in its day, was all set to take the computer world by storm. Back in the middle-80s when the PC was just beginning to make its presence felt as a viable home computer in the UK (courtesy of Amstrad), and the Macintosh offered a windows-and-mouse user interface that would cost you your first born to finance, Jack Tramiel, erstwhile founder/owner of Commodore, sold up, slipped quietly away and resurfaced six or so months later as the new owner of Atari Inc., bought from ailing parent company Warner Bros. for not many millions - and some of that as a loan from Warner itself. Tramiel renamed the company Atari Corp. and himself Uncle Jack, and set about single-handedly reviving the stagnant home computer industry by launching a competitor to the successful but expensive Apple Macintosh. Dubbed the 'Jackintosh' by media wags, the machine used the same 68000 processor and a 'windows' interface based on GEM from Digital Research. The result was a computer around 20 per cent faster than its Apple peer and with a bigger screen and potential for a colour as well as an 8Mb 3.5in disk drive for around £25 at the time I reach print but thanks, I'll have been said again by the time I reach print but thanks, Dick, for your years as editor of SWM. Under your direction, SWM has been a consistently excellent magazine that previously I read avidly, and now happily contribute to. Here's to a long and enjoyable retirement (and many years at the radio sales! Congratulations to able assistant and now new editor, Kevin Nice.

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A good machine in the shack then? Very. Last time I told you about the excellent FaxCode shareware program for the ST, courtesy of Dave Miller, and there's also Pictures From Space, another shareware offering which decodes APT from weather satellites. There are also any number of Morse tutors, data logs, electronics utilities and so on. What's more, underlying the ST's GEM interface is Digital Research's CP/M-86, an updated, multitasking version of the once hugely popular CP/M operating system. It's therefore easy to run a CP/M emulator on the ST and tap into the substantial quantity of CP/M radio-oriented software - check-out regular adverts in PDSL's cheap CP/M CD containing hundreds of Mb of CP/M software and quite a bit of 'shacksoft' too!

It's also possible to run PC emulators, though these usually provide only basic DOS operation and, given the ST's slightly cut-down RS-232 port, cannot be used with DOS-based PC radio software for the most part.

That said, user groups abound, peripherals are plentiful and... well, it's a fine machine and one which will be a very useful tool for s.w.l.s who need a cheap computer.

All My Own Work...

Those of you whose primary interest in listening is using what you hear to further your knowledge of things meteorological may be interested in some code I'm writing at the moment which offers real-time weather data logging to disk, as well as a host of weather-oriented conversion and calculation routines. As a self-confessed meteorological nut and avid consumer of radio and weather guides such as Philip C Mitchell's Weather Reports From Radio Sources, I'm fascinated by the depth of data that can be gleaned from the airwaves.

Naturally, there's some excellent weather-oriented software available in the PC world but try looking for stuff for other machines and suffice it to say, you'll look for a long time with little chance of success. That's what prompted me to write my own and the result is WxLOG.

When used with a simple home-brew interface and the Maplin temperature module (around £9), the software can continually monitor outdoor temperature, plotting mini graphs, and saving the results to disk in a variety of formats (including ASCII and the once popular DIF format used by VisiCalc and lookalikes). These disk logs can then be manipulated by your favourite spreadsheet, statistical analysis or graphing package to uncover interesting trends. Sampling frequency is anything from 1 second to 78 hours, and the software tracks highest and lowest temperatures too.

WxLOG also offers a variety of useful conversions and calculation: centigrade to Fahrenheit, inches to millibars and vice versa, estimated cloud base, humidity, dew point and the wind chill factor.

I plan to upgrade the software to offer continuous humidity, atmospheric pressure and possibly wind speed monitoring too just as soon as I can find suitable modules to attach to the computer. WxLOG is in beta at the moment but I'll let you know when it's completed, whereupon it will be available for the price of a 5.25in disk and s.a.e.

Until next time, good listening.

Mail Bag

When I began writing this column two and a bit years ago, I confessed I was a something of a freak where the Atari 8-bit was concerned. While they pale before today's mighty Intel-driven monsters, Ataris can still prove a useful tool in the shack, I've had to work hard to control my urge to mention them in every instalment but this month I've got a good excuse - two in fact - for a 'ShackWare' Atari special. The second is some self-penned software for listeners who are also amateur meteorologists, but first, let's read a few lines written by Robert Bosher of Sunderland.

"I noted in one of your first columns that you praised the old 8-bit computers from Atari so when I saw one at a boot sale I bought it for £4.50!" writes Robert. For that sum Robert also got a 1050 disk drive, a 1010 cassette recorder, a joystick and several games programs on tape. Now however, he's bored with the games and wants to know what he can do with the machine in his shack. "I've yet to incorporate the ST into my station, but I'd quite like to try my hand at decoding some of the easier data modes - is this computer suitable?" Perfectly - though within limits. By home-brewing a simple interface using a few pounds worth of components available from Maplin, you can decode FAX, and save the results to disk for later enhancement or printing. This is a two-colour only decode but as an introduction, the results are more than acceptable. There's also a very good home-brew c.w. interface that you can make and use to decode Morse transmissions on the fly. Both of these devices are suitable for beginners and require only an ability to use a soldering iron and a good basic electronics diagrams. I'll pass on the instructions and software to interested s.w.l.s who send me a s.a.e. and a 5.25in disk.
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